113th Congress, 2d Session – – – – – – – – – – – – House Document 113–133

WILLAMETTE RIVER FLOODPLAIN RESTORATION, OREGON: INTERGRATED FEASIBILITY REPORT/ENVIRONMENTAL ASSESSMENT

COMMUNICATION

FROM

THE ASSISTANT SECRETARY OF THE ARMY, CIVIL WORKS, THE DEPARTMENT OF DEFENSE

TRANSMITTING

THE INTEGRATED REPORT ON THE WILLAMETTE RIVER FLOODPLAIN RESTORATION PROJECT, LOWER COAST FORK AND THE MIDDLE FORK, OREGON

JULY 10, 2014.—Referred to the Committee on Transportation and Infrastructure and ordered to be printed

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DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON DC 20310-0108

MAY -2 2014

Honorable John Boehner
Speaker of the House
of Representatives
U.S. Capitol Building, Room H-232
Washington, D.C. 20515-0001

Dear Mr. Speaker:

In partial response to study resolutions adopted on November 15, 1961 by the Committee on Public Works of the United States Senate, and on September 8, 1988 by the House Committee on Public Works, the Secretary of the Army recommends authorization of the Willamette River Floodplain Restoration Project, Lower Coast Fork and the Middle Fork, Oregon. The proposal is described in the report of the Chief of Engineers, dated January 6, 2014, which includes other pertinent reports and comments. The Secretary of the Army plans to implement the project at the appropriate time, considering National priorities and the availability of funds. The report includes an Environmental Assessment and a Finding of No Significant Impact.

The recommended plan would restore aquatic habitat for Upper Willamette River Chinook salmon, bull trout, and Oregon chub, which are all listed as threatened under the Endangered Species Act, and would improve floodplain and aquatic habitats for a variety of fish and wildlife species. The project would increase scarce off-channel rearing and refuge habitat for fish species, forested riparian, emergent and shrub wetland habitats for sensitive amphibian species, and nesting, feeding and rearing habitat for migratory waterfowl and neotropical migrant birds using the internationally significant Western Flyway. The recommended plan would restore about 574 acres of floodplain habitat. The recommended plan is the locally preferred plan that is smaller in scale and lower in cost than the national ecosystem restoration plan.

The estimated project first cost of the recommended plan is $42,155,000. In accordance with the cost sharing provision of Section 103 of the Water Resources Development Act of 1986, as amended, the federal share of the first costs of the ecosystem restoration features would be about $27,401,000 (65 percent) and the non-federal share would be about $14,754,000 (35 percent).

Based on October 2013 price levels, a discount rate of 3.5-percent and a 50-year period of economic analysis, the total equivalent average annual costs of the project are estimated to be $1,947,000, including operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The cost of the recommended restoration features is justified by restoring 182 average annual habitat units on 574 acres of floodplain and aquatic habitats. The costs of lands, easements, rights-of-way, relocations, and dredged or excavated material disposal (LERRD) areas are estimated at $428,000, all of which is eligible for LERRD credit. The Nature Conservancy would be the non-federal sponsor responsible for OMRR&R of the project after construction, at an average annual cost estimated to be $150,000.

The Office of Management and Budget (OMB) advises that there is no objection to the submission of the report to Congress and concludes that the report recommendation is consistent with the policy and programs of the President. However, OMB also noted that should the Congress authorize this project for construction, it would need to compete with other proposed investments for funding in future budgets. A copy of OMB's letter, dated April 28, 2014, is enclosed. I am providing a copy of this transmittal and the OMB letter to the Subcommittee on Water Resources and Environment of the House Committee on Transportation and Infrastructure, and the Subcommittee on Energy and Water Development of the House Committee on Appropriations. I am also sending an identical letter to the President of the Senate.

Very truly yours,

Jo-ellen darcy

Jo-Ellen Darcy
Assistant Secretary of the Army
(Civil Works)

Enclosures

V

The Nature Conservancy
Protecting nature. Preserving life.

The Nature Conservancy in Oregon
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Portland, OR 97214-2537

tel 503 802-8100
fax 503 802-8199
nature.org/oregon

August 20, 2013

Colonel John W. Eisenhauer
U.S. Army Corps of Engineers, Portland District
P.O. Box 2946
Portland, Oregon 97208-2946

Dear Colonel Eisenhauer:

The Nature Conservancy in Oregon (the Conservancy) strongly supports the U.S. Army Corps of Engineers' (Corps) Willamette Floodplain Restoration Study, which recommends floodplain restoration projects along the Middle and Coast Forks of the Willamette River in Lane County, Oregon. The Middle/Coast Forks confluence area has been identified as an important location for ecosystem restoration. The project produces habitat for numerous fish and wildlife species including spring Chinook salmon, winter steelhead, Oregon chub, western pond turtle, Fender's blue butterfly and many others. As with much of the Willamette river corridor, there has been widespread loss of floodplain and off-channel habitat in this area due to channel simplification, revetments, and floodplain gravel mining. Restoration and reconnection of the river and floodplain is critical to ensuring the continued viability of all floodplain-dependent species.

The Conservancy has reviewed and participated in the development of the Final Integrated Feasibility Report and Environmental Assessment, dated June 2013, and the Conservancy expresses its support for the recommended plan (Plan 6), as described in the final report. The Conservancy commits to continuing its support of the project as it progresses into the design and implementation phases, and we intend to serve as the non-federal sponsor for project implementation.

The Conservancy owns and manages property in this area, and is also partnering with state and federal agencies and other landowners to protect and restore floodplain and river habitat. The scale of needed effort is large, and requires investment from everyone in the watershed, including the Corps and the Conservancy. We are pleased that the Corps has invested the time and effort in developing a restoration plan and identifying the highest priority projects that will result in the most cost-effective and greatest ecological benefits.

We look forward to partnering with the Corps to develop the Design Agreement and the Project Partnering Agreement (PPA) to ultimately construct the recommended plan. We understand that upon execution of the PPA, we would also be responsible for cost-sharing and providing all necessary lands, easements, and rights of way, as well as for the operation, maintenance, repair,

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rehabilitation, and replacement for the life of the project, as described in the final report. We are eager to move these projects to reality as soon as possible and appreciate the opportunity to work with the Corps to implement this critical and important project. Please call Dr. Leslie Bach (503-802-8146) if you have any questions.

Sincerely,

Russ Hoeflich
State Director and Vice President

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EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

April 28th 2014

The Honorable Jo-Ellen Darcy
Assistant Secretary of the Army (Civil Works)
108 Army Pentagon
Washington, DC 20310-0108

Dear Ms. Darcy:

As required by Executive Order 12322, the Office of Management and Budget (OMB) has reviewed a November, 2013 Army Corps of Engineers (Corps) feasibility study of the Willamette River Floodplain Restoration Project, Lower Coast Fork and the Middle Fork, Oregon, with a first cost of $42.155 million (October 2013 prices).

The Office of Management and Budget does not object to you submitting this report to Congress. When you do so, please advise the Congress that the project is consistent with the policy and programs of the President. In addition, please advise the Congress that should Congress authorize this project for construction, the project would need to compete with other proposed investments for funding in future budgets.

Sincerely,

John Pasquantino
Deputy Associate Director
Energy, Science, and Water

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Willamette River Floodplain Ecosystem Restoration Study – Oregon

Report Synopsis – December 3, 2013
Prepared by the Portland District Corps of Engineer

1 STAGE OF PLANNING PROCESS

This is a feasibility study that was conducted under the traditional planning process. The Feasibility Scoping Meeting was conducted on 17 November 2009, Alternative Formulation Briefing on 24 October 2012, and Civil Works Review Board on 18 September 2013. The Recommended Plan is the Locally Preferred Plan and is less than the NER plan.

2 STUDY AUTHORITY

The feasibility report was prepared as an interim response to the following study authorities:

(1) Senate Committee on Public Works resolution for the Willamette River Basin Comprehensive Study, adopted November 15, 1961 (see attachment 1), authorized the Chief of Engineers to determine:

> *"...whether any modification of the existing project is advisable at the present time, with particular reference to providing additional improvements for flood control, navigation, hydroelectric power development, and other purposes, coordinated with related land resources, on the Willamette River and Tributaries, Oregon."*

(2) House Committee on Public Works resolution for the Willamette Basin Review Study, adopted September 8, 1988 (see attachment 2), authorized the Chief of Engineers to determine:

> *"...whether modifications to the existing projects are warranted and determine the need for further improvements within the Willamette River Basin (the Basin) in the interest of water resources improvements.""*

The Section 905(b) report was completed in 1999. This report evaluated floodplain restoration opportunities in the Willamette River basin and had the following recommendations:

> *" 9.0 RECOMMENDATIONS - This Section 905(b) (WRDA 86) Analysis report be approved as a basis for developing the Project Study Plan (PSP), finalizing the Feasibility Cost Sharing Agreement (FCSA) with the State of Oregon, and continuing into the feasibility phase for the Willamette River Floodplain Restoration Study. There is both need and support for this study to address flooding and floodplain restoration issues in the Willamette River Basin. The Willamette River Floodplain Restoration Study is consistent with Army and budgetary policies.*

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> *The first phase feasibility study would result in a comprehensive, Basin-wide framework for integrated river management and floodplain restoration. This phase is currently estimated to cost about $2.5 million and is expected to be completed (Division Engineer's Public Notice) within 24 months of receipt of sponsor and Federal funds. Subsequent phases would focus on specific floodplain problems and restoration opportunities on a site-specific, sub-reach or sub-basin level, based on criteria and priorities established in Phase I. The initial PSP and FCSA will provide a detailed scope of work and sponsorship agreements for the first phase only. Subsequent phases will be addressed either through modification and amendment of the initial PSP/FCSA, or through development of new agreements with different local sponsors.*

The Section 905(b) report was approved on 18 June 1999 for proceeding into the feasibility phase.

2.1 LOCATION OF THE STUDY AREA/ CONGRESSIONAL DISTRICT

The project is located in Lane County, Oregon. The Congressional District is #4, Oregon. The study area is shown in Figure 1.

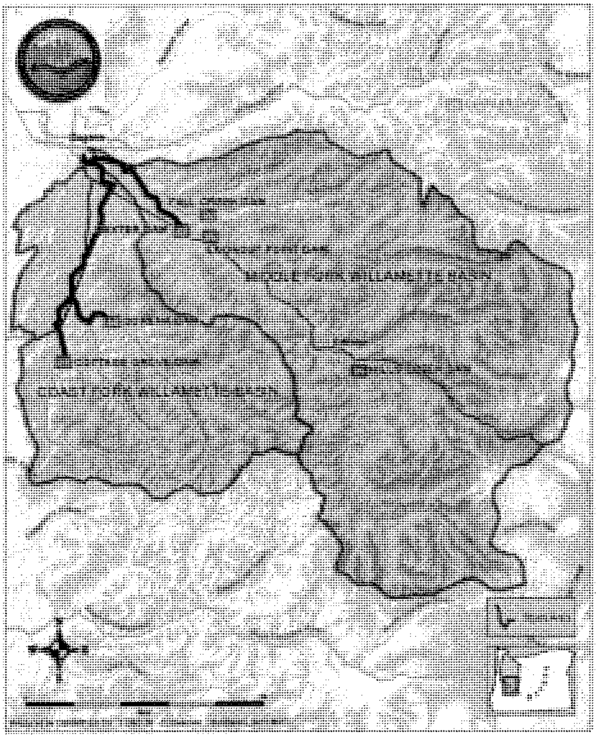


Figure 1 - Study Location Map

X

3 SPONSOR

The sponsor for the Feasibility Study was the Mid-Willamette Council of Governments, while the sponsor for implementation is The Nature Conservancy.

4 PROBLEMS AND OPPORTUNITIES

This study is one component of broader actions being contemplated by the State of Oregon and other stakeholders in the watershed. The Willamette Subbasin Plan (WRI 2004) and the Upper Willamette Chinook and Steelhead Recovery Plan (ODFW 2011) provide watershed-scale restoration considerations that emphasize a holistic, multidisciplinary approach to evaluating and restoring ecosystem function and structure. The concepts of ecosystem function and structure are closely intertwined and include abiotic and biotic elements and processes. This philosophy emphasizes the need for improving or re-establishing both the structural components and the functions of the riverine ecosystem to restore the conditions necessary to create and maintain habitat benefiting a range of species in dynamic environments. Table 1 identifies the major problems in the basin (as derived from an analysis of the factors that limit fish and wildlife survival and productivity in the basin; WRI 2004) that have caused a loss of habitats and the types of opportunities that could address those problems. The opportunities were identified in a series of workshops with project stakeholders.

Table 1. Restoration Problems and Opportunities

Ecosystem Problems	Opportunities
Loss of Natural Floodplain Processes	
Lack of Floodplain Connections and Storage	- Remove or setback levees and revetments - Remove fill or structures in floodplain - Reconnect side-channels and oxbows - Restore floodplain wetlands and storage areas - Reconfigure/restore gravel ponds for storage and habitat
Lack of Natural Sediment Erosion/Deposition	- Remove or setback levees and revetments - Mimic high velocity flows to promote natural scouring - Transport gravel from above the dams - Add in-stream structures (wood, etc.) to promote localized scour and deposition
Loss of Habitat Quantity and Quality	
Channelization / Loss of Channel Complexity	- Reconnect side-channels and oxbows - Add in-stream structures (wood, etc.) - Restore riparian zone
Lack of Large Woody Debris & Sediment	- Replace or retrofit rock revetments with LW structures and bioengineering - Place wood in the rivers - Restore riparian areas to provide source for recruitment of wood in rivers - Transport wood and sediment from above the dams

Table 1. (Continued) Restoration Problems and Opportunities

Loss of Habitat Quantity and Quality	
Invasive Exotic Plant & Animal Species (Aquatic & Terrestrial)	- Remove non-native plants and replant with native species - Restore natural cold-water habitats - Restore seasonality of off-channel habitats to discourage non-native species
Fish Passage Barriers	- Remove fish blocking culverts - Allow overbank flows to promote groundwater recharge to increase low flows in summer
Loss of Floodplain and Riparian Vegetation Communities	- Restore riparian zone with native species - Remove revetments - Reconnect off-channel habitats - Remove non-native plants and replant with native species - Fencing and alternative water supplies for livestock

5 Planning Goal and Objectives

The goal of this project is to restore natural floodplain ecosystem functions and conditions to the Coast and Middle Fork Sub-basins. The study goals and planning objects are listed below in Table 2.

Table 2. Goals and Objectives

Goal/Objective Statement		Issues/Constraints
Coast and Middle Fork Floodplain Restoration Goals and Objectives		
Restoration Goal	Restore natural floodplain ecosystem function and condition to the Coast and Middle Fork Subbasins	No increase in economic flood or erosion damages
Restoration Objective 1	Increase channel complexity and diversity	No increase in economic flood or erosion damages; protect private land Consider impact on recreation
Restoration Objective 2	Restore connectivity of river to floodplain habitats	Locate willing landowners to acquire lands or easements Maintain critical infrastructure
Restoration Objective 3	Restore native floodplain habitats, including cottonwood gallery forests, riparian and wet prairie habitats	Avoid adversely affecting sensitive fish and wildlife species (i.e., Oregon chub)

6 Planning Constraints

Constraints were developed to encompass the physical and policy/programmatic planning constraints. The following bulleted list defines the range of constraints on aquatic ecosystem restoration in the study area.

- Proposed restoration actions must not increase flood water surface elevations or flood damages.
- Proposed restoration actions must not degrade water quality conditions.
- The recommended plan must have willing landowner participation; condemnation will not be utilized.
- Dam Operations
    - The design of restoration measures must account for the current and future changes to dam operations on both the Coast and Middle Forks and be designed to function with these potential changes.
    - This study will not include changes to dam operations, as changes are being evaluated separately as part of the Sustainable Rivers Project (SRP) that seeks to modify dam releases within normal operations throughout the Willamette basin to provide environmental and habitat benefits. Some of the actions to date have included providing environmental flows on the Middle Fork Willamette River during rainfall or other runoff events to mimic more naturally occurring peaks, while still meeting flood risk management requirements. These flows will support the on-the-ground floodplain restoration actions by providing flows that will inundate the newly-connected habitats at the project sites. In addition, the environmental flows are expected to generate geomorphic changes such as gravel/sediment movement in the river, which will support formation of habitat features.
- Costs
    - The local sponsor has requested that the overall total project cost of the recommended restoration plan be limited to $40-50 million, to limit their cost share to approximately $15-20 million.
- Construction
    - Construction will need to occur during the designated in-water work windows for each subbasin.
- The formulation of alternatives must avoid adverse impacts to cultural resources. If avoidance is not feasible, then adverse impacts to cultural resources must be minimized. Unavoidable adverse impacts to cultural resources must be mitigated.
- The formulation of alternatives should avoid areas that are either known or suspected to be contaminated and/or contain hazardous, toxic, and radiological waste.
- The project must adhere to Corps Environmental Operating Principles and be environmentally, economically, and socially sustainable to the greatest extent practicable.

7 Alternatives Considered

A wide variety of management measures were developed that would address one or more of the planning objectives. These measures were then evaluated and screened. Alternative plans were then developed which comprised one or more of the management measures.

7.1 Management Measures Analysis

A total of 43 conceptual alternative site plans were developed following the field reconnaissance, with one to three scales of restoration proposed at each site. Sites are identified and coded by the river reach number and then in alphabetical order from downstream to upstream (for example, site C1A is located in Reach C1 and is the furthest downstream site considered in that reach).

Each of the conceptual alternatives and scales was evaluated for its potential habitat benefit and scored using a multi-species Habitat Evaluation Procedure (HEP) type model using habitat suitability indices developed for a species or guild native to the study area and of interest due to their use of floodplain aquatic and riparian habitats. The species included in the model are: 1) western pond turtle; 2) Oregon chub; 3) beaver; 4) wood duck; 5) yellow warbler (highly riparian associated); 6) native amphibians (red-legged frog, Pacific tree frog, rough-skinned newt); 7) native salmonids (Chinook, steelhead, cutthroat); and 8) American kestrel (uses grasslands/agricultural lands). The model was reviewed and approved by USACEHQ in July 2013. Habitat benefit scores are reported as Habitat Units (HUs). Preliminary cost estimates were developed for each conceptual alternative and scale. The costs and habitat benefits are then calculated as average annual costs and average annual habitat units (AAHUs) that were then used to conduct a Cost Effectiveness and Incremental Cost Analysis (CE/ICA). An initial run was done of the CE/ICA to get a sense of the top ranked project sites and alternatives. Following this initial evaluation, the project sponsors set up meetings or conducted other outreach to both public and private landowners to determine the level of interest in continuing forward with each project site.

7.2 Final Array of Alternative Plans

Following the outreach meetings conducted with landowners, the PDT revised the list of alternatives down to 37 alternatives sites with one to three scales of restoration at each site. The alternatives along with the preliminary costs and benefits were evaluated using CE/ICA.

8 Plan Comparison

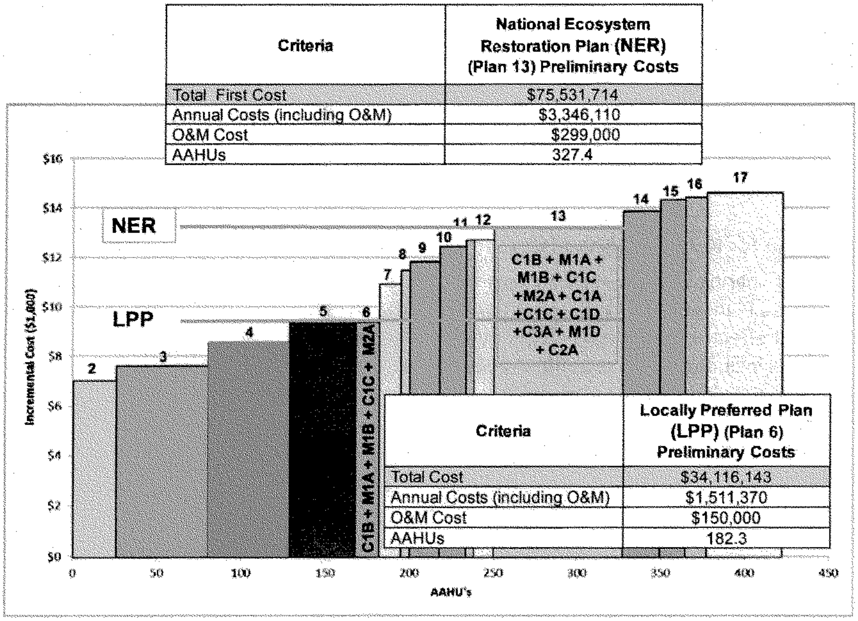
The CE/ICA is conducted to evaluate the relative effectiveness and efficiency of alternative restoration measures at addressing environmental objectives of the project. The analyses provide a framework for comparing the differences in output across alternative measures and the associated changes in cost. The analyses involve deriving all possible combinations of the alternatives and then comparing the cost and output levels associated with each combination. Once all combinations were derived and their cost and output estimates calculated, cost-effectiveness analysis was performed in the following two steps:

- Identify any measures that provide the same output at greater cost than other combinations and screen from further analysis
- Identify any measures that provide less output at the same or greater cost as other combinations and screen from further analysis

8.1 Environmental Outputs of the Plans

Following the identification of cost-effective combinations, an incremental cost analysis was conducted on the cost-effective set for the Coast and Middle Forks, each separately. This incremental cost analysis compares the rate of increase in cost and the rate of increase in output between the cost effective plans providing the least output to all other cost effective plans producing more output. The larger plan that provides the greatest increase in output for the least increase in cost is identified as the "best buy." This best buy is then compared to all larger cost effective plans in a reiteration of the same analytical process to identify the "next best buy." This process is repeated until no larger plans remain. The result is an array of "best-buy" plans that are the most efficient production schedule for the desired environmental outputs. The results from the separate runs for each of the Forks were then combined into the final CE/ICA analysis. Figure 2, shows the resulting best buy plans.

Figure 2. CE/ICA of Best Buy Plans



Criteria	National Ecosystem Restoration Plan (NER) (Plan 13) Preliminary Costs
Total First Cost	$75,531,714
Annual Costs (including O&M)	$3,346,110
O&M Cost	$299,000
AAHUs	327.4

Criteria	Locally Preferred Plan (LPP) (Plan 6) Preliminary Costs
Total Cost	$34,116,143
Annual Costs (including O&M)	$1,511,370
O&M Cost	$150,000
AAHUs	182.3

9 PROJECT IMPACTS

A number of meetings and workshops were held with the stakeholders to identify potential restoration measures and potential restoration sites and then to evaluate the alternatives and recommended plan. Key considerations and issues raised by the stakeholders included the need to obtain bathymetric data on the gravel mined ponds and to conduct fish surveys to identify if native fish are present (particularly threatened and endangered species); important to remove or control invasive species; specific recommendations for particular sites; consider backwater connections to former gravel ponds and side channels to reduce risk of channel avulsion; consider bank lowering; avoid impacts to existing high quality habitats (i.e. forested areas); and the removal of some potential sites from consideration due to other actions currently underway on those sites. The stakeholders are supportive of the project and its objectives and the recommended plan

10 PLAN SELECTION

10.1 Rationale for Designation of the NER Plan

Federal policy requires that the feasibility study must identify the plan that maximizes the potential habitat outputs at an incrementally justifies cost. That plan, the "NER plan," must be recommended for implementation unless there are overriding reasons for recommending another plan.

The NER plan was determined by looking at the AAHU for each alternative. Plan 13 was determined to be the NER plan as it maximized the potential habitat output at an incrementally justified cost.

10.2 Rationale for Recommended Plan

Due to the cost-sharing limitations of the non-Federal sponsor, Plan 6 was selected as the Locally Preferred Plan (LPP) and the recommended plan. The recommended plan is a reduction in scope, is cost effective, and meets all the objectives of the study. Table 3 shows the alternative sites included in the recommended plan.

10.3 Description of the Recommended Plan

Plan 6, the LPP and the recommended plan includes three sites on the Middle Fork and two sites on the Coast Fork. It provides 574 acres of floodplain restoration. Table 3 shows the alternative sites included in the recommended plan.

Table 3. Alternatives Included in the Recommended Plan (Plan 6)

Project ID	Landownership	Acres	Cumulative AAHUs
C1B	Lane County/ OR State Parks	86	26.1
M1A	The Nature Conservancy	147	80.7
M1B	The Nature Conservancy	170	128.8
C1C	The Nature Conservancy	114	168.1
M2A	The Nature Conservancy	68	182.3

10.4 Environmental Compliance

The integrated Feasibility Report and Environmental Assessment has been completed to achieve National Environmental Policy Act (NEPA) compliance for the recommended plan. A Finding of No Significant Impact (FONSI) has been prepared to document the findings of the NEPA evaluation of effects. The Corps has coordinated with the USFWS under the Fish and Wildlife Coordination Act and their recommendations have been received and considered. The Corps has consulted with the USFWS and NMFS under Section 7 of the Endangered Species Act (ESA) and Biological Opinions have been received with documentation that the recommended plan will not jeopardize the existence of any proposed or listed species. The Biological Opinions included a number of conservation measures that will be implemented during construction to further avoid and minimize any potential effects to proposed or listed species. The Corps has consulted with NMFS under the Magnuson-Stevens Fishery Conservation and Management Act and has received concurrence from NMFS that includes conservation measures to be implemented during construction. The Corps has determined that the recommended plan is consistent with Nationwide Permit #27 under Section 404 of the Clean Water Act and the Oregon Water Quality Certification is pre-approved for projects that are appropriate for implementation under Nationwide Permit #27. The Corps has coordinated with the State Historic Preservation Office (SHPO) and appropriate tribes under Section 106 of the National Historic Preservation Act. The SHPO has concurred with the area of potential effects and further coordination will occur during the design phase to ensure no effects to Historic Register eligible properties. The Corps will be in compliance with other relevant Federal laws and Executive Orders.

The State of Oregon submitted a 26 November 2013 statement indicating support of the project.

11 PEER REVIEW

District Quality Control (DQC) is a continual process. Products were DQC'd when a critical point was reached. Continual Quality Assurance (QA) was provided by Northwestern Division. The ATR, Independent External Peer Review (IEPR), Office of Water Project Review (OWPR), and Public review were held concurrently between March and June 2013. Comments from all of the reviews have been resolved or have a path toward resolution. Table 4 lists the dates for major reviews and certifications.

Table 4. Certifications and Review.

Certifications/Reviews Name	Date Signed
Final ATR	5 July 2013
Final IEPR Submittal	27 June 2013
Final IEPR HQ Approval	Pending
Cost Engineering DX	3 July 2013
Model Approval	2 July 2013
Final Legal	8 July 2013

12 PROJECT COSTS AND TIMELINE

12.1 Costs and Benefits

The annualized costs, average annual habitat units (AAHU), and annual costs/AAHU are shown in Table 5. These values are based on October 2013 price levels, an interest rate of 3.5 percent, a 50-year period of analysis, and a 4-year construction period.

Table 5: First Cost, Annual Cost, O&M Cost, AAHU and Annual Costs/AAHU for the Preliminary NER Plan and LPP Plan and the Updated Recommended Plan based on October 2013 price levels.

Criteria	National Ecosystem Restoration Plan (Plan 13) Preliminary Costs	Locally Preferred Plan (LPP) (Plan 6) Preliminary Costs	Updated Recommended Plan (LPP) Costs
Total First Cost	**$75,531,714**	**$34,116,143**	**$42,155,000**
Annual Cost	**$3,346,110**	**$1,511,370**	**$1,797,000**
O&M Cost	**$299,000**	**$150,000**	**$150,000**
AAHUs	**327.4**	**182.3**	**182.3**
Annual Cost/AAHU	**$10,220.25**	**$8,290.56**	**$9,857.38**

The Recommended Plan is the Locally Preferred Plan and is a reduction in scope and cost from the NER plan, incrementally justified, a best buy plan, and meets the study objectives.

The fully funded total project cost at October 2013 price levels is estimated to be $42,155,000 with a sponsor contribution of $14,754,000 and a federal contribution of $27,401,000. The estimated cost of Lands, Easements, Rights-of-way, Relocations and Disposal areas (LERRD) is $428,000. The sponsor's required cash contribution is $14,326,000. The sponsor is responsible for 100 percent of the OMRR&R costs. Table 6 shows the cost for each of the five sites in the recommended plan, total first cost, annualized cost, benefits, and OMMR&R. At October 2013 price levels the LPP will restore 574 acres at a cost of $73,400/acre.

Table 6. Comparison of the First Cost, Interest during Construction, and annual costs, benefits and OMMR&R (Oct 2013 Price Level)

Investment Costs	
C1B	$6,194,000
C1C	$7,953,000
M1A	$8,240,000
M1B	$16,712,000
M2A	$3,056,000
Total First Cost	$42,155,000
Interest During Construction[2]	$209,323
Total	$42,364,323
Average Annual Costs and Benefits	
Total Annual Costs	$1,797,000
OMRR&R	$150,000
Annual Benefits (AAHU)	182.3

12.2 Timeline

Assuming full funding, the project will be fully constructed in the year 2018 as displayed in Table 7: Project Schedule

Table 7: Project Schedule

Task	Date
Release Draft Report	March 2013
Concurrent Reviews	March – June 1, 2013
Civil Works Review Board	18 September 2013
State and Agency Review	September – October 2013
Chief's Report	December 2013
Water Resources Development Act	2014
Planning, Engineering and Design	2014-2015
Construction	2014-2018

5 Enclosures

1. Report of the Chief of Engineers, Jan 06, 2014
2. The Nature Conservancy Letter, Aug 20, 2013
3. OMB Letter, Apr 28, 2014
4. Final Report - Willamette River Floodplain Restoration Project, Lower Coast Fork and the Middle Fork, Oregon, November 2013 (DVD)
5. Summary for the Office of the Parliamentarian

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

REPLY TO
ATTENTION OF

DAEN

- 6 JAN 2014

SUBJECT: Willamette River Floodplain Restoration Project, Lower Coast Fork and Middle Fork, Oregon.

THE SECRETARY OF THE ARMY

1. I submit, for transmission to Congress, my report on the study of ecosystem restoration along the Willamette River, Lower Coast and Middle Forks near Eugene, Oregon. It is accompanied by the reports of the district and the division engineers. This report is an interim response to a resolution by the Committee on Public Works of the United States Senate, adopted November 15, 1961. This resolution authorized the Chief of Engineers to determine "whether any modification of the existing project is advisable at the present time, with particular reference to providing additional improvements for flood control, navigation, hydroelectric power development, and other purposes, coordinated with related land resources, on the Willamette River and Tributaries, Oregon." It is further an interim response to a resolution by the Committee on Public Works of the United States House of Representatives, adopted September 8, 1988. This resolution authorized the Chief of Engineers to determine "whether modifications to the existing projects are warranted and determine the need for further improvements within the Willamette River Basin (the Basin) in the interest of water resources improvements." Preconstruction engineering and design activities for the Willamette River Floodplain Restoration project will continue under the authority provided by the resolutions cited above.

2. The reporting officers recommend authorizing a plan to restore floodplain ecosystem functions by reconnecting floodplain habitats to the rivers and improving fish and wildlife habitats in the vicinity of Eugene, Oregon. The recommended plan for ecosystem restoration includes restoration at five project sites along the lower two miles of both the Coast Fork and Middle Fork of Willamette River. Restoration measures include excavation of connection channels, restoration of gravel-mined ponds, installation of large wood and engineered logjams, removal of invasive plant species, revegetation with native plant species, and installation of culverts for channel crossings. The recommended plan provides restoration on a total of 574 acres of floodplain and provides substantial benefits to fish and wildlife and the ecosystem. Minor adverse environmental effects will be avoided and minimized during construction by the use of conservation measures and best management practices. The long-term effects are beneficial. The recommended plan also includes post-construction monitoring and adaptive management for a period of ten years to ensure project performance. Monitoring will measure the following key elements: vegetation, connector channel hydrology and hydraulics, river and floodplain morphology, wildlife, physical habitat, and fish. Since the recommended plan would

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not have any significant adverse effects, no mitigation measures (beyond avoidance and management practices) or compensation measures are required.

3. The recommended plan is the Locally Preferred Plan (LPP) that is smaller scale and lower cost than the National Ecosystem Restoration (NER) plan. All features are located within the State of Oregon. The Nature Conservancy is the non-federal cost-sharing sponsor for all features. Based on October 2013 price levels, the estimated total first cost of the plan is $42,155,000. In accordance with the cost sharing provisions the Water Resources Development Act (WRDA) of 1986, as amended, the federal share of the first costs of the ecosystem restoration features would be $27,401,000 (65 percent) and the non-federal share would be $14,754,000 (35 percent). The cost of lands, easements, rights-of-way, relocations and dredged or excavated material disposal areas is currently estimated at $428,000. The total project cost includes $429,000 for post-construction monitoring and $535,000 for adaptive management. The Nature Conservancy would be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the project after construction, a cost currently estimated at approximately $150,000 per year. Based on a 3.5 percent discount rate, October 2013 price levels and a 50-year period of analysis, the total equivalent average annual cost of the project is estimated to be $1,947,000, including OMRR&R.

4. Cost effectiveness and incremental cost analysis techniques were used to evaluate the alternative plans to ensure that a cost effective ecosystem restoration plan was recommended. The cost of the recommended restoration features is justified by restoring 182 average annual habitat units on 574 acres of floodplain and aquatic habitats. The restored aquatic habitat would increase habitat for Upper Willamette River Chinook salmon, bull trout, and Oregon chub listed as threatened under the Endangered Species Act, and would improve floodplain and aquatic habitats for a variety of fish and wildlife species in the Lower Coast and Middle Forks of the Willamette River for approximately 2 miles upstream on each river from their confluence. The restored habitat would increase scarce off-channel rearing and refuge habitat for fish species, and scarce forested riparian and emergent and shrub wetland habitats for sensitive amphibian species, and nesting, feeding, and rearing habitat for migratory waterfowl and neotropical migrant birds using the internationally significant Western Flyway.

5. The recommended plan was developed in coordination and consultation with various federal, state, and local agencies using a systematic and regional approach to formulating solutions and evaluating the benefits and impacts that would result. Risk and uncertainty were addressed during the study by completing a cost and schedule risk analysis and a sensitivity analyses that evaluated the potential impacts of a change in economic assumptions.

6. In accordance with the Corps' guidance on review of decision documents, all technical, engineering, and scientific work underwent an open, dynamic, and rigorous review process to ensure technical quality. This included an Agency Technical Review (ATR), an Independent External Peer Review (IEPR), and a Corps Headquarters policy and legal review. All concerns of the ATR have been addressed and incorporated into the final report. An IEPR was completed by Battelle Memorial Institute in May 2013. A total of 15 comments related to plan

formulation, economic analysis, and hydrology and hydraulics were documented. All comments were addressed by report revisions, and subsequently closed.

7. Washington level review indicates that the plan recommended by the reporting officers is environmentally justified, technically sound, cost effective and socially acceptable. The plan complies with all essential elements of the U.S. Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Land Related Resources Implementation Studies. The recommended plan complies with other administration and legislative policies and guidelines. The views of interested parties, including federal, state and local agencies, were considered. Comments received during review of the integrated draft report and environmental assessment included comments by the US Fish and Wildlife Service (USFWS), the Oregon State Historical Preservation Office (SHPO), and the National Marine Fisheries Service (NMFS). The National Environmental Policy Act (NEPA) process resulted in a finding of no significant impacts from this project. The USFWS and NMFS agreed with the use of best management practices and continued coordination during design and implementation, and SHPO concurred with the Area of Potential Effect (APE) and proposed management plan for implementation. During state and agency review of the proposed Report of the Chief of Engineers, no comments were received and agencies were supportive of the recommended plan.

8. I concur with the findings, conclusions, and recommendations of the reporting officers. Accordingly, I recommend that the plan to restore the ecosystem of the Willamette River Floodplain, Lower Coast and Middle Forks near Eugene, Oregon, be authorized in accordance with the reporting officers' recommended plan at an estimated first cost of $42,155,000. My recommendation is subject to cost sharing, financing, and other applicable requirements of federal and state laws and policies, including Public Law 99-662, the Water Resource Development Act of 1986, as amended, and in accordance with the required items of local cooperation that the non-federal sponsor shall, prior to project implementation, agree to perform:

a. Provide 35 percent of total project costs as cash or in-kind services, as further specified below:

(1) Provide the required non-federal share of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

(2) Provide, during the first year of construction, any additional funds necessary to pay the full non-federal share of design costs;

(3) Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material as determined by the government to be required or to be necessary for the construction, operation, and maintenance of the project.

(4) Provide, during construction, any additional funds necessary to make its total contributions equal to 35 percent of total project costs.

b. Provide work-in-kind during final design and construction as well as providing the post-construction monitoring. The value of LERRDs needed for the project are credited against the non-federal sponsor's cost-sharing requirement. The sponsor anticipates contributing the balance of funds from grant funding that will not include funds from federal agencies.

c. Shall not use funds from other federal programs, including any non-federal contribution required as a matching share therefore, to meet any of the non-federal obligations for the project unless the federal agency providing the federal funds verifies in writing that such funds are authorized to be used to carry out the project;

d. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project's proper function;

e. Shall not use the project or lands, easements, and rights-of-way required for the project as a wetlands bank or mitigation credit for any other project;

f. Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. §§ 4601-4655), and the Uniform Regulations contained in 49 C.F.R. part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

g. For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, at no cost to the federal government, in a manner compatible with the project's authorized purposes and in accordance with applicable federal and state laws and regulations and any specific directions prescribed by the federal government;

h. Give the federal government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;

i. Hold and save the United States free from all damages arising from construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;

j. Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management.

k. Comply with all applicable federal and state laws and regulations, including but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. § 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable federal labor standards requirements including, but not limited to, 40 U.S.C. §§ 3141-3148 and 40 U.S.C. §§ 3701-3708;

l. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. §§ 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the federal government determines to be required for construction, operation, and maintenance of the project. However, for lands that the federal government determines to be subject to the navigation servitude, only the federal government shall perform such investigations unless the federal government provides the non-federal sponsor with prior specific written direction, in which case the non-federal sponsor shall perform such investigations in accordance with such written direction;

m. Assume, as between the federal government and the non-federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the federal government determines to be required for construction, operation, and maintenance of the project;

n. Agree, as between the federal government and the non-federal sponsor, that the non-federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and,

o. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. § 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. § 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

9. The recommendation contained herein reflects the information available at this time and current departmental policies governing formulation of individual projects. It neither reflects

program and budgeting priorities inherent in the formulation of a national Civil Works construction program, nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendation may be modified before it is transmitted to the Congress as a proposal for authorization and implementation funding. However, prior to transmittal to Congress, the non-federal sponsor, the state, interested federal agencies and other parties will be advised of any significant modifications, and will be afforded an opportunity to comment further.

THOMAS P. BOSTICK
Lieutenant General, USA
Chief of Engineers

U.S. Army Corps
of Engineers
Portland District

Willamette River Floodplain Restoration, Oregon
Integrated Feasibility Report/Environmental Assessment

Lower Coast and Middle Fork Willamette River Subbasins

VOLUME 1: FINAL REPORT (ECOSYSTEM RESTORATION)

November 2013

Prepared by:

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Willamette River Floodplain Restoration Study (Middle Fork and Coast Fork)
FINAL INTEGRATED FEASIBILITY STUDY
AND
ENVIRONMENTAL ASSESSMENT

ERRATA SHEET
November 2013

The following corrections, clarifications, and augmentations are made to the final FS/EA:

1. Section 11, page 199.

Added the following to second paragraph:

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

2. Section 11, page 199.

Replaced the wording in second bullet: "The value of the LERRDs needed for the project will be deducted from the non-Federal sponsor's cost-sharing requirement."

With: "The value of the LERRDs needed for the project are credited against the non-Federal cost share."

3. Section 11, page 201.

Added the District Commander's signature and date.

4. Appendix I.

Added amendment with revised incidental take statement to the original NMFS BiOp.

5. Appendix I.

Added 2 amendments with revised incidental take statements to the original USFWS BiOp.

6. Appendix C, Cost and Schedule Risk Analysis (CSRA).

Clarified Risk #19 detail page in the CSRA to read as follows:

"This feasibility study has been conducted at a watershed scale due to the multiple sites included in the recommended plan. However, because LiDAR topography was available at all sites, the site topography is likely to be very good. The bathymetry of the gravel mined ponds in the floodplain has just been surveyed for Sites C1C, M1A, M1B, and M2A and indicates depths are as predicted. The hydraulic model used for analysis is a bank-full calibrated model and the design flows for the sites are typically at or below bankfull. Thus, the quantities generated for the cost estimate are likely to be reasonable. Supplemental topography in areas of heavy tree canopy or shrub cover will be conducted during PED and is accounted for in the schedule, and additional reach-scale hydraulic modeling will be conducted to refine connection elevations. However, due to refinement of details during PED, quantities may change and thus the cost estimate could vary from -10% to +20%."

7. Section 6.8, page 144.

Added to first paragraph: "Discussion regarding project sustainability is included in Section 6.12. Additional discussion on hydrologic/hydraulic and geomorphic trajectory and risks is described in Section 7."

8. Appendix G, page 14, 15, and Table 3.

Revised current and future land use to be consistent with project purposes, as follows:

ANY OTHER REAL ESTATE ISSUES

Tasks to be completed in the design phase:

1. Update real estate maps to reflect final real estate requirements for the final design, including the approved non-standard estate.
2. Coordinate with NFS regarding acquiring and certifying lands available for the project.
3. Update real estate requirements and LERRD map to support the final 100% project design.

Existing and Foreseeable Non-project Use of Lands

The District conducted an analysis to assess whether current and future land uses are consistent with the proposed ecosystem restoration project. Each proposed easement parcel was reviewed to determine current and projected future land use (See Table E-1). Analysis was conducted to determine the impact of the proposed NSE use restrictions on each parcel. The District conducted the parcel analysis with complete cooperation from the Non-Federal Sponsor (NFS). It was determined that all of the proposed easement parcels are compatible with the use restrictions in the proposed NSE with the following details:

1) The Rhoads Family parcels used for a hazelnut orchard are expected to continue to be used for this purpose in the future. Rhoads Family Trust lowlands that are not used for farming operations have been initially targeted for ecosystem restoration. If restoration is limited to the Rhoads Family Trust lands which aren't currently used for hazelnut orchard operations, the NSE and its restrictions will apply to these lands.

For example, farming, use of machinery, removal of vegetation and the application of herbicides will not be permitted in the NSE footprint. It is anticipated that the Rhoads Family Trust will continue their hazelnut orchard operations on areas outside of the NSE footprint/Project boundary but this is not expected to impact any of the ecosystem restoration features within the Project boundary. The Non-Federal sponsor has fully briefed the Rhoads Family of anticipated ecosystem restoration activities as well as proposed NSE restrictions (no farming, herbicide applications, etc.) and received complete buy-in from the landowner. The Non-Federal Sponsor is attempting to acquire the entire Rhodes Family Trust parcel in fee. If negotiations are successful, the proposed NSE will not be required. At this point, negotiations are stalled for various reasons, thus the request for the NSE. Future use of the Rhodes Family Trust property is compatible with the ecosystem restoration project. Natural plantings will be introduced to help control invasive species and to improve riparian lands. Finally, public access will be controlled to be compatible with the ecosystem restoration features. Any residual recreational access to the property is incidental to the primary purpose. There are no recreational features included in this restoration project.

2) The PacifiCorp parcel is used for an access road for power transmission lines and the Project will require the use of this road as well. Accordingly, a permanent road easement is a more appropriate estate for the PacifiCorp property since the required project lands only involve a 10- foot wide access road that will remain open to both TNC and PacifiCorp during and after project construction.
3) Finally, the Oregon Parks and Recreation Department land is available for pedestrian fishing access and will remain so. While there is no reason to think that fishing access will conflict with the proposed NSE language, care should be taken to make sure project features are not placed in areas where heavy foot traffic will occur. It should be possible to address this concern in the design.

On numerous occasions during past months, the NFS assured the District that they have secured complete project support from all affected public and private landowners. The Non-Federal Sponsor has also secured each landowner's firm commitment to refrain from actions that would adversely impact the proposed ecosystem project. NWS-RE verbally re-confirmed that support during an 8/22/2013 conversation with the NFS.

Conclusions:

NWS' parcel analysis found non-use project lands are compatible with the proposed project.

Table 3. Analysis of Non-Standard Easements.

Parcel ID	Tax Lot	Owner	Zoning or Classification	Acreage within Project Footprint	Total Parcel Acreage	Estate to be Provided	Current and Future Use
0088	1803110000088	Oregon Department of State Lands	Submerged	1.73	N/A	Ecosystem Restoration Easement	Submerged Lands
0100	1803113000100	Lane County	Sand, Gravel, Rock Products	63.22	63.22	Ecosystem Restoration Easement	All sand gravel rock production has ceased for last 20 years, currently fallow lands; Future Use: passive public use ecosystem restoration site.
0200	1803113000200	Oregon Parks and Recreation	Parks and Recreation	10.62	10.62	Ecosystem Restoration Easement	River access only –anglers pull ashore and fish once they're in the river (passive fishing). Very light fishing pressure –most fishing will occur from boats NOT from the lands. Future Use: passive public ecosystem restoration site and fishing.
0600	1803110000600	Oregon Parks and Recreation	Parks and Recreation	2.5	56.66	Ecosystem Restoration Easement	Same as above
0800	1803110000800	Oregon Parks and Recreation	Parks and Recreation	6	6	Ecosystem Restoration Easement	Same as above
3802	1803113003802	Lane County	Rural Industrial	0.62	0.62	Ecosystem Restoration Easement	Currently fallow lands; Future Use: passive public use ecosystem restoration site
4300	1803113004300	County Owned Lands Department	Sand, Gravel, Rock Products	0.1	0.1	Ecosystem Restoration Easement	All sand and gravel operations discontinued during past twenty years; currently fallow lands Future Use: passive ecosystem restoration site
0088a	1803110000088	Oregon Department of State Lands	Submerged	0.8	N/A	Ecosystem Restoration Easement	Submerged Lands

Parcel ID	Tax Lot	Owner	Zoning or Classification	Acreage within Project Footprint	Total Parcel Acreage	Estate to be Provided	Current and Future Use
0088b	1803120000088	Oregon Department of State Lands	Submerged	2.9	N/A	Ecosystem Restoration Easement	Submerged Lands
0088	1803110000088	Oregon Department of State Lands	Submerged	2.47	N/A	Ecosystem Restoration Easement	Submerged Lands
0200a	1803110000200	Rhoads Family Real Estate LLC	Farming	6.4	6.4	Ecosystem Restoration Easement No farming restriction language in NSE;	Hazel nut orchard – All orchard farming operations take place on the uplands portion of the property. Farming activities will not impact floodplain restoration activities. Upland revegetation will support floodplain restoration. Expect farming to continue post NSE.
0300a	1803110000300	Rhoads Family Real Estate LLC	Farming	6.0	6.0	Ecosystem Restoration Easement	Same as above
1501	1802060001501	PacifiCorp	Forest	0.66	30.0	Use Permanent Road Easement instead of Ecosystem Restoration Easement	10-foot wide access road on edge of PacifiCorp property that serves both TNC and PacifiCorp. Access road will remain open during and post project construction.
088	1802080000088	Oregon Department of State Lands	Submerged	5.99	N/A	Ecosystem Restoration Easement	Submerged lands

9. Section 5.2.5, page 104.

Removed "relocation" from first paragraph.

10. Appendix G, page 13.

Changed Activity table as follows:

Added "Chief's Report" with projected date "Anticipated in December 2013"
Changed "Authorization" to "Congressional Authorization"

11. Appendix G, page 7.

Added the following to first paragraph: "The District will continue to further refine the terms of the proposed NSE and will submit same to NWD and HQUSACE for review and final approval."

12. Section 5.6, page 130.

The word "bridge" was removed.

13. Section 6.1.9, page 140.

The word "bridge" was removed.

14. Section 6.2, page 141.

The word "bridge" was removed.

15. Section 6.5, page 143.

The word "bridge" was removed.

16. Section 6.11, page 149.

The word "bridge" was removed.

17. Appendix C and Main Report.

All cost figures were updated with FY2014 costs.

WILLAMETTE RIVER FLOODPLAIN RESTORATION STUDY
FINAL REPORT (ECOSYSTEM RESTORATION)

APPENDICES

A. CONCEPTUAL ALTERNATIVES

B. HABITAT EVALUATION MODEL

C. COST APPENDIX

D. BIOLOGICAL ASSESSMENT

E. HYDROLOGY AND HYDRAULICS APPENDIX

F. DESIGN AND ENGINEERING

G. DRAFT REAL ESTATE PLAN

H. PUBLIC AND STAKEHOLDER INVOLVEMENT APPENDIX

I. ENVIRONMENTAL COMPLIANCE DOCUMENTS

J. INVASIVE SPECIES MANAGEMENT

FINDING OF NO SIGNIFICANT IMPACT
WILLAMETTE RIVER FLOODPLAIN RESTORATION, OREGON

I find that the selected course of action, the *recommended plan*, will not significantly affect the quality of the human environment. The recommended plan and its potential effects are described in the *Feasibility Report/Environmental Assessment, Willamette River Floodplain Restoration, Oregon* (June 2013) (hereafter FR/EA).

PROJECT PURPOSE AND NEED

The purpose of the proposed action is to restore natural floodplain ecosystem functions along the lower Coast and Middle Forks of the Willamette River. Because of the substantial changes in natural riverine and floodplain processes due to the construction of multiple dams and revetments in the subbasins, the habitats that sustain fish and wildlife populations are disappearing and becoming degraded or developed. This project is needed to improve habitats for sensitive fish and wildlife species and provide other important floodplain functions in the subbasins.

RECOMENDED PLAN

The recommended plan will restore about 574 acres at five sites on the lower Coast and Middle Forks. See the FR/EA Section 6 for a detailed project description.

FINAL DETERMINATION

The Corps is required by the National Environmental Policy Act (NEPA) to determine if the impacts of the project are significant. Following are the tests of significance from (1) to (10) as specified in 40 C.F.R. 1508.27:

1) Significant Effect(s) Even Though the Overall Effect Is Beneficial. The proposed restoration will benefit multiple fish and wildlife species, including species that are listed under the Endangered Species Act (ESA). The restoration of off-channel and floodplain aquatic and riparian habitats, particularly hydrologic connectivity and fish access will enhance natural floodplain processes including habitat formation. A finding of no significant environmental impact is not biased by the beneficial effects of the action. See the FR/EA Section 7 for additional information.

2) The Degree to which the Action Affects Public Health and Safety: The construction effects will be short-term, localized, and temporary, and as such will have no long-term adverse effects on public health and safety. The temporary closure of pedestrian access for non-construction workers from construction zones will prevent a public safety hazard. The grading and shallowing of gravel mined ponds also will remove an existing public safety hazard. See the FR/EA Section 7 for additional detail.

3) Unique Characteristics of Geographical Area: The project sites are gravel mined floodplains adjacent to the Coast and Middle Forks. The Corps will: protect cultural resources that may be inadvertently discovered during construction; and existing high quality riparian areas, wetlands, shorelines, and streams from construction activities to the maximum extent practicable. There will not be any measurable adverse effects to Essential Fish Habitat. Construction will avoid and minimize impacts to waters of the United States. There are no prime farmlands, wild and scenic rivers, wilderness, ecologically critical areas, or other unique natural features in the project area, thus, no effects will occur to unique geographical characteristics.

4) Highly Controversial Effects on the Quality of the Human Environment: The effects of the restoration of gravel mined floodplains have been examined by the Corps and resources agencies and interested Tribes. The project will result in ecological benefits. The types of restoration activities proposed are supported by the resource agencies. Public review of the recommended plan identified specific issues that are addressed in the FR/EA. While concerns regarding public access and invasive species are identified, none of these issues rise to highly controversial levels.

5) Highly Uncertain, Unique, or Unknown Risks: The project will not present highly uncertain, unique or unknown risks as the proposed restoration measures have been widely used in the Pacific Northwest and their functions are well understood.

6) Future Precedents: This ecosystem restoration does not constitute an irrevocable or irretrievable step toward future changes in the scope, scale, orientation, or design of the current flood risk management system or in the current approach to managing gravel mined areas. For these reasons, the action will not establish a precedent for future restoration actions.

7) Significant Cumulative Impacts: The FR/EA considers the effects of implementing the proposed action in association with past, present, and reasonably foreseeable future actions in the study area. Significant cumulative adverse effects are not identified, and the project will incrementally reverse some of the adverse effects of past actions that occurred in the area. See the FR/EA Section 7.17 for more detail.

8) National Register of Historic Places and Other Historical and Culturally Significant Places: A cultural resources survey was performed in 2012 that did not reveal any properties on or eligible to the National Register of Historic Places (NRHP) within the work areas. Many locations within the five parcels have been subject to high degrees of previous ground disturbance. The Corps has received concurrence from the Oregon State Historic Preservation Office (SHPO) (letter dated 6/25/13) on the area of potential effect and additional assessment strategies to be employed during design. Consultations will continue with SHPO and interested Tribes during the design phase to ensure the potential impacts will not exceed a *no adverse effect* determination on any properties on or eligible to the NRHP. See the FR/EA Section 7.10 for more detail.

9) Endangered or Threatened Species or Critical Habitat: Although there will be temporary adverse impacts as a result of the project construction, every effort will be made to minimize those impacts by incorporating anticipated conservation measures and best management practices (BMPs). The Corps received biological opinions from NMFS (June, 19, 2013) and USFWS (June 13, 2013) confirming the project will not jeopardize the existence of any listed species or adversely modify critical habitat. See the FR/EA Section 7.7 for more detail.

10) Other Legal Requirements: The Corps will implement the project to comply with all environmental laws and regulations, as discussed in detail in Section 9 of the FR/EA.

OTHER CONSIDERATIONS

The Corps will not begin construction activities until it completes all consultations and receives required permits. The Corps will obtain all required state and local approvals and concurrence from SHPO on the project's effects to properties on or eligible to the NRHP.

CONCLUSION

All applicable laws, executive orders, regulations and guidelines were considered in the evaluation of alternatives, including the selected course of action. Based on the review of these evaluations, I have determined these impacts, both individually and cumulatively, are not "significant" as defined by the NEPA legal statue, regulations, and case law. Based upon the FR/EA, I have determined that the selected action will not significantly affect the quality of the human environment and that an environmental impact statement is not warranted.

Date: ____________________

____
John W. Eisenhauer, P.E.
Colonel, Corps of Engineers
District Commander

EXECUTIVE SUMMARY

This feasibility report presents the results of a U.S. Army Corps of Engineers (Corps) feasibility study undertaken to identify and evaluate alternatives for restoring natural floodplain functions in the lower Coast and Middle Forks of the Willamette River. This study is an interim response to the study authorization. This report documents the plan formulation process to select a recommended restoration plan, along with environmental, engineering, and cost details of the recommended restoration plan, which will allow final design and construction to proceed following approval of this report.

The study area is the Willamette River Basin of western Oregon. The Willamette River is a major tributary of the Columbia River and is the tenth largest river in the United States, based on average annual flow. The Coast Fork and Middle Fork of the Willamette River merge upstream of Eugene, Oregon, to form the mainstem Willamette River (see Figure ES-1). The lower Coast and Middle Forks and their floodplains downstream of Cottage Grove and Dexter Dams, respectively, are of interest for restoration because many areas of the floodplain are relatively undeveloped and the construction and operation of Corps' revetments and the upstream dams have had adverse effects on floodplain functions, which makes Corps involvement appropriate. The lower Coast and Middle Forks of the Willamette have substantial opportunities for floodplain restoration and could provide key habitats for federally listed species including Upper Willamette River Chinook salmon, steelhead, and bull trout. Sensitive wildlife species such as western pond turtle, red-legged frog, and a variety of neotropical migratory bird species could also benefit.

This study has involved a large number of stakeholders including agencies, watershed councils, academic researchers, and other organizations. From the outset, this stakeholder group has helped scope and refine the study. The restoration goal and objectives developed with the stakeholders for this study are outlined below. The goal and objectives have guided the plan formulation process and selection of a recommended restoration plan.

Coast and Middle Fork Floodplain Restoration Goal and Objectives	
Restoration Goal	Restore natural floodplain ecosystem function and condition to the Coast and Middle Fork Subbasins
Restoration Objective 1	Increase channel complexity and diversity
Restoration Objective 2	Restore connectivity of river to floodplain habitats
Restoration Objective 3	Restore native floodplain habitats, including cottonwood gallery forests, riparian, and wet prairie habitats

Figure ES-1. Coast Fork and Middle Fork Subbasins

The baseline condition in the study area is degraded for native fish and wildlife and has much reduced floodplain functions. Causes for this degradation include the construction of upstream dams that have modified flows and raised water temperatures, construction of revetments that reduce channel migration and the formation of habitats, development of the floodplain, extensive gravel mining of the channels (historically) and floodplains, removal of riparian vegetation, removal of wood from the river channels, blocking access to off-channel habitats, and the widespread presence of non-native species.

Forty-three potential floodplain restoration sites were identified in consultation with the stakeholder group and were initially developed at a conceptual level. A variety of restoration measures were considered at each site and then developed into scaled plans for each site: 1) a minimum level of restoration that included measures such as removal of invasive species, replanting with native riparian and floodplain vegetation, and placement of large wood in the floodplain; and 2) a maximum level of restoration that included the measures from the minimum scale plus other features such as excavation of channels, removal of revetment, floodplain grading, restoration of gravel mined ponds, installation of engineered log jams, culverts or bridges, and other features. The majority of the potential sites were visited to collect data on existing conditions and to confirm if restoration measures were appropriate, and/or to add additional measures.

Preliminary cost estimates were developed for each site and scale of restoration, along with calculation of habitat benefits that could accrue from restoration measures over the 50-year period of analysis. Habitat benefits were calculated using a multi-species Habitat Evaluation Procedures or HEP model. The preliminary costs and habitat benefits were used in a Cost Effectiveness and Incremental Cost Analysis to identify alternatives that provide high levels of habitat benefit relative to the costs. The analysis was a primary element used to select the recommended restoration plan.

A recommended restoration plan was selected that includes floodplain restoration on five sites (Figure ES-2). All five sites selected for restoration have been subject to gravel mining in the past and include multiple gravel mined ponds. Restoration would include grading on-site sediments and topsoil back into the gravel mined ponds to create wetland and shallow water habitats, excavating connector channels between ponds to connect to the rivers via backwater channels, removing invasive species, planting native wetland, riparian and floodplain vegetation, placing large wood in the ponds and floodplain, installing engineered log jams in the river adjacent to the sites, removing debris and revetment materials, and installing culverts at road crossings to remain on site.

The effects of the recommended restoration plan would be beneficial in the long term by restoring native fish and wildlife habitats, increasing floodplain connections and storage on a frequent basis, promoting the natural formation of gravel bars and side channels by the installation of engineered log jams and removal of revetment material, and providing fish access into off-channel and floodplain habitats. During construction there could be temporary adverse effects such as the potential for increased turbidity, release of pollutants, and handling of fish. These effects would be minimized by providing erosion and pollution control best management practices and conducting all fish salvage and removal activities according to state and Federal requirements. A number of conservation measures would be implemented during construction to minimize effects to listed species.

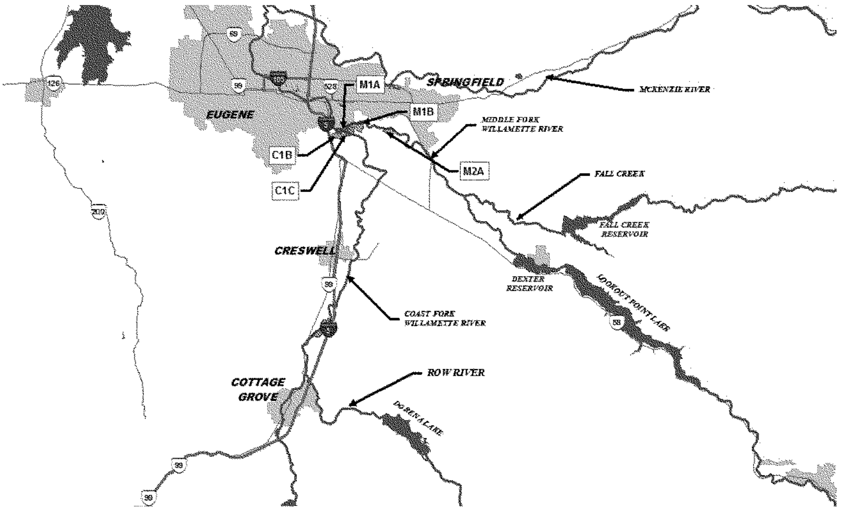

Figure ES-2. Location of Project Sites Included in Recommended Restoration Plan.

Overall, the recommended restoration plan would provide frequent hydrologic connections to nearly 600 acres of floodplain habitats; restore off-channel habitats for fish rearing and refuge; substantially improve the quality of a variety of natural floodplain, wetland, and riparian habitats; reduce invasive species; and reduce fish stranding and mortality that can currently occur following flood events. This plan would also provide substantial benefits to listed fish species that occur in the Upper Willamette Basin.

The recommended restoration plan is proposed for implementation at a total project cost of $42,155,000 to be cost-shared 65 percent Federal and 35 percent non-Federal. The non-Federal sponsor is The Nature Conservancy. The project would be implemented in four phases from 2015 through 2018. Additionally, development of this report applied the recent Lessons Learned resulting from Hurricanes Katrina and Rita. They are as follows:

- Point 1 – Employ Integrated, Comprehensive and Systems-Based Approach
- Point 2 – Employ Risk-Based Concepts in Planning, Design, Construction, Operations and Maintenance
- Point 3 – Continuously Reassess and Update Policy for Program Development, Planning Guidance, Design and Construction Standards
- Point 4 – Dynamic Independent Review
- Point 5 – Employ Adaptive Planning and Engineering Systems
- Point 6 – Focus on Sustainability
- Point 7 – Review and Inspect Completed Works
- Point 8 – Assess and Modify Organizational Behavior
- Point 9 – Effectively Communicate Risk
- Point 10 – Establish Public Involvement Risk Reduction Strategies
- Point 11 – Manage and Enhance Technical Expertise and Professionalism
- Point 12 – Invest in Research

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ACRONYMS AND ABBREVIATIONS

AAHU	Average annual habitat units
ACHP	Advisory Council on Historic Preservation
BA	Biological Assessment
BiOp	Biological Opinion
BLM	U.S. Bureau of Land Management
BMPs	Best Management Practices
BP	Before Present
BPA	Bonneville Power Administration
CE/ICA	Cost-effectiveness and incremental cost analysis
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	Cubic feet per second
Corps	United States Army Corps of Engineers
CREP	Oregon Conservation Reserve Enhancement Program
DPS	Distinct Population Segment
EDT	Ecosystem Diagnosis and Treatment
EFH	Essential Fish Habitat
ELJ	Engineered log jams
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FBP	Friends of Buford Park
FEMA	Federal Emergency Management Agency
FWCA	Fish and Wildlife Coordination Act
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HEP	Habitat Evaluation Procedures
HGM	Hydrogeomorphic Method
HSI	Habitat Suitability Indices
HU	Habitat units
IDC	Interest during construction
LCOG	Lane Council of Governments
LERRDs	Lands, easements, rights-of-way, relocations, and excavated or dredged material disposal areas
LRAPA	Lane Regional Air Protection Agency
LWD	Large woody debris
MCACES	Micro computer aided cost estimating software
NAVD88	North American Vertical Datum 1988
NED	National Economic Development
NEPA	National Environmental Policy Act
NER	National ecosystem restoration
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration

NPCC	Northwest Power and Conservation Council
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and maintenance
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
OMRR&R	Operation, maintenance, repair, replacement, and rehabilitation
OPHD	Oregon Public Health Division
OPRD	Oregon Parks and Recreation Department
PCBs	Polychlorinated biphenyls
PED	Preconstruction engineering and design
PM10	Particulate matter less than 10 microns in size
PPA	Project Partnership Agreement
RED	Regional Economic Development
RM	River Mile
RPA	Reasonable and Prudent Alternative
SHPO	State Historic Preservation Office
SLOPES	Standard Local Operating Procedures for Endangered Species
SRP	Sustainable Rivers Program
SWPPP	stormwater pollution and prevention plan
TMDL	Total Maximum Daily Load
UGB	Urban Growth Boundary
USC	United Stated Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WRDA	Water Resources Development Act

1. STUDY BACKGROUND

1.1 STUDY OVERVIEW

The purpose of this feasibility study is to identify opportunities for restoring natural floodplain functions and improving flood storage along the Willamette River and its tributaries. The study emphasizes the identification of opportunities for the restoration of natural floodplain aquatic and riparian ecosystems and functions and contributions towards the recovery of proposed and listed threatened and endangered species. The study area is the lower Coast and Middle Forks of the Willamette River.

The Coast Fork and Middle Fork subbasins are located in the southern portion of the Willamette River Basin (Figures 1 and 2). These particular subbasins were chosen for the feasibility study for several reasons. First, several opportunities exist below the dams to restore natural floodplain functions. Second, Corps dams and bank protection projects, among other activities, have substantially altered hydrologic and hydraulic conditions in these subbasins, and it is appropriate for the Corps to take the lead in restoring more natural floodplain functions to these subbasins. Third, the high percentage of public land ownership in these subbasins, as compared to other major tributaries and the mainstem Willamette, increases the likelihood that a cost-effective, integrated restoration plan can be implemented. Finally, there is a high degree of interest in floodplain restoration among stakeholders and potential sponsors in these subbasins.

1.2 STUDY AUTHORITY

Below are the study authorities that initiated the Willamette River Basin, Oregon Floodplain Restoration Project Section 905(b) Analysis. This feasibility study is an interim response to the study authorization.

(1) Senate Committee on Public Works resolution for the Willamette River Basin Comprehensive Study, adopted November 15, 1961 (see attachment 1), authorized the Chief of Engineers to determine:

> *"...whether any modification of the existing project is advisable at the present time, with particular reference to providing additional improvements for flood control, navigation, hydroelectric power development, and other purposes, coordinated with related land resources, on the Willamette River and Tributaries, Oregon."*

(2) House Committee on Public Works resolution for the Willamette Basin Review Study, adopted September 8, 1988 (see attachment 2), authorized the Chief of Engineers to determine:

> *"...whether modifications to the existing projects are warranted and determine the need for further improvements within the Willamette River Basin (the Basin) in the interest of water resources improvements.""*

The Section 905(b) report was completed in 1999. This report evaluated floodplain restoration opportunities in the Willamette River basin and had the following recommendations:

> *" 9.0 RECOMMENDATIONS*
> *This Section 905(b) (WRDA 86) Analysis report be approved as a basis for developing the Project Study Plan (PSP), finalizing the Feasibility Cost Sharing Agreement (FCSA) with the State of Oregon, and continuing into the feasibility phase for the Willamette River Floodplain*

Restoration Study. There is both need and support for this study to address flooding and floodplain restoration issues in the Willamette River Basin. The Willamette River Floodplain Restoration Study is consistent with Army and budgetary policies.

The first phase feasibility study would result in a comprehensive, Basin-wide framework for integrated river management and floodplain restoration. This phase is currently estimated to cost about $2.5 million and is expected to be completed (Division Engineer's Public Notice) within 24 months of receipt of sponsor and Federal funds. Subsequent phases would focus on specific floodplain problems and restoration opportunities on a site-specific, sub-reach or sub-basin level, based on criteria and priorities established in Phase I. The initial PSP and FCSA will provide a detailed scope of work and sponsorship agreements for the first phase only. Subsequent phases will be addressed either through modification and amendment of the initial PSP/FCSA, or through development of new agreements with different local sponsors.

It is likely that some potential ecosystem restoration and/or flood damage reduction projects will be identified during Phase I for more detailed evaluation and implementation under other Corps' continuing and/or environmental authorities (such as Sections 1135, 206 and 205). Some of these may be acted on prior to completion of Phase I."

The Section 905(b) report was approved on 18 June 1999 for proceeding into the feasibility phase.

1.3 REPORT CONTENTS

This report contains a summary of the feasibility study from plan formulation through selection of a recommended plan, feasibility designs and cost estimating, and an analysis of the effects of the recommended plan. This document is an integrated feasibility report with an Environmental Assessment to comply with the National Environmental Policy Act (NEPA). The feasibility report has been prepared to an appropriate detail of analysis required to develop the project schedule and baseline cost estimate and to facilitate a decision on whether to move forward with preconstruction engineering and design (PED). PED will include additional reach-scale analyses required to finalize the design and prepare plans and specifications. These additional analyses are proposed in Appendix F.

Chapter 1 includes the general description of the study authorization, process, and study area. Chapter 2 describes other Federal, state and local programs and projects operating within the study area. Chapter 3 describes the existing and likely future conditions within the study area. Chapter 4 describes the problems and restoration opportunities in the study area. Chapter 5 describes the plan formulation process. Chapter 6 describes the recommended restoration plan. Chapter 7 describes the effects of the recommended restoration plan on the environment. Chapter 8 describes public and agency involvement efforts conducted, to date. Chapter 9 describes the status of environmental compliance. Chapter 10 describes the proposed monitoring plan. Chapter 11 provides the conclusions and recommendations from the study.

1.4 PLANNING PROCESS

Ecosystem restoration is one of the primary missions of the Corps' Civil Works program. The Corps' main objective in ecosystem restoration planning is to contribute to national ecosystem restoration (NER). Contributions to NER are increases in the net quantity and/or quality of desired ecosystem resources. Measurement of NER outputs are based on changes in ecological resource quality as a function of improvement in habitat quality and/or quantity and expressed quantitatively in physical units or indexes (but not monetary units). These net changes are measured both in the regional planning area and for the overall benefit of the nation.

The Corps planning process is six steps. This process is a structured approach to problem solving that provides a rational framework for sound decision-making. The six-step process is used for all planning studies conducted by the Corps. The six steps are:

Step 1 - Identifying Problems and Opportunities
Step 2 - Inventorying and Forecasting Conditions
Step 3 - Formulating Alternative Plans
Step 4 - Evaluating Alternative Plans
Step 5 - Comparing Alternative Plans
Step 6 - Selecting a Plan

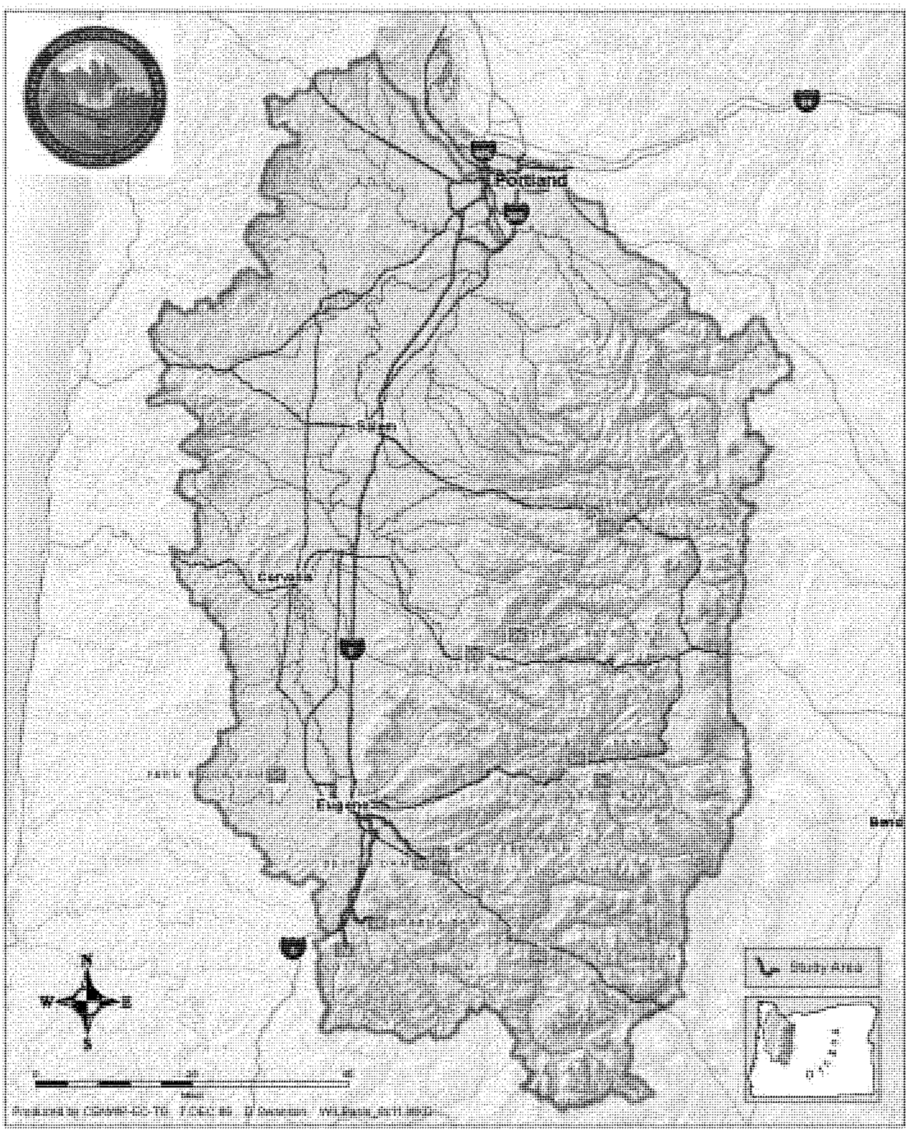


Figure 1. Willamette River Basin

Figure 2. Coast Fork and Middle Fork Subbasins

1.5 FEASIBILITY STUDY SCOPE AND OBJECTIVES

In the fall of 2002, a comprehensive stakeholder group shown in Table 1 was convened to help develop the scope of the feasibility study. Over a series of workshop meetings, the stakeholder group reviewed the set of problems, opportunities and objectives developed in the reconnaissance report and a number of alternatives were considered and discussed. The reconnaissance report had described one potential floodplain restoration site, at Harken's Lake on the mainstem Willamette, but had not proposed any larger reach(es) of floodplain to conduct further detailed analysis during feasibility. The reaches around the confluence of the McKenzie River and the mainstem Willamette River between Harrisburg and Corvallis were considered but dropped because of concerns regarding the lack of support from the major landowners in these reaches. The site-specific project identified in the reconnaissance study (Harken's Lake) could not be pursued because there was no interested sponsor. The Coast and Middle Forks of the Willamette River were then considered for study because there was substantial support from local sponsors and landowners and critical opportunities for floodplain restoration. A feasibility cost-sharing agreement was signed with the Mid-Willamette Council of Governments on February 20, 2004, for this study to include the lower Coast and Middle Forks of the Willamette River.

Table 2 summarizes the restoration goals and objectives developed for the feasibility study.

Table 1. Stakeholders Involved in Feasibility Study Scoping

Watershed Councils	**Local Governments**
Coast Fork Willamette Watershed Council	Lane County
Middle Fork Willamette Watershed Council	Lane Council of Governments
Federal Agencies	City of Springfield
USDA Forest Service	City of Cottage Grove
National Marine Fisheries Service	City of Creswell
Natural Resources Conservation Service	City of Lowell
Bureau of Land Management	City of Oakridge
U.S. Fish and Wildlife Service	East Lane Soil and Water Conservation District
U.S. Environmental Protection Agency	**Other Interest Groups**
State Agencies	Willamette Restoration Initiative
Oregon Department of Agriculture	Friends of Buford Park & Mt. Pisgah
Oregon Dept. of Environmental Quality	McKenzie River Land Trust
Oregon Dept. of Fish and Wildlife	The Nature Conservancy
Oregon Dept. of Forestry	Oregon State University
Oregon Dept. of Geology & Mineral Industries	Pacific Northwest Ecosystem Research Consortium
Oregon Dept. of Land Conservation and Development	The Trust for Public Land
Oregon Watershed Enhancement Board	Willamette Riverkeepers

Table 2. Goals and Objectives

Goal/Objective Statement		Issues/Constraints
Coast and Middle Fork Floodplain Restoration Goals and Objectives		
Restoration Goal	Restore natural floodplain ecosystem function and condition to the Coast and Middle Fork Subbasins	No increase in economic flood or erosion damages
Restoration Objective 1	Increase channel complexity and diversity	No increase in economic flood or erosion damages; protect private land Consider impact on recreation
Restoration Objective 2	Restore connectivity of river to floodplain habitats	Locate willing landowners to acquire lands or easements Maintain critical infrastructure
Restoration Objective 3	Restore native floodplain habitats, including cottonwood gallery forests, riparian and wet prairie habitats	Avoid adversely affecting sensitive fish and wildlife species (i.e., Oregon chub)

1.6 PROJECT PURPOSE AND NEED

The purpose of this floodplain restoration feasibility study is to restore natural floodplain ecosystem functions along the lower Coast and Middle Forks of the Willamette River. These functions include fish and wildlife habitat, groundwater recharge, incidental flood storage, and sediment and erosion processes. This project is needed because of the need to restore large floodplain sites to contribute to the recovery of sensitive fish and wildlife species in the subbasins. Without Federal action, other stakeholders in the subbasins would not have the funds or means to accomplish this same scale of restoration. Because of the substantial changes in natural riverine and floodplain processes due to the construction of multiple dams and revetments in the subbasins, as well as development and gravel mining in the rivers and floodplains, the habitats that sustain fish and wildlife populations are disappearing and becoming degraded or developed. Large-scale restoration of floodplains provides the best opportunity to restore the natural formation of habitats and provide important off-channel rearing and refuge habitats for multiple species. Floodplains will likely become even more important to dissipate high energy and high flows as climate change occurs; it is likely that winter snowpack in the Pacific Northwest will decline, whereas more variable rainfall will lead to higher peak runoff events and lower sustained flows. Floodplains help moderate peak runoff events and allow groundwater recharge that contributes to the maintenance of low flows.

1.7 STUDY AREA

1.7.1 Coast Fork Willamette River Subbasin

The Coast Fork Willamette River subbasin covers an area of about 665 square miles within the Calapooya Mountains (Western Cascades province) and the floor of the Willamette Valley. The river is approximately 40 miles long and joins the Middle Fork Willamette near Eugene to form the mainstem Willamette River. Big River and Saroute Creek in the Calapooya Mountains join to form the Coast Fork Willamette River.

About 96 percent of the Coast Fork subbasin is in Lane County, with the remainder of its southern extremity in Douglas County. About 64 percent of land in the subbasin is privately owned with the remainder under Federal ownership. Management of Federal lands is almost equally divided between the Forest Service and the Bureau of Land Management (BLM). Ninety percent of the subbasin is forested. Commercial forestry is the major land use in the subbasin, but mining and agricultural resources are also important. The communities of Creswell, Cottage Grove, Goshen, London, and Dorena are located in the subbasin.

The Row River, the largest tributary, drains nearly 60 percent of the Coast Fork subbasin and joins the Coast Fork Willamette River just below the City of Cottage Grove. Sharps and Mosby Creeks are important tributaries to the Row River, which flows through a complex mixture of sedimentary and volcanic rocks. Mineral bearing layers intrude into bedrock in the headwaters of the Row River, and the area continues to be mined both commercially and recreationally. Mercury has been mined intensively in the Black Butte area in the upper reach of the mainstem Coast Fork Willamette, and in the Bohemia Mining District in the upper Row River drainage. The latter has been the most productive mining district in the Oregon Cascade Range for gold, silver, copper, lead, zinc, and antimony. Bedrock in the western portion of the subbasin, including the majority of the Coast Fork Willamette and Mosby Creek drainages, is composed of marine sandstones and siltstones of the Eugene Formation.

Two dams divide the Coast Fork subbasin, Cottage Grove on the Coast Fork Willamette at River Mile 29 and Dorena on the Row River. These dams limit upstream fish passage and greatly influence downstream hydrologic regimes, temperature patterns, sediment and bedload transport, and large wood delivery to the lower reaches.

Stream gradients are generally high in the upper Coast Fork subbasin and gentler in the middle to lower reaches. The longitudinal profile of the Coast Fork Willamette reflects the difference in parent material between the more resistant volcanic materials underlying the Row River, and the more erodible marine silt and sandstones of the Coast Fork Willamette and Mosby Creek drainages. Lower Mosby Creek and the Row and Coast Fork Willamette Rivers downstream of the dams flow through narrow valleys filled with erodible alluvial sediments. Downstream of the confluence of these three major tributaries, in the upper Willamette Valley, the gradient is less than 0.2 percent. The valley widens considerably downstream of this confluence. Sand and gravel are mined in the lower subbasin, and much of the area is used for agriculture. Although the Row River downstream of Dorena Dam has an average slope of about 0.2 percent, it quickly increases from 0.5 percent to more than 2 percent within 30 miles upstream of the dam. The Coast Fork Willamette upstream of Cottage Grove Dam continues at a slope of approximately 0.3 percent until rapidly steepening 10 miles upstream of the dam. Slopes in the upper Row River drainage are steep and the streams flow through narrow, deeply incised valleys.

The upper subbasin drains the lower elevations of the western Cascade Range and the Calapooya Mountains. Headwater elevations in the Coast Fork are lower than in the Middle Fork and the Coast Fork hydrograph does not exhibit a spring snowmelt runoff. As a result of the subbasins' low elevations, summer stream flows are not supplemented by large amounts of snowmelt or numerous spring-fed sources.

This study is focused on the floodplain of the Coast Fork Willamette River below Cottage Grove Dam to the confluence with the Middle Fork Willamette River. This lower floodplain area is the primary area of interest for restoring natural floodplain processes and habitats. The lower mile of the Row River is also considered in this study.

1.7.2 Middle Fork Willamette River Subbasin

The Middle Fork Willamette River subbasin covers an area of approximately 1,360 square miles (865,920 acres) on the western slope of the Cascade Mountains and the floor of the Willamette Valley. The river is 84 miles long and joins the Coast Fork Willamette River near Eugene to form the mainstem Willamette River. The Middle Fork Willamette River originates in two connecting lakes formed by lava flows: Opal and Timpanogas Lakes in the Willamette National Forest.

About 94 percent of the Middle Fork subbasin is in Lane County, with the remainder of its southern extremity in Douglas County. Approximately 12 percent of the land area of the subbasin is below Dexter Dam (108,026 acres). Dexter Dam is located 18 river miles upstream from the confluence with the Coast Fork. The majority of the land below Dexter is privately owned, although there are a few large publicly owned sites, including Elijah Bristow State Park and Howard Buford Regional Recreation Area. About 75 percent of the land in the upper subbasin (above Dexter Dam) is publicly owned, most of which is managed by the U.S. Forest Service.

The headwaters of the subbasin are characterized by two major physiographic provinces; the High Cascades and the Western Cascades provinces (Franklin and Dyrness 1988). In the High Cascades the geology includes recent deep lava deposits that contribute spring-fed flows to the system, particularly in some tributaries above Hills Creek Reservoir. These spring-fed sources are not of sufficient volume to significantly influence flow patterns or water temperature regimes in the mainstem river reaches below the dams; however, the headwater elevations are high enough to form a seasonal snowpack, which contributes to summer stream flows and maintains low water temperatures. The western foothills and lower peaks of the Western Cascades province has much older volcanic material including deeply weathered rocks, steep and highly dissected hill slopes, and substantial erosion. Stream runoff patterns are dominated by a rain-on-snow hydrology in the mid to upper elevations and rain-dominated flow patterns in the lower subbasin, which lead to rapid delivery of water into the stream network. The lower subbasin below Jasper is in the Willamette Valley Province, characterized by broad alluvial flats and low basalt hills. The very low gradient profile of the valley promotes substantial meandering of the rivers.

Soils in the Middle Fork subbasin tend to be unstable and finely textured with high clay content. Mass wasting from steep slopes, and less severe but more pervasive surface erosion, contributes substantial sediment and turbidity to downstream areas. Shoreline erosion from winter wave action results in high turbidity in Hills Creek Reservoir and in downstream waters.

The Lookout Point and Dexter projects divide the Middle Fork subbasin, limiting upstream fish passage and greatly influencing downstream hydrologic regimes, temperature patterns, sediment and bedload transport, and large wood delivery to the lower reaches. The North Fork of the Middle Fork Willamette River and Salt and Salmon Creeks are major tributaries in the upper subbasin that historically supported anadromous fish populations. The upper Middle Fork Willamette River flows through a narrow, steep forested canyon. Hills Creek Dam further divides the upper subbasin. The river's gradient decreases from 2.6 percent upstream of Hills Creek Reservoir to approximately 0.5 percent between Hills Creek Dam and Lookout Point Reservoir.

Below Dexter Dam, the Middle Fork Willamette River flows into the wide, alluvial Willamette Valley. Fall, Little Fall, and Lost Creeks are major tributaries in the lower subbasin. Below Dexter, the river is very low gradient (less than 0.2 percent) and flows through a relatively wide valley with an extensive floodplain.

As the leading land use in the subbasin, commercial forestry has contributed to degradation of fish habitat by modifying hydrology and increasing sediment inputs and water temperatures. Mature and old-growth forest currently occupy about 36 percent of the Hills Creek Reservoir drainage, which has been estimated to be a loss of 55 percent from historic conditions (NPCC 2004a). The lower subbasin is dominated by agricultural and urban land uses that constrain the river's ability to meander and have resulted in the removal of much of the riparian gallery forest.

The communities of Oakridge, Westfir, Lowell, Dexter, Fall Creek, Jasper and portions of south Springfield and Pleasant Hill all lie within the Middle Fork subbasin. The North Fork of the Middle Fork Willamette River is a designated National Wild and Scenic River.

This study is primarily focused on the floodplain below Dexter Dam to the confluence with the Coast Fork Willamette River. This lower floodplain area is the primary area of interest for this study for restoring natural floodplain processes and habitats. The upper subbasin has a narrower valley and floodplain. Some opportunities may exist for floodplain restoration above Lookout Point Reservoir, but are not considered further in this report.

1.7.3 River Reaches

To more effectively describe the conditions in the lower rivers and their floodplains based on geomorphic and land use conditions of the Coast Fork and Middle Fork Willamette Rivers, each river has been broken into the reaches outlined below and shown in Figure 3.

Throughout this report, river mile locations on each fork are referenced in the text. River Mile (RM) locations for the Coast Fork start at RM 0 (corresponding to the confluence with the Middle Fork) and extend upstream. When referencing RM locations for the Middle Fork, the confluence of the Coast Fork and Middle Fork is referred to as RM 187 and increases moving upstream along the Middle Fork, which continues the river mileage of the mainstem Willamette where RM 0 is the confluence with the Columbia River.

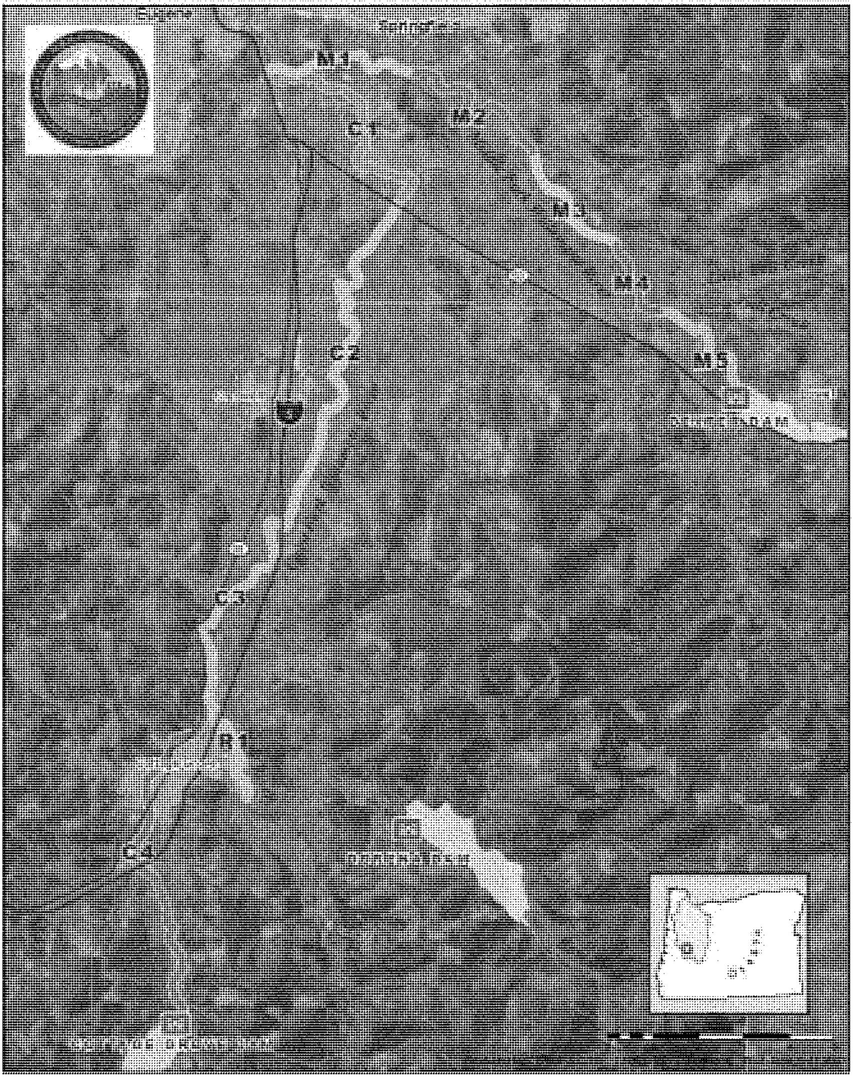


Figure 3. Coast Fork and Middle Fork with Study Reaches Delineated

Coast Fork Willamette River

1. *Reach C1 – Middle Fork/Coast Fork confluence to Highway 58 crossing (RM 0 to 6.4).* This reach is 6.4 miles in length and flows between Buford Park and I-5/Hwy 58 for its entire length. There are two tributaries that enter this reach, Wild Hog and Papenfus Creeks, and several remnant sloughs or cut-off meanders of the river. Land uses in the floodplain include agriculture, rural residential, suburban residential, and park/open space. Howard Buford Recreation Area (Lane County) occupies the majority of the right bank in this reach. There are numerous roads and residential structures in the left bank floodplain, with several dense developments. There are several gravel ponds located near the confluence. There are five crossings of the Coast Fork in this reach, the private access road to the gravel pits, Seavey Loop Road, two transmission lines, and Hwy 58. This reach is predominantly a single-thread channel with rock bank protection in many locations, except at the confluence where gravel bars and islands are present.

2. *Reach C2 – Highway 58 crossing to I-5 crossing (RM 6.4 to 15.6).* This reach is 9.2 miles in length and the Coast Fork flows through a wide and more rural floodplain. There are numerous revetments along this reach that reduce the tendency to meander. The left bank floodplain is developed in a large portion of this reach with residential and other development in the City of Creswell. There are three tributaries that enter this reach, Camas Swale, Bear, and Hill Creeks and several remnant sloughs or cut-off meanders of the river. Land uses in the floodplain include agriculture, golf course, rural residential, suburban residential, industrial, and park/open space. There are numerous roads and residential structures in the floodplain, with several dense developments. There are only two crossings in this reach, Cloverdale Road and I-5. There are numerous houses immediately adjacent to the river upstream of Cloverdale Road, but very few structures within 1000 feet of the river downstream of Cloverdale Road. The portion of the reach between where the tributaries enter still has a fairly substantial riparian forest and multiple sloughs and off-channel areas.

3. *Reach C3 – I-5 crossing to Row River confluence (RM 15.6 to 21).* This reach is approximately 5.4 miles in length and is constrained to a fairly narrow floodplain between I-5 and Highway 99. There are numerous gravel ponds in this reach. There are three tributaries that enter this reach, Gettings and Hill Creeks, and the Row River, and several remnant sloughs or cut-off meanders of the river. Land uses in the floodplain include agriculture, rural residential, suburban residential, and industrial. There is only one crossing in this reach, Saginaw Road. Figure 4 shows an existing oxbow in this reach.

Figure 4. Remnant Oxbow along Coast Fork near Camas Swale

4. *Reach C4 – Row River confluence to Cottage Grove Dam (RM 21 to 29.6).* This reach is approximately 8.6 miles in length and flows from Cottage Grove Dam to the downstream end of Cottage Grove. This reach is fairly confined along most of its length, first in the City of Cottage Grove and then in the narrower floodplain below the dam. There are thirteen tributaries that enter this reach, Piper, Langdon, Snyder, Lane, Cooley, Finney, Martin, Silk, and Bennett Creeks, and four unnamed creeks. Land uses in the floodplain include agriculture, urban residential, commercial, industrial, rural residential, a golf course and developed athletic facilities, and park/open space. There is high density development through the City of Cottage Grove. In general, there is limited undeveloped floodplain in this reach.

5. *Reach R1 – Row River Confluence to Row River Road (RM 0 to 2.8).* This reach is approximately 2.8 miles in length and is constrained by I-5 and the Cottage Grove Airport, although the confluence area is fairly unconstrained and undeveloped and much of the confluence area and the left bank upstream is owned by the City of Cottage Grove. There are two crossings in this reach, I-5 and Row River Road at the upstream end. Land uses in the floodplain include a golf course, airport, residential and commercial development, and City-owned parkland and open space.

Middle Fork Willamette River

1. *Reach M1 – Middle Fork/Coast Fork confluence to Springfield Millrace (RM 187 to 191).* This reach is approximately 4 miles in length and generally flows along the southern edge of the City of Springfield. The Middle Fork is constrained by some revetments and natural basalt hill slopes, but there is otherwise a large area of floodplain in this reach. The river flows adjacent to Howard Buford Recreation Area (Mt.

Pisgah) on the south. Several gravel pit ponds are present directly adjacent to the river on the south side and gravel mining within the channel has occurred in the past in this reach. The Springfield Millrace is a diversion from the river that flows approximately 4 miles northwest and re-enters the mainstem Willamette River downstream of the confluence. The Springfield Utility Board operates a well field in the floodplain, partially fed by infiltration from Gorrie Creek, a secondary diversion off of the Millrace. Land uses in the floodplain include agriculture, rural residential, sand/gravel mining, and park/open space. There are very few structures located within 1000 feet of the Middle Fork in this reach, except on the right bank at the Middle Fork/Coast Fork confluence and some houses adjacent to the Millrace. A large portion of the floodplain in this reach is publicly owned, as well as one major private landowner (The Nature Conservancy recently acquired Wildish Land Company's property). Islands and bars are present in the river in several locations.

2. *Reach M2 – Springfield Millrace to Hills Creek confluence (RM 191 to 195.2).* This reach is approximately 4.2 miles in length and generally flows from Jasper to Springfield. There are multiple Corps revetments in this reach, although there is limited development in the floodplain. The revetments generally protect agricultural lands. The Springfield-Creswell Highway and Southern Pacific Railroad line are located very close to the Middle Fork and constrain the river's right bank for approximately 1.5 miles of this reach. The tributaries that enter this reach include Pudding and Wallace Creeks and Hill Creek. Land uses in the floodplain include agricultural, rural residential, gravel mining, and forested/undeveloped. There is a major electrical transmission line crossing in this reach as well as the Springfield-Creswell Highway bridge. Several old meander scars and oxbows are present in this reach. Figure 5 shows a representative section of this reach near Clearwater Park.

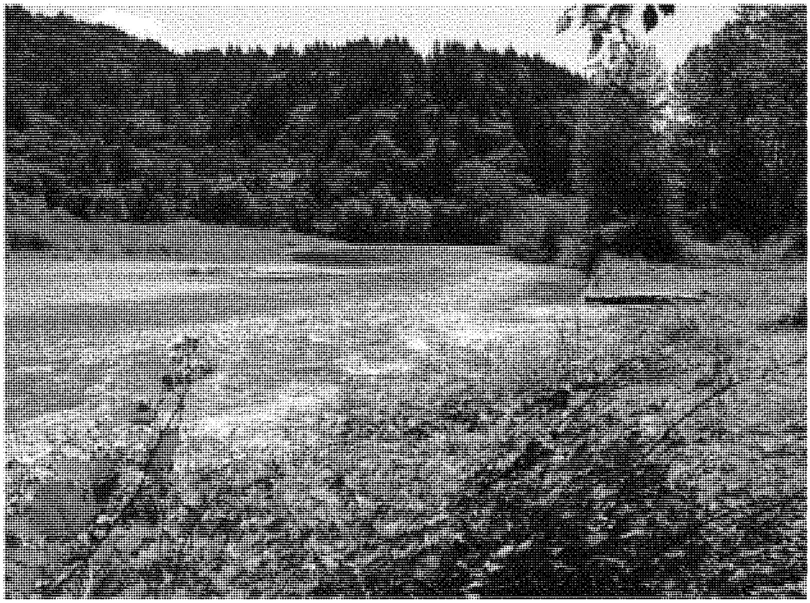


Figure 5. Middle Fork Willamette River at Clearwater Park

3. *Reach M3 – Hills Creek confluence to Fall Creek confluence (RM 195.2 to 198.3).* This reach is approximately 3.1 miles in length and flows primarily adjacent to Jasper, OR. The Middle Fork is less constrained by roads in this reach, although the Jasper-Lowell Road goes through the right bank floodplain, along with residential streets in the left bank floodplain. The primary tributaries that enter this reach are Rattlesnake and Fall Creek. Little Fall Creek is a major tributary to Fall Creek. Land uses in the floodplain include agriculture, rural residential, industrial, and park/open space. Development is more dense in this reach than in Reaches M1 or M2 associated with Jasper and Pleasant Hill, and there is limited opportunity for floodplain restoration on the left bank, except for the area immediately adjacent to the railroad crossing. There are numerous structures located within 1,000 feet of the Middle Fork in this reach. There is only one major crossing in this reach, the Southern Pacific Railroad line. This reach has numerous islands and bars and is braided in multiple locations.

4. *Reach M4 – Fall Creek confluence to Lost Creek confluence (RM 198.3 to 200.6).* This reach is approximately 2.3 miles in length and flows through a highly braided section likely influenced by alluvial deposits from both Fall and Lost Creeks. There is limited development in the floodplain in this reach and a moderate riparian zone. Land uses in the floodplain include agriculture, rural residential, and park/open space. There is a power line crossing in this reach. This reach has numerous islands and bars and old meander scars and oxbows.

5. *Reach M5 – Lost Creek confluence to Dexter Dam (RM 200.6 to 203.8).* This reach is approximately 3.2 miles in length and is located primarily within Elijah Bristow State Park. The river meanders and braids through this reach fairly extensively. The river is constrained in some locations by roadways, but otherwise is not constrained. There are several remnant or high flow side channels that could be reconnected to the river in this reach.

2. EXISTING PROJECTS AND RELATED STUDIES/PROGRAMS

There have been multiple water resources infrastructure projects developed in the Middle and Coast Forks subbasins, and there continues to be additional development of plans and implementation of restoration and enhancement measures in many parts of the Willamette River Basin. Major Federal, state, and local initiatives and programs are summarized below, with an emphasis on those pertaining to the Coast Fork and Middle Fork subbasins.

2.1 CORPS OF ENGINEERS

2.1.1 Willamette Projects

The major tributaries of the Willamette River, including the Coast and Middle Forks, are regulated by the Corps of Engineers' multiple purpose dams. There are five large storage reservoirs and one re-regulating reservoir (Dexter) in the Coast Fork and Middle Fork subbasins (Table 3). These projects are part of a system of 13 multiple-purpose dams and reservoirs in the overall Willamette Basin constructed by the Corps. The annual weather patterns and runoff characteristics of the Willamette Basin make the multiple purpose operation of the reservoir system possible. The well-defined limits of the flood season allow the reservoirs to be drawn down in the fall and winter to catch flood flows. The reservoirs are then filled in the spring and held full as long as possible in the summer so that water stored in, or released from the reservoirs can serve a variety of beneficial uses. Each reservoir is operated on the basis of a water control plan (rule curve) which establishes the elevation at which the pool is to be maintained during various seasons and seasonal transitions.

The original authorized plan for the Willamette projects is described in House Document 544, 75th Congress, third session, March 16, 1938. The plan for open-river navigation improvement above Willamette Falls stipulated a minimum flow of 5,000 cubic feet per second (cfs) between Albany and the Santiam River, and 6,500 cfs downstream to Salem to provide navigation depths of 6 feet and 5 feet, respectively. House Document 544 also recognized that these navigation flows would increase flows during the low-water period and would "benefit sanitary conditions along the main stream" by diluting wastes and would increase "the dissolved oxygen content of the stream with a resultant beneficial effect on fish life."

Table 3. Corps Projects in the Coast Fork and Middle Fork Subbasins

Project	River	Date Completed	Flood Storage Capacity (acre-feet)	Total Storage (acre-feet)	Drainage Area (sq. miles)
Coast Fork Subbasin					
Dorena	Row River	Oct 1949	70,500	71,900	265
Cottage Grove	Coast Fork Willamette	Sep 1942	30,060	31,790	104
Middle Fork Subbasin					
Hills Creek	Middle Fork Willamette	Aug 1961	200,000	350,600	389
Lookout Point	Middle Fork Willamette	Nov 1953	337,300	443,000	991
Dexter*	Middle Fork Willamette	Dec 1954	7,200	29,900	996
Fall Creek	Fall Creek	Oct 1965	115,000	117,500	184

*Dexter is a re-regulating project below Lookout Point Dam.

Navigation is currently a minor purpose of the system, and the navigation flow requirements originally established at Albany and Salem are now utilized as control points for fishery and water quality objectives. Minimum authorized instream flows are required for fish and other aquatic life below each dam and are higher than historic flows during the summer. These flows serve indirectly as partial mitigation for effects of each dam and reservoir complex on the aquatic ecosystem (Corps 2000a). The rest of the mitigation for aquatic impacts of the Coast and Middle Forks dams is met through production of salmon and trout at the Willamette Hatchery in Oakridge, operated by the Oregon Department of Fish and Wildlife (ODFW).

The Corps coordinates an annual summer flow augmentation plan with federal, state, and local agencies. The coordination process attempts to balance the state's water management objectives for the Willamette with Corps policy, flexibility, and project authorizations. The flexibility to manage any one reservoir is influenced both by project authorizations and the Corps' discretionary authority. There also are provisions for adjustments to the state's water management objectives for flow conditions in terms of average, better, or below normal water conditions.

Middle Fork Subbasin Projects

In the Middle Fork subbasin, the Hills Creek project, completed in 1961, is located at RM 234.8 on the Middle Fork Willamette River. It is operated in conjunction with Lookout Point to meet summer instream flow needs on the mainstem Willamette River. The Hills Creek embankment dam is 338 feet high, impounds 350,600 acre-feet of water at full pool, and controls runoff from a 390 square-mile drainage area. An authorized minimum release flow of 100 cfs is maintained below the dam from February through November. However, because this is less than the minimum discharge (300 cfs) required for efficient operation of the power generation units, no power is generated if flow drops below 300 cfs.

Lookout Point is located at RM 208.3 on the Middle Fork Willamette River. Dexter Dam is located about 3 miles downstream and re-regulates the releases from Lookout Point to provide more consistent flows downstream and additional power generation. The Lookout Point embankment dam is 258 feet high and impounds 443,000 acre-feet of water at full pool, while the Dexter embankment dam is 107 feet high and impounds 29,900 acre-feet of water (Figure 6).

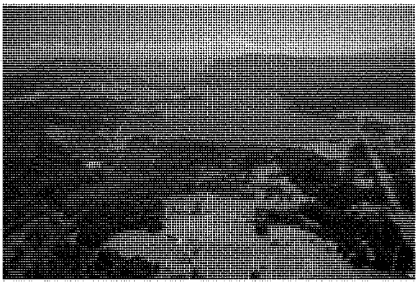


Figure 6. Dexter Reservoir

Lookout Point has a large storage capacity and is the first of the 13 Willamette reservoirs to be drafted in the spring and early summer for meeting flow requirements on the mainstem Willamette River. An authorized minimum flow of 1,200 cfs is maintained below Lookout Point/Dexter from February through June, and 1,000 cfs from July through November.

The Fall Creek project, completed in 1965, is located at RM 7.2 on Fall Creek, a tributary of the Middle Fork Willamette River. It controls runoff from a 184-square-mile drainage area. The 193-foot-high embankment dam impounds 117,500 acre-feet of storage at full pool. There are no hydropower facilities at the project. The lake has substantial recreational use in summer. An authorized minimum flow of 30 cfs is maintained below the dam from February through November. However, a negotiated discretionary minimum flow of 150 cfs between April and June and then limiting maximum flows below the dam to 1,000 cfs from September through October is done as part of the state's water management objectives. Fish collection facilities are provided and Chinook salmon collected at Fall Creek are transported to state hatcheries. Steelhead migrating upstream are collected and transported past the dam. Fingerlings migrate downstream through a collection system and bypass conduit at the dam.

Coast Fork Subbasin Projects

In the Coast Fork Willamette River subbasin, the Dorena project, completed in 1949, is located at RM 6.5 on the Row River. It controls runoff from a 265-square-mile drainage area. The dam is 145 feet high and impounds 71,900 acre-feet of storage at full pool. There are no hydropower facilities at the project. An authorized minimum flow of 190 cfs is maintained below the dam from February through June, and 100 cfs from July through November.

Figure 7. Cottage Grove Reservoir

The Cottage Grove project, completed in 1942, is located at RM 29 on the Coast Fork Willamette River and also includes revetments at 9 locations downstream. It controls runoff from a 104-square-mile drainage area. There are no hydropower facilities at the project. The dam is 95 feet high and impounds 31,790 acre-feet of water at full pool (Figure 7). An authorized minimum flow of 75 cfs is maintained below the dam from February through June, and 50 cfs from July through November.

2.1.2 Willamette River Bank Protection Program

The Willamette River Bank Protection program protects public and private lands in the Willamette Valley from erosion damage. The program was authorized by the Flood Control Acts of 1936, 1938, and 1950 and covers bank protection and channel clearing works along the Willamette River from New Era (approximately RM 30; upstream of Willamette Falls) and upstream to each Corps dam. Project components include bank revetments, pile and timber bulkheads, drift barriers, minor channel improvements, and continued maintenance for flood protection and the prevention of bank erosion and to maintain an efficient discharge channel below the flood control reservoirs operated by the Corps. This program was an integral part of the overall Willamette River flood control project.

In 1947, the Corps specified that approximately 6 miles of levees with a mean height of 6 feet would be required to provide adequate channel capacity for controlled flood discharges released from the dams in the Middle Fork subbasin. As of 1989, approximately 50 percent of the lower 8 miles of the river had been protected by levees or revetments (Corps 2000a).

The Corps also specified that construction of 11-foot-high levees along the Coast Fork Willamette from Cottage Grove (RM 23) to the confluence with the Middle Fork would prevent flood damage, but determined that the cost of construction outweighed the benefits at that time (Corps 2000a). A need for approximately 4.3 miles of levee along the Row River also was noted. As of 1989, approximately 5 miles of levees and revetments had been constructed on the Coast Fork downstream of RM 12, and 1 mile of levees and revetments had been constructed on the lower Row River (Corps 2000a).

2.1.3 Middle Fork Willamette River Fishery Restoration Project

A reconnaissance study was completed in 1997 that evaluated the potential to modify the Hills Creek and Lookout Point/Dexter projects to restore native runs of spring Chinook salmon and winter steelhead upstream of the dams (Corps 1997). The study evaluated alternatives for adult and juvenile passage and identified four alternatives for re-establishing fish runs above Lookout Point Reservoir. The alternatives were combinations of measures providing both juvenile and adult passage past the Lookout Point/Dexter projects. Two of the alternatives also provided temperature control of water releases from Hills Creek Dam to facilitate upstream migration. While Federal interest in further study was demonstrated, a feasibility level study will not proceed until a local sponsor is able to cost-share a study.

2.1.4 Willamette Project Operations Biological Opinion

A Biological Assessment (BA) was prepared by the Corps (Corps 2000a) to assess the ongoing operation and maintenance of the Willamette projects in accordance with Section 7 of the Endangered Species Act (ESA). The BA included the Bureau of Reclamation and Bonneville Power Administration (BPA) as action agencies. The BA evaluated the likely effects of the Willamette projects for species listed under the ESA and their critical habitats. The BA concluded that continued operation and maintenance of the projects was likely to adversely affect several listed species. On the basis of this finding, the action agencies requested formal Section 7 consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS).

The services prepared a draft joint Biological Opinion in 2000. In 2001 and 2002, the services worked with the action agencies to define a Reasonable and Prudent Alternative (RPA) that would reduce effects on listed species. In 2003, the services determined that they should prepare separate Biological Opinions for the project and included an Updated Proposed Action proposed by the action agencies. Revised draft Biological Opinions were completed in 2003 and 2004. A supplemental BA was prepared in 2007 (Corps 2007).

The NMFS and USFWS completed final separate but coordinated Biological Opinions (BiOps) in 2008 addressing the effects of the operation and maintenance of the Willamette Project on the respective listed species for which they are responsible (NMFS 2008a; USFWS 2008). In its BiOp, NMFS determined that the continued operation of the Willamette Project was likely to jeopardize continued existence of the Upper Willamette spring Chinook and winter steelhead and adversely modify their critical habitat. Thus, this required the development and inclusion of a RPA to the proposed action. The USFWS agreed to use the RPA developed by NMFS in the preparation of its BiOp. The following measures have been included in the RPA for the action agencies to implement in addition to those actions already proposed in the BA. A total of 10 major components were included:

1. Creation and coordination of a multi-agency action team for ecosystem restoration to oversee flow management activities and other interim measures to avoid jeopardy to the listed species.
2. Operational modifications to modify flows to provide more natural seasonal fluctuations and access to riverine/floodplain habitats and provide suitable flows for out-migrating juveniles in the spring and summer and also to provide adequate rearing habitat and temperatures for fish during the summer/fall months. Additional monitoring activities such as the installation of new gages and instream flow studies will help to inform and revise minimum flow targets in future years.
3. Evaluate and update water contracts and require fish screening at all diversions receiving federally provided water.

4. Provide fish passage at the dams through a variety of methods including outplanting, trap and haul, fish collection, downstream passage through dams, and other methods to be identified through the development of a Willamette Fish Operations Plan. Upgrade facilities to comply with the plan.
5. Improve water quality downstream of the dams by operational activities and facility upgrades/construction at dams to provide more normative water temperatures and reduced total dissolved gas in the tributaries and mainstem Willamette.
6. Evaluate and modify hatchery operations through Hatchery and Genetic Management Plans and other measures such as upgrades to facilities and mass-marking of hatchery releases.
7. Implement habitat mitigation and restoration measures throughout the basin (at both off-site and on-site locations). Collect and make large woody debris available and restore habitat at existing Corps revetments. Funding to be provided through existing funding programs such as the:
    - Columbia Basin Fish and Wildlife Program,
    - Continuing Authorities Programs,
    - General Investigation Studies (applicable GI studies include the Willamette Floodplain Restoration Study, Eugene-Springfield Metro Area Watershed Feasibility Study, and Lower Willamette Ecosystem Restoration Feasibility Study),
    - Planning Assistance to the States
    - Upper Willamette Watershed Ecosystem Restoration Authority (Section 3138, Water Resources Development Act [WRDA] 2007),
    - Ecosystem Restoration and Fish Passage Authority (Section 4073, WRDA 2007),
    - Sustainable Rivers Partnership with The Nature Conservancy.
8. Conduct ESA compliance and coordination activities with NMFS and USFWS.
9. Develop and implement a comprehensive research, monitoring and evaluation plan.
10. Identify fish protection maintenance needs.

2.1.5 Willamette Flow Management Project

The Nature Conservancy, in partnership with the Corps and other stakeholders, has begun a study to evaluate the potential benefits of modifying the operation of several dams in the Willamette basin. The study will focus on the Coast Fork, Middle Fork, McKenzie, and North and South Fork Santiam Rivers below the Corps dams and the mainstem Willamette River down to Salem. The purpose of this study will be to understand how modified flows could benefit species and ecosystems within the context of existing flood control, recreation, and irrigation needs. Key elements of the study include:

- Compile existing information and literature describing current data and knowledge on the flow requirements of the river-floodplain system and native species and communities.
- Develop ecological models to link flow conditions to ecological processes and biotic response.
- Hold a workshop with key scientific experts to develop initial flow recommendations based on ecological objectives and identify critical information gaps. Initial quantitative flow recommendations will include recommended ranges for low flow, high flow and flood pulses, duration and frequency of each, and the rate of change from one condition to another.
- Develop a monitoring program to evaluate the ecological effects of implementing the recommended flow regimes. Utilize model simulations or economic analysis to evaluate the effects of flow changes on reservoir operations and ability to meet the multi-use purposes of the dams. Utilize existing hydrologic models to evaluate effects on downstream hydrographs and water surface elevations.
- Apply adaptive management principles to refine flow targets and dam modifications.

2.2 STATE OF OREGON

2.2.1 Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead

In August 2011, ODFW with participation from the Governor's Natural Resource Office and NMFS adopted their final recovery plan for Chinook salmon and steelhead in the Upper Willamette River watershed. While the NMFS is responsible for preparing recovery plans for listed species, the State of Oregon wishes to be a strong partner in the delisting and recovery of salmonids for future generations and has thus, led the preparation of this plan. The plan identifies delisting goals, recovery goals, current status, viability gaps, and limiting factors, and then outlines a management strategy to fill the viability gaps, reach the delisting goals and progress towards the broader recovery goals. Fourteen management strategies were identified, 11 of which are relevant to habitat conditions: 1) protect and conserve natural ecological processes that support the viability of wild salmon and steelhead populations and their life history strategies throughout their life cycle; 2) restore floodplain connectivity and function and maintain unimpaired floodplain connectivity and function; 3) restore riparian condition and large woody debris (LWD) recruitment and maintain unimpaired conditions; 4) restore passage and connectivity to habitats blocked or impaired by artificial barriers and maintain unimpaired passage and connectivity; 5) restore and maintain hydrologic regimes that support the ecological needs of wild salmon and steelhead populations; 6) restore channel structure and complexity and maintain unimpaired structure and complexity; 7) restore impaired food web dynamics and function and maintain unimpaired dynamics and function; 8) restore degraded water quality and maintain unimpaired water quality; 9) restore degraded upland processes to minimize unnatural rates of erosion and runoff and maintain natural upland processes; 10) reduce the impact of non-native plants and animals on wild salmon and steelhead populations and prevent the introduction of new non-native plants and animals; and 11) reduce predation on wild salmon and steelhead that has been exacerbated by anthropogenic changes to the ecosystem.

2.2.2 Oregon Plan for Salmon and Watersheds

In April 1997, the *Oregon Plan for Salmon and Watersheds* (the Oregon Plan) was adopted by the Oregon Legislature. The Oregon Plan represents commitments on behalf of government, interest groups and citizens from all sectors of the state to protect and restore watersheds for the benefit of salmon, and the economy and quality of life in Oregon. The Oregon Plan originally evolved from two components: 1) the Healthy Streams Partnership, a cooperative effort among landowners, government, and interest groups aimed at improving and preserving water quality in water quality limited streams in Oregon, and 2) the Coastal Salmon Restoration Initiative, which guides habitat restoration efforts for coastal coho salmon in an effort to restore populations to sustainable levels. The Oregon Plan also serves as a federally recognized restoration plan for coastal coho salmon. In December 1997, a steelhead supplement was added to the Oregon Plan, including those in the upper Willamette Basin, and addressed fish restoration within the context of watershed health.

2.2.3 Willamette Partnership

In September 1998, Governor John Kitzhaber established the Willamette Restoration Initiative (now the Willamette Partnership). The Partnership was established to develop and implement a long-range conservation plan for the Willamette River and its watershed. Completed in 2001, this conservation plan, called the Willamette Restoration Strategy, is the Willamette chapter of the Oregon Plan. The Willamette Restoration Strategy identifies 27 critical actions needed to preserve and improve watershed health in the areas of water quality, water supply, habitat and hydrology, and institutions. Two of the actions call for more detailed identification of fish and wildlife conservation priorities and more integrated environmental planning. The development of the *Willamette Subbasin Plan*, below, represents substantial progress for the Partnership in both of these areas.

2.2.4 Willamette Subbasin Plan

The Northwest Power Act directs the Northwest Power and Conservation Council (NPCC) to develop a program to protect, mitigate, and enhance fish and wildlife of the Columbia Basin and to make annual funding recommendations to the BPA for projects to implement the program. The purpose of subbasin planning is to document subbasin conditions and evaluate and define strategies that will drive the implementation of the Fish and Wildlife Program at the subbasin level. The NMFS and USFWS also use the plans in their recovery planning efforts for threatened and endangered species. The NPCC designated the Willamette Partnership as the lead entity for developing the *Willamette Subbasin Plan*, which was completed in May 2004 (Phase 1 of this study). The plan includes a compendium of current knowledge about basin conditions (particularly fish and wildlife and their habitats), an inventory of existing plans and programs, and strategies and actions to implement the plan. This plan is the basis for developing more detailed studies and restoration designs in the basin.

2.2.5 Total Maximum Daily Loads

The Oregon Department of Environmental Quality (ODEQ) is required to establish Total Maximum Daily Loads (TMDLs) for stream segments in the state that do not meet water quality standards and are listed under Section 303(d) of the Clean Water Act. The *Final Willamette Basin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP)* were completed and approved in 2006 for all Willamette Basin streams and developed waste load allocations for individual facilities (point sources) and for nonpoint sources. Some stream segments in the Middle Fork subbasin do not meet standards for temperature and dissolved oxygen, and some segments in the Coast Fork subbasin do not meet standards for temperature, bacteria, dissolved oxygen, and mercury. More information on TMDLs and specific recommendations for the Middle Fork and Coast Fork are found in Section 3.2.4.

2.2.6 Conservation Reserve Enhancement Program

The Oregon Conservation Reserve Enhancement Program (CREP) is a cooperative program between the U.S. Department of Agriculture and the State of Oregon that provides financial incentives for riparian restoration along agricultural lands. The program was created in 1998 with a purpose to establish riparian vegetation on agricultural lands, protect water quality and restore fish and wildlife habitat. CREP allows agricultural landowners to enroll eligible near-stream lands into a 10- to 15-year contract and receive annual conservation payments for the contract period, cost reimbursement, and other financial incentives. The program was recently amended to provide more riparian restoration options for pasture and rangeland statewide. This program could be used as an incentive to landowners that may be interested in participating in this study, although the short-time period for contracts may not provide adequate guarantees of habitat restoration or protection in perpetuity.

2.2.7 Native Fish Conservation Policy

In November 2002, the Oregon Fish and Wildlife Commission adopted the Native Fish Conservation Policy. The policy is focused on the conservation and recovery of naturally produced native fish. There are three major goals of the policy: 1) prevent the serious depletion of native fish; 2) maintain and restore naturally produced fish in order to provide substantial ecological, economic, and cultural benefits to the citizens of Oregon; and 3) foster and sustain opportunities for fisheries consistent with the conservation of naturally produced fish and responsible use of hatcheries. This policy will allow the management of hatcheries, habitat, fish harvest, predators, competitors, and water quality across the state with the goal of recovery naturally produced native fish.

2.2.8 Willamette River Legacy Program

On March 5, 2004, Governor Ted Kulongoski announced that his "top environmental priority over the next three years is to clean up the crown jewel of Oregon's river system – the Willamette River…from the headwaters east of Eugene all the way to the Columbia." Governor Kulongoski identified three priority areas of focus for the *Willamette River Legacy Program*. The plan lists a number of high priority actions for each of the following themes.

1. Repair – clean up the industrial pollutants and toxins that have contaminated the river.
2. Restore – return the river to its natural state, restoring its abundant wildlife and pristine riverbanks. Recommended high priority actions that are particularly relevant to this study include protection/restoration of floodplain functions and restoration of riparian habitats.
3. Recreate – address the role that the Willamette River plays in Oregon's quality of life so Oregonians can enjoy the many activities the river offers, and to do so responsibly so that it will be here for future generations.

2.2.9 Oregon Parks and Recreation Department Master Plan

The Oregon Parks and Recreation Department (OPRD) completed a final Master Plan for management of their parks on the Middle Fork Willamette River and Dexter and Fall Creek Lakes (OPRD 2006). The planning process includes 15 properties that OPRD owns or leases, reaching from Jasper State Recreation Site on the lower Middle Fork to Fisherman's Point campground at the upper end of Fall Creek Reservoir. Input was gathered from an Advisory Committee and a wide variety of stakeholders to develop long-term plans for further development to accommodate recreation needs and opportunities. Plans for further actions at the sites below Dexter Dam acknowledge the presence of several high quality habitats and will provide additional protections for these habitats. The Master Plan also references the potential for floodplain restoration activities in conjunction with the Corps of Engineers and other partners.

2.3 LOCAL INITIATIVES AND PROGRAMS

2.3.1 Oregon Habitat Joint Venture

The Oregon Habitat Joint Venture is a coalition of groups and agencies involved in cooperative efforts to protect and restore important habitats for birds and other native fish and wildlife. As the Oregon arm of two larger, regional joint ventures – the Pacific Coast Joint Venture and the Intermountain West Joint Venture – this partnership serves as a vehicle for implementation statewide of national and international conservation initiatives targeting habitat for birds.

The primary purpose of the *Pacific Coast Joint Venture Implementation Plan, Willamette Valley* (Roth *et al.* 2004) is to provide a common framework for action by the joint venture partners. It also may serve other purposes by highlighting habitat conservation needs and opportunities at an ecoregion scale, and to provide a strategic framework for site-specific habitat protection and restoration projects. One of the target areas in the plan is the Willamette Forks Confluence area. The confluence holds tremendous potential for restoring a diverse array of wetlands.

Camas Swale is a broad band of hydric soil and floodplain area that is currently farmed. There is potential to restore wet prairie habitat throughout the area and upland prairie and oak savanna on the fringes of the swale. The Natural Resources Conservation Service has purchased one permanent easement in this area and the City of Creswell owns a small parcel. Recommended actions in the confluence area include:

- Protect and restore an additional 1,000 acres of floodplain habitat around the confluence area through conservation easements and fee title acquisition from willing landowners.
- Restore / enhance oak savanna and woodland habitats at Howard Buford Recreational Area and Camas Swale.
- Acquire and protect intact floodplain forest along the Middle Fork Willamette River.
- Protect and restore wetlands in the Camas Swale area through conservation easements and fee title acquisition from willing landowners.
- Create a riparian and floodplain corridor along the Coast Fork Willamette River from the confluence upstream to Creswell.

These recommended actions are very similar to and compatible with the objectives of this restoration study and will be considered further in the study for potential high priority floodplain restoration areas. It may also be possible to leverage Joint Venture funds with Corps funding.

2.3.2 Willamette River Basin Planning Atlas

The *Willamette River Basin Planning Atlas* (Hulse *et al.* 2002) is a product of the Pacific Northwest Ecosystem Research Consortium, a regional research consortium involving researchers at Oregon State University, the University of Oregon, the University of Washington and the U.S. Environmental Protection Agency (EPA) supported under cooperative agreement between the EPA and the universities. The intent of the research is to: 1) create a regional context for interpreting trajectories of landscape and ecosystem change; 2) identify and understand critical ecological processes; and 3) develop approaches for evaluating outcomes of alternative future land and water use, management, and policy. The Planning Atlas provides current available information about critical natural and cultural factors influencing land and water use decisions in the Willamette Basin. The information was used to create a set of mapped depictions of three plausible future configurations of land and water use for the basin in the year 2050 including: Plan Trend 2050, Development 2050, and Conservation 2050. These alternative futures were then scientifically evaluated for their effects on important environmental and ecological processes.

Future scenario Plan Trend 2050 depicts a future in which the currently published policies of civil jurisdictions and land management agencies, and the currently dominant practices in private agriculture and forestry would be extrapolated to the year 2050. Development 2050 is a future scenario in which legal and administrative land use regulations would be relaxed relative to Plan Trend, and market forces would have greater influence. The Conservation 2050 scenario projects a future in which the conservation and restoration of ecological function would play a larger role in land and water allocation decisions. There were significant differences in environmental qualities among the scenarios with most indicators of natural resource condition showing substantial improvement in Conservation 2050 and little change or future decline in Plan Trend 2050 and Development 2050. Key features of the Conservation 2050 scenario include protection and restoration of riparian areas, conifer forests, grasslands, and oak savannah habitats.

2.3.3 Region 2050, Southern Willamette Valley

Region 2050 is a voluntary, collaborative regional planning effort to improve and sustain the quality of life in the southern Willamette Valley over the next 50 years (Lane Council of Governments [LCOG] 2001). Region 2050 began in the summer of 1999 with the adoption of formal resolutions by the Lane County Board of Commissioners and the City Councils of Coburg, Cottage Grove, Creswell, Eugene, Junction City, Lowell, Oakridge, Springfield, Veneta, and Westfir. The resolutions endorsed the concept of developing a Regional Growth Management Strategy and defined the forum for the dialogue among the partners. Other collaborators include the Lane Transit District, local utilities, the Oregon Department of Land Conservation and Development, other state agencies, the Governor's office, and the League of Women Voters.

The outcome of this effort is the *Southern Willamette Valley Regional Growth Management Strategy*. The strategy includes an evaluation and goals for population growth, economic development, transportation infrastructure upgrades, and protection of the environment. Major recommendations relevant to this study include the likelihood of transportation upgrades (I-5 widening and Highway 58 improvements) that may constrain some reaches of the Coast or Middle Forks and the intent to protect and restore floodplain and riparian areas to minimize future problems and restore high quality habitats.

2.3.4 Lane County Parks

Lane County Parks is updating its *Parks and Open Space Master Plan*. The new master plan will replace the outdated 1980 master plan and will document the condition of the existing 61 county parks, analyze needs and issues, and set forth goals, policies and recommendations. Howard Buford Recreational Area is a key Lane County Park and includes floodplain areas that may provide key locations to restore floodplain functions through this study.

2.3.5 Coast Fork Willamette Watershed Council

The Coast Fork Willamette Watershed Council serves to improve water quality and watershed conditions in the Coast Fork Willamette subbasin through education, coordination, consultation and cooperation of diverse interests. The Council serves local communities by acting as a forum for natural resource issues which results in both broad-based science education and voluntary landowner participation in watershed restoration. In June 2005, an assessment of the Lower Coast Fork subbasin was completed. The assessment identifies impairments to water quality, hydrology, sedimentation, and riparian, wetland, and in-stream habitats. These impairments are caused by stream channel modifications due in part to land use practices intended for flood control, development, and agriculture. Priority action items for the Watershed Council as identified in the assessment include: riparian zone protection and restoration, floodplain reconnection, reintroduction of flooding along some segments, fish passage, and wetland restoration. The Council completed a 2-year Action Plan and a 5-year Strategic Vision in 2007 from the assessment and other data sources.

2.3.6 Middle Fork Willamette Watershed Council

The Middle Fork Willamette Watershed Council is a volunteer-based partnership of diverse stakeholders to work together as a community to restore and sustain the ecological integrity and economic viability of the watershed, and promote local control by providing effective voluntary solutions to watershed issues. The Council completed the Lower Middle Fork Willamette River Watershed Assessment in August 2002 and used the results of the assessment to develop a 5-year Action Plan for habitat restoration/protection, water quality, and education. Parameters assessed in the watershed assessment included hydrology, riparian condition, aquatic habitat condition, wetlands, water quality, and sediment. Many of the recommendations made in the action plan directly relate to this study. Such actions include protection and restoration of riparian areas, restoring floodplain connections and functions such as bar and side channel formation, removal/modification of revetments, and exploring opportunities to modify flows from the dams. The Council prioritized actions for the protection and restoration of floodplain and riparian forest areas, and is working with the Corps and other partners to identify and implement a comprehensive floodplain restoration strategy in the lower Middle Fork subbasin.

2.3.7 Friends of Buford Park and Mt. Pisgah

The mission of the Friends of Buford Park and Mt. Pisgah (FBP) is to preserve the ecological integrity of the 2,363-acre Howard Buford Recreation Area (the largest Lane County park) and its adjacent natural areas. Activities include:

- Restoring diverse native plant communities and the wildlife they support.
- Conducting public education and encouraging volunteer activities.
- Fostering public involvement in park planning, maintenance and enhancement.
- Raising funds for acquisition, development and operation of the park.

The dominant feature of the park is Mt. Pisgah, which rises 1,000 feet above the valley. The lands around the mountain are of incredible natural diversity. In particular the wetland, prairie and oak savanna habitats are some of the most valuable left in existence in the Willamette Valley. Hundreds of plant species, dozens of birds and mammals, numerous reptiles and amphibians, and countless insects and fungi make the park their home. A trail system of over 16 miles allows access to the recreation area's natural beauty.

FBP completed the South meadow project (see Figure 8 below) to restore more frequent flows to a side channel of the Coast Fork Willamette River within Lane County's Howard Buford Recreation Area, at the foot of Mt. Pisgah. In 2003, FBP and Lane County Parks Division collaborated to remove obstructions at the inlet, outlet and along the course of two side channels of the Coast Fork and removing dirt to restore more frequent flows through the site. This project is a good example of a side channel reconnection and floodplain/riparian revegetation project along the Coast Fork Willamette River.

Figure 8. South Meadow Project

3. CHARACTERIZATION OF BASELINE CONDITIONS

3.1 HISTORICAL CONDITIONS

3.1.1 Pre-Settlement

This assessment of conditions prior to Euro-American settlement is based on available reconstructions of historic conditions (Hulse *et al.* 2002; Holland 1994) and currently accepted hydrologic and biologic principles. It is intended to give a sense of what conditions were like historically in the lower Coast and Middle Forks study area.

Landscape and Vegetation

The pre-settlement landscape of the Willamette Valley was a highly complex mosaic of deciduous and coniferous forest, shrubland, prairies, and wetlands (Hulse *et al.* 2002; Holland 1994). Plant communities included Douglas fir forest, multiple oak savannah communities, mixed deciduous/coniferous forest, cottonwood riparian, alder/willow shrubland, chaparral, and wetlands and other aquatic features. The map of pre-settlement vegetation (circa 1851) in the *Willamette River Basin Planning Atlas* (Hulse *et al.* 2002) shows that the Coast and Middle Forks floodplains were a diverse mix of closed forest riparian (cottonwood gallery), emergent wetlands, woodland, savannah, and prairie.

The vegetation of the Willamette Valley was managed prior to European settlement by the native peoples. Kalapuyan people that occupied the Willamette Valley during the early 19th century are reported to have set regular fires in the study area (Hulse *et al.* 2002). These fires are believed to have maintained the prairie and oak savannah communities by preventing tree species from encroaching and dominating the landscape.

Both wet and dry meadows and prairies were extensive in the valley outside of the riparian gallery forest with species including: tufted hairgrass, slough grass, Roemer's fescue, June grass, slender wheatgrass, California oat grass and meadow barley (Christy *et al.* 1998 cited in CFWWC 2005). Riparian forests containing cottonwood, Oregon ash, big leaf maple, dogwood and willows lined the river banks. Oak savanna with a scattering of ponderosa pine and Douglas fir covered higher ground that did not flood in the winter. Further up the hill slopes were hardwood trees like big leaf maple, Oregon white oak and golden chinquapin. On the surrounding hills were forests of Douglass fir, grand fir, ponderosa pine, incense cedar, western hemlock and western red cedar (CFWWC 2005).

Wetlands likely were abundant in the Coast Fork and Middle Fork Willamette River subbasins. For example, based on the location and amount of hydric soils in the Coast Fork subbasin, wetlands have been estimated to have covered approximately 36 percent of the subbasin (CFWWC 2005). The Middle Fork subbasin floodplain has a predominance of alluvial soils demonstrating historic meandering of the river (SCS 1981). Many historic wetlands were likely created and maintained by beaver activity as well as the frequent migration of the rivers.

Fish and Wildlife

Information concerning wildlife species in the Middle Fork and Coast Fork subbasins prior to Euro-American settlement is limited to anecdotal information from Indian tribes and early settler accounts. However, accounts indicate that, in general, during aboriginal times, deer, elk, bear, and other land mammals were extremely abundant. Elk were tied closely to the prairies for grazing, deer utilized both prairie and forest areas, while brown bear, wolf, and coyote all foraged extensively in the grasslands (Holland 1994). Seasonal flocks of waterfowl used this habitat for forage and resting grounds, California condor scavenged the carcasses of large herbivores, while a diverse passerine, raptor and (seasonal) shorebird community were present in the area (Holland 1994).

Historically the Middle Fork Willamette River subbasin supported viable populations of spring Chinook salmon, bull trout, Oregon chub, and cutthroat trout. The upper Middle Fork may have supported the largest spring Chinook stock in the upper Willamette basin (WRI 2004). Native fish species in the Coast Fork subbasin included spring Chinook, Oregon chub, and cutthroat trout. It is not believed that the spring Chinook population in the Coast Fork was very large (Connolly et al. 1992b). Steelhead are not thought to have been present in the Coast or Middle Fork subbasins historically, although there were likely resident rainbow trout populations.

The area also supported a moderate diversity of reptile and amphibian species. Historical reports cite that the western pond turtle was found to be very common in all the sloughs of the Willamette River and its tributaries and the sluggish streams and ponds of the lowlands (Holland 1994).

Flooding

The rivers of the Coast Fork and Middle Fork Willamette subbasins had low summertime flows and intermittent high flows, which often overtopped the banks, in the fall, winter, and spring. Flooding therefore was a natural and frequent occurrence in the Willamette Valley and encompassed an extremely large area. The width of the valley floor is an indication of the formerly flood-prone area.

Large downed trees and piles of wood contributed to the formation and movement of the river channels. The wood obstructed and diverted channel courses and contributed to the dynamics of the river (Sedell and Froggatt 1984). In general, the braided and complex channel created a connectedness between the river's channel and its floodplain that was once complex and extensive and supported critical biological and ecological linkages (Benner and Sedell 1997).

3.1.2 Post-Settlement

A number of major changes have occurred in the basin, since Euro-American settlement began in the subbasins. Historians believe that the first Euro-Americans to enter the upper Willamette Valley region were fur trappers working for the Northwest Company of Montreal, Canada. Fur trading between Europeans and Northwest Native Americans starting in the late 1700s and early 1800s led to the gradual exploration and settlement of the area by Europeans. By the 1840s, logging and agriculture began to replace fur trading as the primary activities in the region. As a result, major alterations to local aquatic and plan communities occurred over much of the area, as the land was subjected to greater amounts of burning, logging, and clearing.

Landscape and Vegetation

Logging of the dense forested hills began soon after settlers arrived to the area in the 1830s and 1840s. The transportation of logs involved log driving in rivers and the creation of splash dams in smaller tributaries (CFWWC 2005). Removal of LWD in the river channels to allow for log driving and navigation contributed to the simplification of the channel systems.

Much of the river valleys were developed for agricultural use and most of the major cities were settled along the rivers. The level, fertile alluvial lands on floodplain islands were more accessible for farming once secondary and seasonal channels were eliminated (Benner and Sedell 1997). In order to drain flooded fields, homesteaders would ditch and straighten small streams that meandered across their homesteads.

The *Willamette River Basin Planning Atlas* documents substantial changes in the basin since Euro-American settlement (Hulse *et al.* 2002). By 1990, 42 percent of the Willamette Valley had been converted from natural vegetation to agricultural use and 11 percent to structures. The acreage of older conifer forests (older than 80 years) was reduced by two-thirds. Although the number of people living in the basin is expected to nearly double over the next 50 years, more landscape change, and thus more environmental effects, occurred from 1850 to 1990 than is likely to happen under any future scenario to 2050.

Fish and Wildlife

Salmon harvest and canning operations on the Columbia River from Euro-American settlers began in the 1860s and peaked in 1883 with nearly 43 million pounds of salmon harvested (Montgomery 2003). Harvest declined from then on, well before the construction of major dams began on the Columbia River. Salmon populations throughout the basin were heavily affected, with few fish to be found. Chinook were the primary species exploited because of their large size (Montgomery 2003).

The U.S. Bureau of Fisheries (McIntosh *et al.* 1990) surveyed the Willamette Basin for fish habitat in the 1930s and 1940s, shortly prior to the construction of the first major dams. The Middle Fork was surveyed in 1937-38 and the Coast Fork was surveyed in 1938. Notes from the survey indicate that fish populations had been larger, according to old-time residents, prior to various human actions such as construction of agricultural and mill diversions and small dams. No salmon had been seen in the Coast Fork for 20 to 30 years (which coincides with the dramatic downturn of harvest on the lower Columbia River). Trout were abundant in both subbasins, along with other species such as whitefish and cottids. The Middle Fork was still a major spring Chinook river, although the majority of the spawning habitat was upstream of Lookout Point. The Coast Fork was becoming highly polluted from mill and mining wastes and sewage effluent. The Middle Fork had good water quality with temperatures less than 60°F, even in the lower reaches. Pools were very common in both subbasins (up to 20/mile) and the substrate was primarily small to large gravels/cobbles.

The construction of the major dams in the subbasins further changed the water quality, habitats and fish and wildlife populations in the basin. It has been estimated that the construction of the Dexter and Fall Creek dams blocked approximately 80 percent of the habitat historically accessible to spring Chinook in the Middle Fork subbasin (Connolly et al. 1992a). The Willamette Hatchery on the Middle Fork was constructed as mitigation for the construction of the dams, and the hatchery stock represents more than 50 percent of the returning adults. The dams have changed the water temperature regimes in the Coast and Middle Forks by discharging cold water from the stratified reservoirs during the summer months and then warm water as the reservoirs are drawn down in the fall during the salmon spawning period.

Flooding

Annual flooding was a constant struggle for early settlers. The flood-prone area extended throughout the Coast Fork Willamette valley north to the Coburg Hills and south to areas of Cottage Grove (CFWWC 2005). Floods could occur at least two out of every three years. When official records of the Coast Fork began in 1897, local records show that 40 out of the first 49 years the Coast Fork reached flood stage (Register Guard, December 15, 1946 cited in CFWWC 2005).

Dams on the Coast Fork and Middle Fork Willamette River were constructed beginning in the 1940s for the primary purpose of flood control (MFWWC 2002b). There have been several environmental consequences as a result, including blocking fish passage and alteration of flow patterns. As a result of the dam operations, flows are higher in the summer, unusually high during the reservoir draw down period in the fall, and winter and spring peak flows are 70 - 80 percent of what they were under natural conditions (CFWWC 2005 and MFWWC 2002b).

Channelization of the rivers through levee building and stabilization of banks with riprap was a common practice to reduce flood and erosion damages (CFWWC 2005). Once the floodplains were protected, development of the floodplains through the construction of buildings and homes further altered the floodplain condition.

Due to the development of the floodplains since Euro-American settlement in the 1800s, the Willamette River, including the Coast Fork and Middle Fork has experienced extensive channel loss. For example, an analysis of the Willamette River between Eugene and Albany shows an average loss of approximately 45 to 50 percent of the original channel length. Over time, the rivers have been altered from multiple channels to a simplified and often single-thread channel system (Benner and Sedell 1997).

3.2 CURRENT AND FUTURE WITHOUT PROJECT CONDITIONS

3.2.1 Hydrology

Coast Fork Willamette River Subbasin

The Coast Fork Willamette River drains an area of approximately 665 square miles. Flow rates in the Coast Fork reflect the seasonality of rainfall, with the majority of runoff occurring during the winter and spring and low flows occurring during July and August. However, headwater elevations in the Coast Fork are not in the high Cascades and are fairly low elevation, thus, the Coast Fork hydrograph does not exhibit a spring snowmelt runoff. Within the study area the hydrograph has been altered from natural conditions. With dam regulation, the average monthly flows from February to April are 10 to 20 percent of what they were under natural conditions, and flows from July to October are typically 200 to 400 percent higher (CFWWC 2005). Peak flows have also been reduced substantially.

Flows in the lower Coast Fork Willamette River have been controlled by Dorena and Cottage Grove Dams since 1949 and 1943, respectively. Flood risk management is the primary purpose of the entire Willamette system and Dorena and Cottage Grove Dams are operated in concert with the other 11 dams in the system. The reservoirs are drawn down to the minimum flood control pool between September and December and the primary flood control season is December through January. Floods are less likely to occur from February through May and thus conservation storage for multiple uses occurs during this time period.

The dams have substantially decreased the magnitude and frequency of extreme high flow events in the Coast Fork Willamette and Row Rivers. Additionally, the dams have decreased the magnitude of lower return period channel forming flood events (Corps 2000a). Flood frequency analysis conducted by the Corps-Portland District for the USGS Gage at Goshen (USGS 14157500) has shown that the 2-year return period flood event is 15,800 cfs for the regulated condition, as compared to 26,700 cfs for the unregulated condition (OSU 2007); see Table 4 for flows for various frequencies of occurrence under existing conditions. The bankfull flow and regulation goal at Goshen is 12,000 cfs, so flows are typically maintained to this level unless runoff is above the 2-year return event.

Table 4. Coast Fork Willamette River Flow Rates for Range of Exceedance Values and Return Periods

Flow Duration and Flood Frequency Ordinate	Flow Rate by Location (cfs)		
	Coast Fork below Cottage Grove USGS Gage 14153500	Row River near Cottage Grove USGS Gage 14155500	Coast Fork near Goshen USGS Gage 14157500
95% Exceedance [a]	46	107	274
90% Exceedance [a]	57	177	386
75% Exceedance [a]	78	221	632
50% Exceedance [a]	180	600	1,350
25% Exceedance [a]	425	1,300	2,920
10% Exceedance [a]	883	2,660	5,890
5% Exceedance [a]	1,330	3,900	7,686
1.5-year Return Period [b]	2,500 [c]	4,000 [c]	11,000 [c]
2-year Return Period [b]	2,500 [c]	4,000 [c]	15,800
5-year Return Period [b]	2,500 [c]	5,500 [c]	20,000 [c]
10-year Return Period [b]	2,900	7,700	25,500
20-year Return Period [b]	3,600 [c]	10,500 [c]	31,500 [c]
100-year Return Period [b]	8,400	19,300	48,000

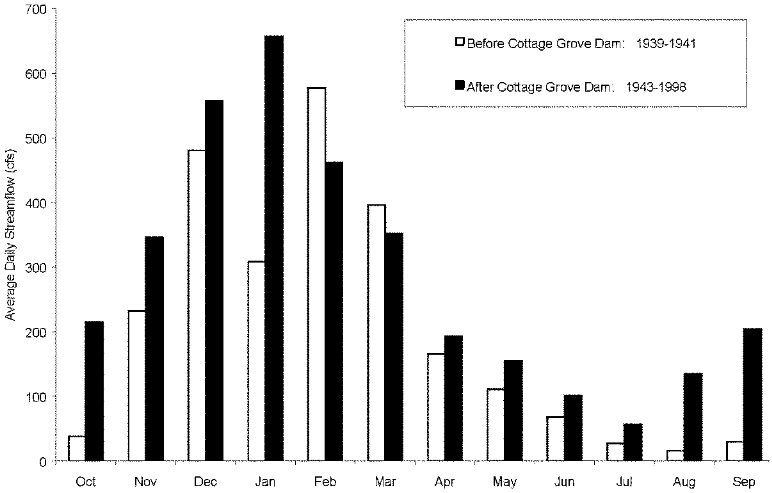
Notes:

a. Flow Exceedance Values from Winter/Spring Season Flow Duration Curve

b. Flood Frequency Values are for the Regulated Condition; less frequent flows than the 100-year return period not shown.

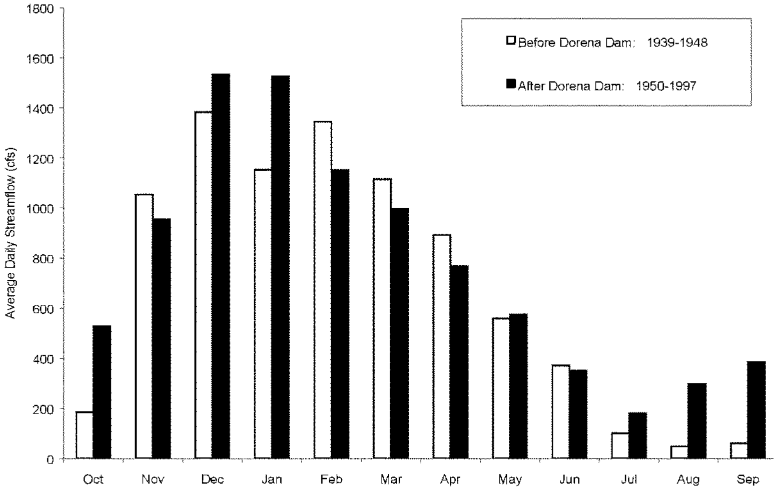
c. Value Interpolated from Corps-Portland District Flood Frequency Curve

Figures 9 to 11 illustrate the pre- and post-dam changes in average monthly flows below Cottage Grove and Dorena dams, as well as on the Coast Fork Willamette River below the dams. In the Coast Fork subbasin, flows are naturally lowest in the late summer and early fall. The average daily flow of the Coast Fork Willamette near Goshen in August was 95 cfs prior to dam construction, which increased to 481 cfs after dam construction. Post-dam summer flows are greater than what occurred historically because multiple-use storage is available to redistribute winter volumes for irrigation, navigation, power generation, recreation, instream flows for aquatic life, wildlife, and municipal and industrial water supply (Corps 2000a).



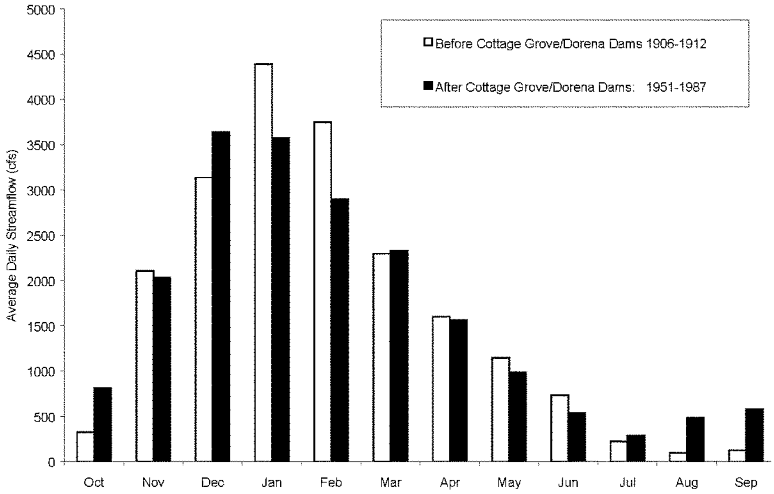
Data from USGS gage 14153500 (Corps 2000a).

Figure 9. Average Monthly Flows, Coast Fork Willamette below Cottage Grove Dam



Data from USGS gage 14155500 (Corps 2000a).

Figure 10. Average Monthly Flows, Row River near Cottage Grove below Dorena Dam



Data from USGS gage 14157500 (Corps 2000a).

Figure 11. Average Monthly Flows, Coast Fork Willamette near Goshen

A hydraulic model was developed for the project using Version 4.1 of the Hydrologic Engineering Center's River Analysis System (HEC-RAS) (Corps 2010) to develop a combined model of the lower Coast Fork and Middle Fork Willamette River systems. HEC-RAS is a one-dimensional hydraulic model software that models hydraulic parameters such as velocity and water depth. It can be used to model either steady-state or unsteady state flow conditions. For this study, the model was used exclusively in a steady state mode. The model is described in more detail in Appendix E.

The model was run for a range of design flow rates to support the preliminary design of the restoration sites and to establish without project hydraulic conditions throughout the study area. The following flow rates were the primary flow rates used to support the hydraulic design:

- **90 percent exceedance flow** – the 90 percent exceedance flow rate for the winter/spring period (defined as November 1 through June 1, inclusive) was used as a design flow in support of frequent backwater connections to the floodplain.
- **2-year return period flood flows** – this flow rate was used in general to identify estimated top elevations for in-channel engineered log jam features (i.e., river-type ELJs). This flow rate was also used as the design flow in support of flow through side channel features.
- **100-year return period flood flows** – this flow rate was used to estimate conservatively high values for general contraction scour for in-channel engineered log jam features to ensure size and cost of features was not undersized in this preliminary design.

Figure 12 shows the water surface profile of the lower Coast Fork.

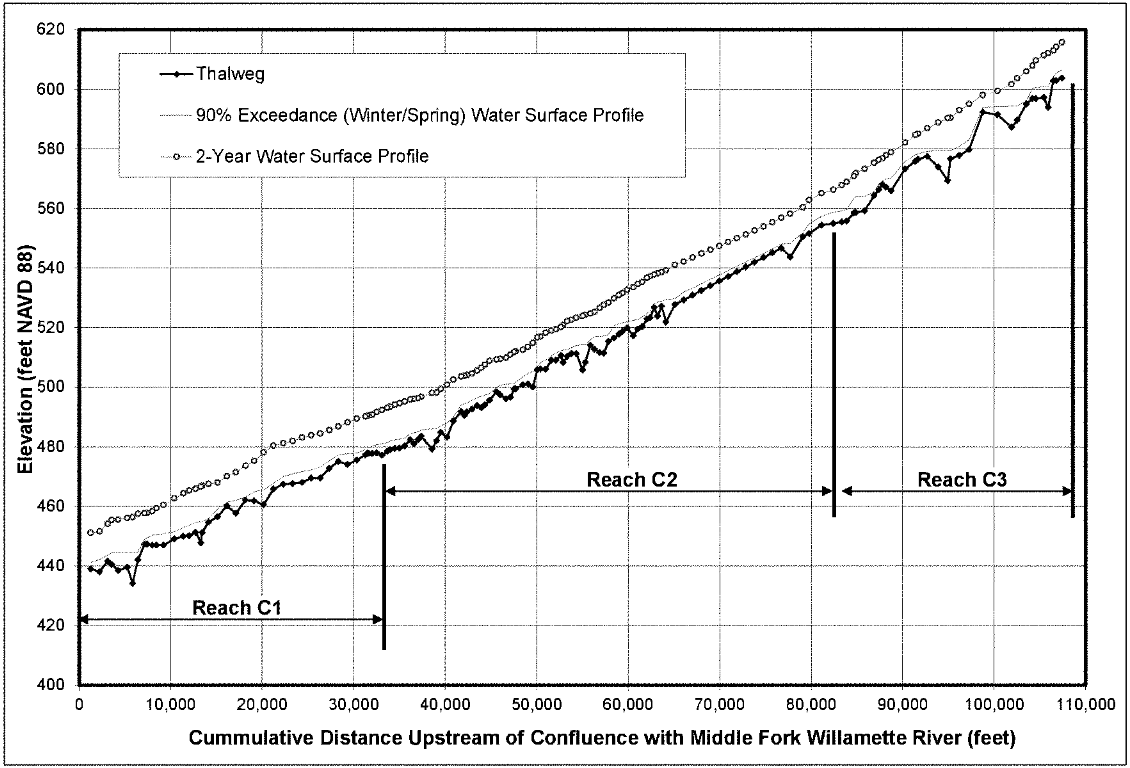


Figure 12. Without Project Conditions Water Surface Profiles for the Coast Fork Willamette River

Middle Fork Willamette River Subbasin

The Middle Fork Willamette River drains an area of approximately 1,360 square miles. The hydrograph in the Middle Fork subbasin also reflects the seasonality of rainfall, with the majority of runoff occurring during the winter and low flows occurring during July and August. Typically a smaller, secondary peak occurs in May and June because headwater elevations are high enough to develop a seasonal snowpack and meltwater runoff. The majority of the study area is below 1500 feet and therefore, rainstorms are the dominant cause of runoff in the lower subbasin. A portion of the Lower Middle Fork Willamette River and the majority of the Little Fall Creek and Lost Creek Watersheds are above 1,500 feet and are subject to rain-on-snow events. These events occur when warm rainstorms rapidly melt accumulated snow creating high runoff events (MFWWC 2002b).

Flows in the Middle Fork have been controlled by the Lookout Point-Dexter, Hills Creek, and Fall Creek projects since 1954, 1961, and 1965, respectively. These dams are operated similarly in concert with the other Willamette system dams for flood risk management. Flood control operations at the dams have substantially decreased the magnitude and frequency of extreme high flow events in the lower Middle Fork Willamette River. Additionally, the dams have decreased the magnitude of channel forming flood events (Corps 2000a). Flood frequency analysis conducted by the Corps-Portland District for the USGS Gage near Jasper (USGS 14152000) has shown that the 2-year return period flood event is 20,000 cfs for the regulated condition, as compared to 39,900 cfs for the unregulated condition (OSU 2007); see Table 5 for flows for various frequencies of occurrence under existing conditions. The bankfull flow and regulation goal at Jasper is 20,000 cfs.

Table 5. Middle Fork Willamette River Flow Rates for Range of Exceedance Values and Return Periods

Flow Duration and Flood Frequency Ordinate	**Flow Rate by Location (cfs)**	
	Dexter Dam Outflows	**Middle Fork near Jasper USGS Gage 14152000**
95% Exceedance [a]	1,070	1,380
90% Exceedance [a]	1,150	1,530
75% Exceedance [a]	1,250	1,970
50% Exceedance [a]	2,550	3,670
25% Exceedance [a]	4,350	6,140
10% Exceedance [a]	7,930	10,300
5% Exceedance [a]	9,824	13,300
1.5-year Return Period [b]	12,000 [c]	20,000 [c]
2-year Return Period [b]	12,000 [c]	20,000
5-year Return Period [b]	12,000 [c]	20,000 [c]
10-year Return Period [b]	12,000	20,000
20-year Return Period [b]	12,000 [c]	20,000 [c]
100-year Return Period [b]	20,300	35,500

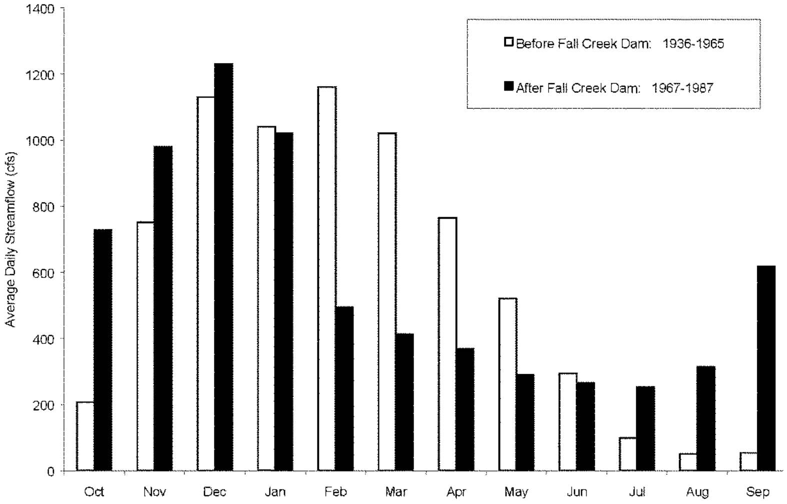
Notes:

a. Flow Exceedance Values from Winter/Spring Season Flow Exceedance Curve

b. Flood Frequency Values are for the Regulated Condition; less frequent flows than the 100-year return period not shown.

c. Value Interpolated from Corps-Portland District Flood Frequency Curve

In general, dam construction resulted in higher summer and fall flows, and lower spring flows. Figures 13 and 14 illustrate the pre- and post-dam changes in average monthly flows below Fall Creek dam, as well as on the Middle Fork at Jasper after construction of all the Corps dams in the subbasin. In the Middle Fork subbasin, flows are naturally lowest in the early fall.[1] The average daily flow at Dexter in September prior to dam construction was 846 cfs. Since construction, the average daily flow in September has increased to 2,760 cfs. Figure 15 shows the water surface profile in the lower Middle Fork.



Data from USGS gage 14151000 (Corps 2000a).

Figure 13. Average Monthly Flows, Fall Creek below Winberry Creek (below Fall Creek Dam)

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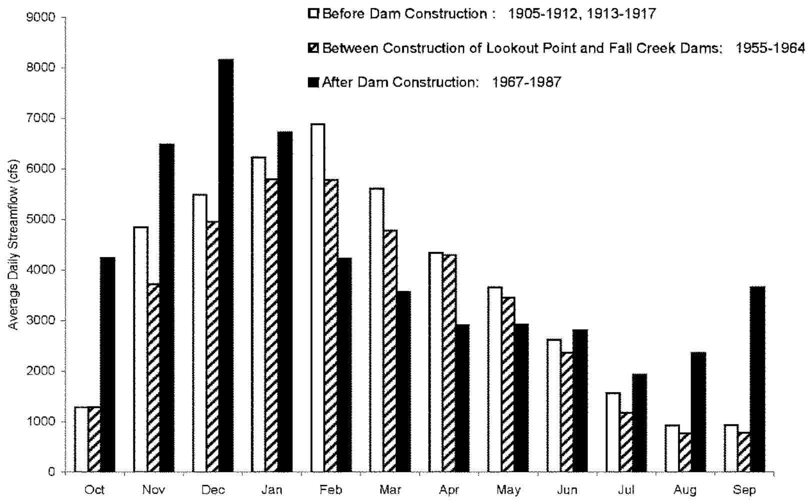
[1] Data from U.S. Geological Survey (USGS) gage 14148000 (Corps 2000a). Note for Figures 9 to 13: average monthly flows were estimated for USGS gages before and after dam construction by using data reported in Moffatt and others (1990) or by using USGS daily streamflow data. Data for the year of dam construction were not included.



Data from USGS gage 14152000 (Corps 2000a).

Figure 14. Average Monthly Flows, Middle Fork Willamette at Jasper (below Fall Creek Dam)

The Corps is cooperating with The Nature Conservancy and other entities to implement the Sustainable Rivers Program (SRP) on the McKenzie and Middle Fork Willamette Rivers. The goal of the SRP is to restore pre-dam riverine functions with the specific objectives to: 1) allow more winter flows to reach bankfull; 2) provide spring and fall flows that mimic natural hydrograph from rain events; and 3) provide lower and steadier summer and early fall flows that mimic more natural conditions (Scullion and Tackley 2011). The SRP flows have been ongoing since 2008 and initial monitoring indicates the higher winter flows are allowing reconnections of existing side-channels, movement of large wood, and recruitment of gravel. The hydrograph under the SRP is shown in Figure 16. It is likely that these types of flows will be implemented for both the Middle Fork and the Coast Fork in the future. Flows will still be controlled to the bankfull maximum, as feasible, but pulsed flows that coincide with rain events will occur as feasible.

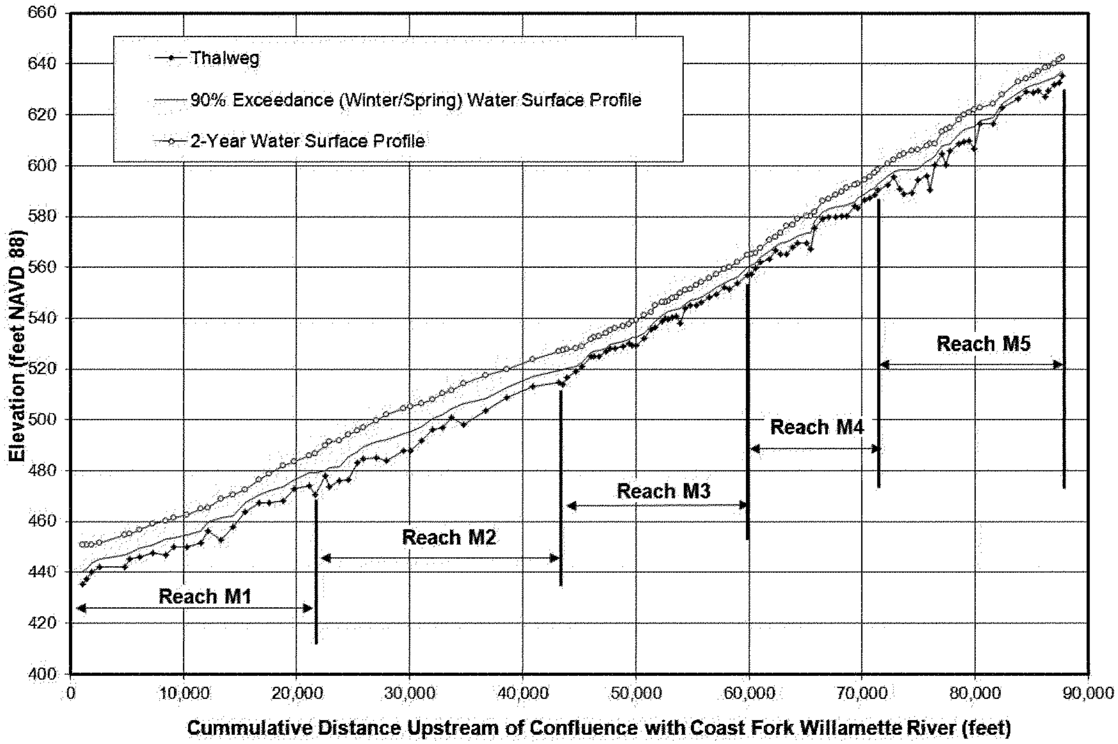


Figure 15. Without Project Conditions Water Surface Profiles for the Middle Fork Willamette River

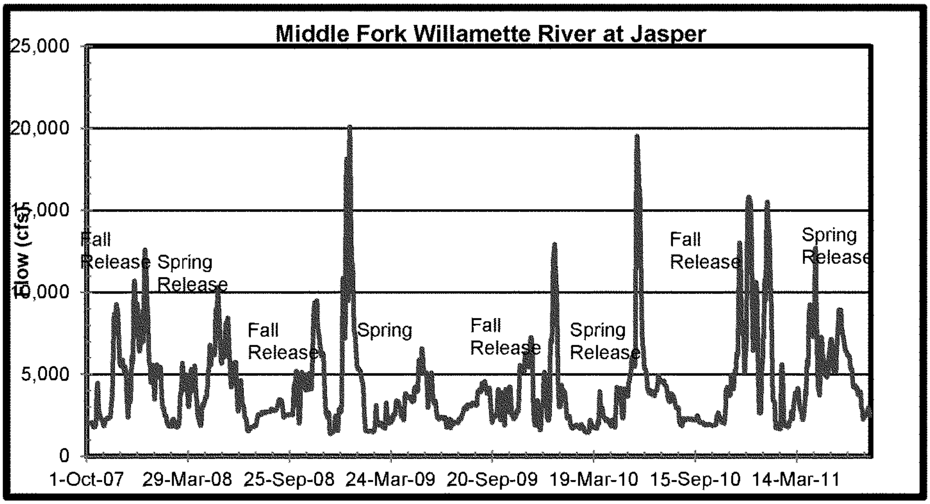


Figure 16. SRP Flow Releases since 2007

The dominant land uses in the study area are forestry and agriculture/rural residential. These land uses combined with an associated road density have the potential to affect peak flows. Table 6 displays the results of an assessment conducted by the Middle Fork Willamette River Watershed Council to determine the potential land use impacts on peak flow runoff.

Table 6. Potential Land Use Impacts on Peak Flow Runoff

Watershed	Risk from Forest Land	Risk from Ag/RR land		Risk from Forest Roads	Risk From Ag/RR Roads	Risk from Urban Roads
		Poor Condition	Good Condition			
Lower Middle Fork	Low	Mod	Low	Low	Low	High
Little Fall Creek	Low	Mod	Low	Low	Mod	NA
Lost Creek	Low	Mod	Low	Low	Mod	NA

In addition to the dams, many existing revetments constructed by the Corps affect the geomorphology of their respective streams. These revetments were intended to function in perpetuity and will remain in place, functioning as designed to control erosion, unless specifically requested by the landowner or operator to be removed or modified (CFWWC 2005). Figure 17 shows the Corps' revetments along the Coast and Middle Forks that constrain natural geomorphic processes. There are additionally a number of other revetments along both rivers installed by other public and private entities.

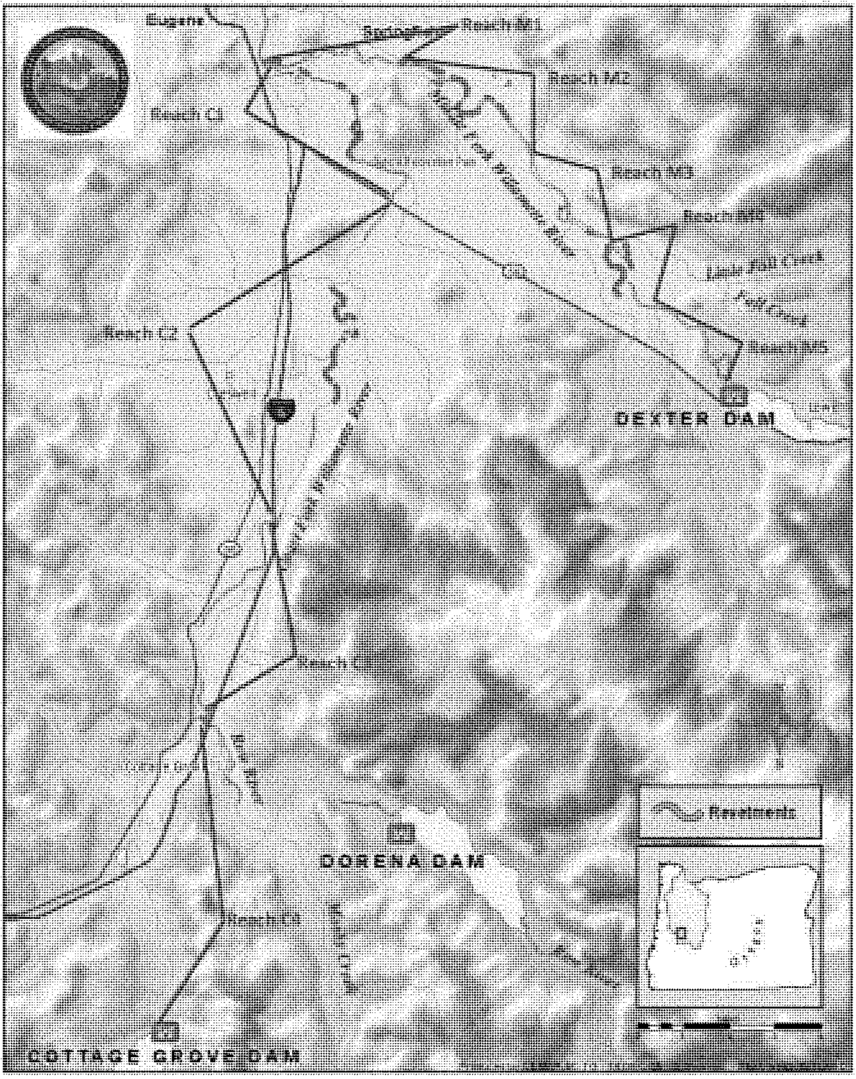


Figure 17. Corps Revetments along the Coast and Middle Forks Willamette River

NOTE: Revetments occur primarily in reaches C1, C2, M2 and M4 where channel avulsion and braiding were most predominant.

Future without Project Hydrology

The result of the altered hydrology, hydraulics and geomorphology in the study area due to dams and revetments and other development in the basin has been the loss of habitat quantity and complexity in the rivers due to a simplification of the channel network. It is highly unlikely that any of the major dams in the subbasins will be removed due to the large flood-prone population downstream in Eugene and Springfield. Dam operations will be modified to some extent to comply with the recent Biological Opinions (NMFS 2008a; USFWS 2008), but continued simplification or reductions of habitat is expected because the dams are required to reduce flood flows and are also likely to dampen channel forming flows.

Some change in the operation of the Coast and Middle Forks dams is expected in the future. Since the 1999 listing of salmon and steelhead as threatened under the ESA, the Corps has made a number of adjustments in the operation of the Willamette Projects to better meet the needs of aquatic species. In particular, the initiation of mainstem Willamette River springtime (April-June) flow augmentation targets have resulted in changes in the timing and volume of storage in the reservoirs and downstream releases. The Corps is continuing to work with state and Federal fish management agencies to adjust the operational regime of all of the dams within the Willamette Project. In addition to working with The Nature Conservancy of Oregon under the SRP, the Corps is implementing flows and water quality improvements under the requirements of the recent Biological Opinions (NMFS 2008a; USFWS 2008). Additionally, the Cities of Cottage Grove and Creswell are developing plans to withdraw surface water from the Row River and the Coast Fork, respectively, to accommodate future growth and provide cleaner water to their customers. It is likely that water withdrawals for municipal and industrial use will increase over time as the population increases, although agricultural usage may decline somewhat. However, even with increased demand for municipal and industrial water supply, minimum flows will still be required in the rivers from both the State of Oregon and per the recent Biological Opinions (NMFS 2008a; USFWS 2008).

3.2.2 Geomorphology

Dykaar (2005) conducted an assessment of the status and trends of river-floodplain habitats downstream from Corps dams in the Coast Fork and Middle Fork subbasins. This section summarizes the results of Dykaar's study. Representative reaches were chosen to assess the status and trends of habitats since the 1930s using geomorphic indicators as visible on historical aerial photography.

Riverine and floodplain morphology is driven by the natural processes of erosion and sedimentation. Spatial and temporal patterns of erosion and sedimentation come from a combination of controlling factors: hydrologic regime, sediment and wood supply, and bed and bank erodability. River movement and fluvial landform and bedform development result from a combination of these controlling factors. Native species are adapted to, or dependent upon, an array of habitat types that are formed and reformed by the natural fluvial geomorphic regime of a river.

Human activities, however, have disrupted riverine and floodplain habitats by altering the controlling factors. For example, dams have reduced peak flood flows which diminish a river's capacity to erode, transport and deposit sediment; riprap revetments harden banks reducing sediment supply and preventing channel migration; and gravel mining also removes the sediment supply and changes the channel morphology. Disruptions to the natural hydrologic and sediment regimes change the rate and types of habitat forming processes.

Geomorphic Indicators of Habitat Function

Five geomorphic features were used by Dykaar (2005) in the analysis of the Coast and Middle Fork study reaches: main channel, islands, barforms (gravel), avulsions, and large woody debris jams.

- **Main channel**. The main channel of a river can change over time due to channel migration. The rate of channel migration is related to the erosion and deposition of bars, floodplain deposits and wood. Avulsions (a rapid shift in channel position) create secondary channels with associated shallow-water habitats and oxbow lakes.
- **Islands**. Islands naturally form from bars and may coalesce with the bank and floodplain yielding numerous habitat types such as high and low flow secondary channels, backwaters, lakes and smaller ponds, and floodplain woodland.
- **Barforms**. Gravel supplies the material to construct almost all alluvial river-floodplain habitat types. The amount of bare gravel visible in any given year is a precursor to future habitat creation (bar/island/floodplain).
- **Avulsions**. An avulsion is a rapid change in channel alignment (an event) that can create additional channel length, side channels, and habitat diversity.
- **Large woody debris jams**. Large wood, particularly root wads, increase habitat diversity and can be a catalyst for gravel bar development.

The Coast and Middle Fork Willamette Rivers are medium energy, gravel-bedded streams, and their natural fluvial processes are broadly similar. Within-channel bars appear to be the dominant floodplain landform and habitat for primary succession of important riparian species (i.e., cottonwoods). The interlinked development of bar(s) and erosion of near banks, the filling of channels, and establishment and growth of pioneering trees results in islands that eventually coalesce with older floodplain or other islands. Floodplain appears constructed from coalesced bars and islands, meander lobe cut-offs (Middle Fork only) and filling of channels. Off-channel aquatic features result from incomplete channel filling.

The differences between Coast and Middle Fork habitat formation appear to be due to the relative importance of certain fluvial processes and landforms. Notable differences between the streams are discussed below.

3.2.2.1.1 Coast Fork

- Pre-dam Coast Fork fluvial processes created relatively long avulsions through mature floodplain.
- Avulsions yielded new straighter and higher gradient channels whose subsequent self-adjustment to a lower gradient produced bars first, then islands and floodplain.
- Abandonment of the old channel following avulsion produced side channels and ox-bows and linear patches of woodland as channels filled.
- Coast Fork floodplain woodland was patchy in aerial photo reviews, with large open areas, whereas the Middle Fork floodplain forest had mostly a closed canopy. Euro-American settlement had been occurring in the Willamette Valley for nearly 100 years prior to the earliest photography available and it is unclear if the observed lack of tree canopy is natural. Whether natural or not, a lack of trees in the floodplain likely increased the ability of the river to avulse by reducing the resistance of the floodplain to erosion. Riprap has been placed on banks in multiple locations, likely to prevent these large-scale avulsions.

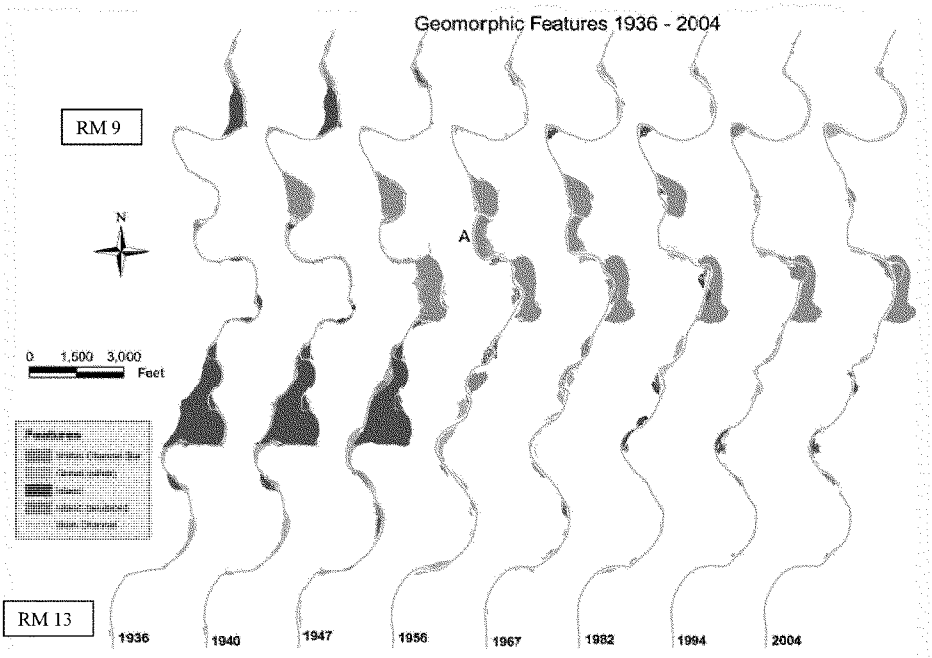
3.2.2.1.2 Middle Fork

- Pre-dam Middle Fork fluvial processes created many large meander loops.
- Meander loop construction created conditions for subsequent cut-off avulsions through the meander lobe. The new straighter and higher gradient channel would rapidly generate barforms,

lengthening its path. The cut-off lobe would merge with mature floodplain adding a patch of woodland and aquatic features.

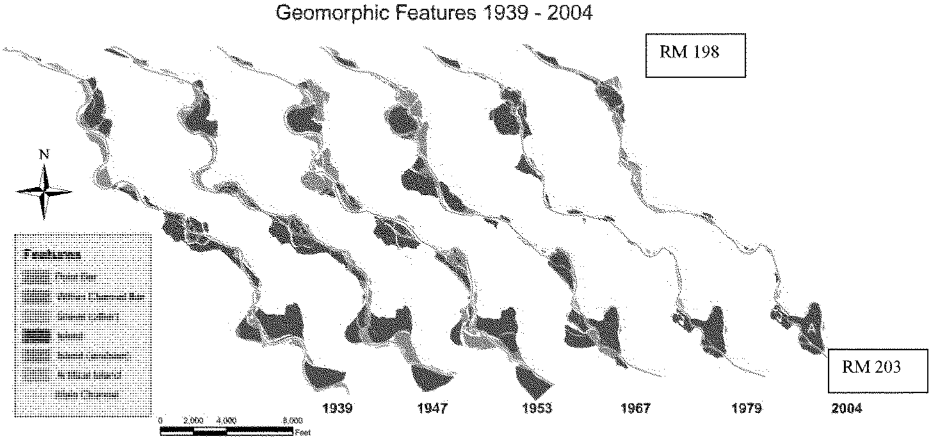
- The pre-dam river built broad sheets of within-channel gravel composed of overlapping barforms.

Following dam and revetment construction on both the Coast and Middle Forks, channel migration and changes in channel and floodplain morphology declined (Figures 18 and 19).



Pre-dam periods are 1936, 1940, 1947. Source: Dykaar 2005.

Figure 18. Comparison of Geomorphic Features within Reach C2, Coast Fork Willamette River (RMs 8-13)



Pre-dam periods are 1939, 1947, 1953. Source: Dykaar 2005.

Figure 19. Comparison of Geomorphic Features in reaches M4 and M5, Middle Fork Willamette River (RMs 198-203)

Important changes from the pre-dam to post-dam conditions are discussed below and in Table 7.

- Main channels of the Coast Fork and Middle Fork were found to be shorter in the post-dam years, about 6 percent and 10 percent shorter, respectively.
- Avulsions on both rivers were greatly reduced in post-dam years. In the pre-dam era on the Coast Fork, avulsion rate was 344 feet/year while post-dam rate was 22 feet/year, a reduction of 94 percent. Pre-dam avulsions on the Coast Fork appeared to be the primary channel migration mechanism. On the Middle Fork, in the pre-dam era, three avulsions were identified, cutting about 4,011 feet of total new channel. This amounts to an average rate of about 670 feet of new channel cut per year. The immediate post-dam rate (1953 to 1965) was 71 feet/year (a 62 percent reduction) while the post-dam rate from 1965 to 2004 was zero.
- The amount of exposed gravel in the Coast Fork was down 20 percent from a pre-dam average. On the Middle Fork, exposed gravel was down 70 percent from a pre-dam average. Most areas of formerly exposed gravel have become vegetated islands or vegetated bank features. Formation of meander loops with associated point bars has stopped on the Middle Fork in the post-dam era.
- Total island area on the Coast Fork was down 74 percent from a pre-dam average by 2004. On the Middle Fork, total island area was down 57 percent from a pre-dam average; the overall rate of island loss exceeds formation rate as island area appears to be continuing to decline at a rate of about 2.53 acres per year. Rates of island formation (gravel deposition and colonization/growth of trees) were down dramatically in the post-dam era. The most recent average rate of island formation measured from 1979 to 2004 is only about 10 percent of the pre-dam level from 1947 to 1953.

Table 7. Summary of the Percent Change in Geomorphic Indicators

River	Percent Change from a Pre-dam Average						
	Main Channel Length	Avulsion Rate		Total Gravel Area	Total Island Area	Rate of Island Formation	Large Wood Jams
		1st Order	2nd Order				
Coast Fork	-6%	-94%	-100%	-20%	-74%	NA	NA
Middle Fork	-10%	-100%	-95%	-70%	-57%	-91%	-100%

Source: Dykaar 2005

Note: Values used to calculate a percent change are from the most recent time period available for each category and river. NA = not applicable.

In summary, Dykaar's investigation (2005) found that the rate of formation of new riverine and floodplain habitats has been reduced substantially in the post-dam time period for both the Coast and Middle Fork study reaches. The natural ecosystem was highly dynamic with many habitat types forming simultaneously over extended areas of the floodplain and time periods.

The Willamette Subbasin Plan (WRI 2004) identified that up to 90% of the historic sediment supply in both subbasins is being affected by the upstream dams and that some coarsening of the bed has been observed downstream of the dams. Wood yield upstream of the dams has been heavily modified due to timber harvest and other development, although the dams do provide a barrier to the transport of the limited wood that is recruited upstream. An evaluation of sediment supply was conducted for another Willamette River tributary (the North Santiam River) in 2009 (Tetra Tech 2009). The anticipated average annual sediment delivery to the upstream reservoir (Detroit Lake) is on the order of 18,000 tons from a watershed of 425 mi^2. This information could be extrapolated to the Middle Fork subbasin that has a watershed of over 1,000 mi^2 upstream of the dams, so sediment yields could be 2-3 times the value for the North Santiam River (potential for 36,000 to 54,000 tons/year). The Coast Fork has a similar watershed area upstream of the dams as the North Santiam River. The blockage of sediment and wood from the upper watersheds has likely had a substantial effect on the rate of channel migration and habitat formation in the lower reaches.

However, it is also important to note that while the construction and operation of the dams in the Coast and Middle Forks dramatically changed the hydraulic and sediment/wood transport regimes, a second key activity of the installation of bank protection/revetments also contributed to the reduction of channel migration. Other activities such as the removal of floodplain vegetation, building of structures in the floodplain, gravel mining in the channels and floodplain and removal of wood have also reduced the rate of channel migration and habitat formation. Human activities have dramatically reduced the fluvial processes that cause habitat formation, which has diminished the capacity of both rivers to support native species.

Geomorphology by Reaches

The high priority reaches C1, C3, M1 and M2 are described in more detail in this section based on a review of historic aerial photos and site visits.

3.2.2.1.3 Reach C1 – RM 0 to RM 6.4

Reach C1 is the downstream most reach on the Coast Fork and extends from the Middle Fork confluence, upstream for over 6 miles. It has the shallowest gradient of all the reaches studied at 0.0013 (approximately 7 feet/mile). This area has historically been quite active geomorphically, with the presence of multiple channels. It appears to have been a depositional area which is likely why it has historically been an area heavily mined for gravel. The left bank of the Coast Fork in this reach is an area that has several gravel pits that have been protected via bank protection on the Coast Fork as well as some gravel pits that have been captured (likely in 1996) and incorporated into the floodplain and side channel features of the Coast Fork.

3.2.2.1.4 *Reach C3 — RM 15.6 to RM 21*

The slope of the Coast Fork in Reach C3 is moderately low gradient at 0.0019 (approximately 10 feet/mile). Through this reach the Coast Fork channel planform changes considerably. From approximately RM 17.9 to RM 18.6, the river is a straight and single channel with a total absence of channel features such as bars, islands and side channels. The river appears to have been channelized in this reach. Below RM 17.9 the channel splits into two main side channels around a mid-channel island. The mid-channel island is laced with numerous small chutes. The two primary side channels rejoin at RM 17.3 to form a single channel with smaller islands and bars. Review of aerial photos spanning the period from 1974 to the present indicate that this has been the form of the channel over the past 40 years. The gravel mining activity on the left bank appears to have been prior to 1974, whereas the mining on the right bank appears to have been ongoing from prior to 1974 into the 1990s. There is some riprap along the toe of both banks as well as high ground that appears to have been fill material placed for roadways or other access features during the gravel mining period.

3.2.2.1.5 *Reach M1 RM 187 to RM 191*

Reach M1 is the downstream-most reach on the Middle Fork and extends 4 miles upstream from the confluence with the Coast Fork. It has an average gradient of 0.0018 (approximately 9 feet/mile), which is slightly steeper than the adjacent Coast Fork with a gradient of 0.0013 (approximately 7 feet/mile). As previously described, the confluence area of the Middle and Coast Forks of the Willamette River is a depositional area with multiple channel braids. Much of the floodplain area has been gravel mined in the reach. A review of historic aerials indicates that extensive gravel mining occurred first in the river channel and then a berm was constructed to isolate the primary gravel mining from the river in the 1970s.

3.2.2.1.6 *Reach M2 RM 191 to RM 194*

The average slope of Reach M2 at 0.0020 (approximately 10 ft/mi) is only slightly steeper than that of the downstream Reach M1 at 0.0018 (approximately 9 ft/mi). Similar to the other priority reaches, this reach has been mined for gravel. Review of historical aerials show multiple channel braids and a large expanse of open gravel bed prior to the 1960s. The remnant of one of these channels is evident on the back side (south) of the existing left bank gravel pits. Over the decades and under the influence of the water and sediment regime after dam construction, the channel has evolved into a single thread with limited bars and islands. Observations of this reach after high flows in January 2012 indicate that localized erosion and deposition of gravel is still occurring at flows at or above bankfull. Deposition of gravel occurred at the boat ramp at Clearwater Park on the right bank, and the left bank had localized erosion.

Future without Project Geomorphology

It is likely that the river channels would continue to become more predominantly single thread channels in the future without project condition. This is due to a reduced supply of sediment from the upstream watershed due to dams, vegetation growing on existing bars and islands that reduces that ability of the river to erode the bars, a reduction in peak flows that tends to confine the flows within the bankfull channel and reduce channel migration and avulsion, and bank armoring that further prevents channel migration. Several former gravel pits have been captured over the past decades and more could naturally be captured during flood flows in the future. While this would tend to reconnect former floodplain areas it is difficult to predict when or how this would occur. The benefits that could be realized to the ecosystem by the capture of these off-channel habitats could sporadically occur, but would be much less than what could occur under the proposed with project condition.

Without Federal action, it would be very difficult for stakeholders in the subbasins to undertake large-scale floodplain restoration that would affect the rivers on a geomorphic scale. While localized habitats would continue to be restored (especially riparian revegetation), likely in multiple locations, the stakeholders in the subbasins do not have the funds or means to provide this scale of restoration. The future-without project geomorphic condition will likely continue to worsen, by continuing the trend towards single-thread channels with limited off-channel and in-channel diversity, even with actions taken by the Corps specific to compliance with ESA requirements and the recent Biological Opinions (NMFS 2008a; USFWS 2008).

3.2.3 Water Quality Conditions

The Oregon Department of Environmental Quality maintains ambient water quality monitoring sites throughout Oregon to provide representative statewide geographical coverage. Trends in water quality are measured using the Oregon Water Quality Index (ODEQ 2008). The Index analyzes a defined set of water quality parameters including temperature, dissolved oxygen, biochemical oxygen demand, pH, total solids, ammonia and nitrate nitrogen, total phosphorous, and fecal coliform. The Index produces a score describing general water quality. Index scores are grouped into the following categories: less than 60 (very poor), 60-79 (poor), 80-84 (fair), 85-89 (good), and 90-100 (excellent).

In addition, in September 2006, EPA approved the ODEQ Total Maximum Daily Load, for the Willamette Basin. The TMDL focuses on the three most common 303(d)-listed pollutants in the basin: bacteria, mercury, and temperature. A TMDL can be thought of as a tool for implementing water quality criteria and is based on the relationship between pollution sources and in-stream water quality conditions. The Coast Fork and Middle Fork Willamette rivers and some of their tributaries do not meet water quality standards for some parameters (Figure 20).

3.2.3.1 Coast Fork Willamette River

The ODEQ ambient water quality monitoring site on the Coast Fork Willamette River is located at Mt. Pisgah Park (RM 3.0). This site scored 87 points on the Oregon Water Quality Index (ODEQ 2008) and is ranked in the 'good' category.

Within the study area, the mainstem of the Coast Fork is listed on the 303(d) list for iron and Camas Swale Creek is listed for dissolved oxygen (ODEQ 2010). Dorena Lake is newly listed for aquatic weeds or algae. Three health advisories issued were by Oregon Harmful Algae Bloom Surveillance program based on cell counts or toxicity levels.

There are five individual National Pollutant Discharge Elimination System (NPDES) permitted point sources in the subbasin. Two discharge directly into the Coast Fork Willamette River downstream of Cottage Grove Reservoir. In addition, there are 38 general NPDES permits in the subbasin, consisting of 21 stormwater permits. Stormwater sources are not considered to have reasonable potential to contribute to exceeding temperature criteria (ODEQ 2006).

3.2.3.2 Middle Fork Willamette River

The DEQ ambient water quality monitoring site on the Middle Fork Willamette River is located at Jasper Bridge (RM 195.0). This site scored 93 points on the Oregon Water Quality Index and showed an increasing trend in the score over the past 10 years (ODEQ 2008). This site is ranked in the 'excellent' category.

The ODEQ (2006) states that the dissolved oxygen 303(d) listings were not addressed in the Willamette Basin TMDL. In the study area, Anthony Creek and Lost Creek are listed for dissolved oxygen on the 303(d) list (ODEQ 2010). The listings occurred in 2002 and there was not sufficient time to collect data for the TMDL analysis.

The Dexter Reservoir, Hills Creek Lake, and Lookout Point Lake, have all been newly listed on the 303(d) list for aquatic weeds or algae (ODEQ 2010). Health advisories for each of these lakes were issued by Oregon Harmful Algae Bloom Surveillance program based on cell counts or toxicity levels.

In the Middle Fork subbasin, point source discharges also play only a minor role in stream heating. There are six individual NPDES permitted sources in the subbasin. Three sources discharge directly into the mainstem Middle Fork Willamette River. The remaining three discharge year-round and are classified as minor discharges; two are domestic discharges into the North Fork of the Middle Fork and the mainstem Middle Fork, and the third is an individual discharge into the Mill Race in Springfield (lumber company). In addition to these individual NPDES permits, there are 14 general NPDES permits in the subbasin that include 12 storm water permits (ODEQ 2006).

3.2.3.3 Future without Project Water Quality

Water quality conditions in the subbasins are expected to slightly improve in the future without project condition, with the implementation of the TMDLs and other regulations and programs. To implement the temperature TMDL, ODEQ will look to permit holders, local governments, land managers, and others to develop and implement TMDL Implementation Plans, which will describe the strategies and timelines needed to meet the temperature load allocations set in the TMDL (ODEQ 2006). The Corps may implement temperature control facilities on the Middle Fork dams to allow selective withdrawal to more effectively mimic pre-dam water temperatures. However, this would tend to increase summer and fall temperatures, thus potentially working against the TMDL requirements. Additionally, climate change may reduce winter snowpack in the Cascades, thus reducing summer/fall flows, which could exacerbate temperature problems (ODFW 2011; Climate Impacts Group 2006).

To implement the mercury TMDL, ODEQ will look to permit holders, local governments, land managers, and others to begin reducing the amount of mercury released into the environment. Permitted point sources will likely need to reduce mercury emissions. To help minimize the movement of mercury into waterways, soil erosion from urban, agricultural and forested landscapes will be controlled through a variety of mercury reduction plans (ODEQ 2006).

Until a TMDL for dissolved oxygen is developed, riparian protection and restoration measures developed to address temperature concerns also will benefit dissolved oxygen levels because dissolved oxygen concentrations are directly related to water temperature.

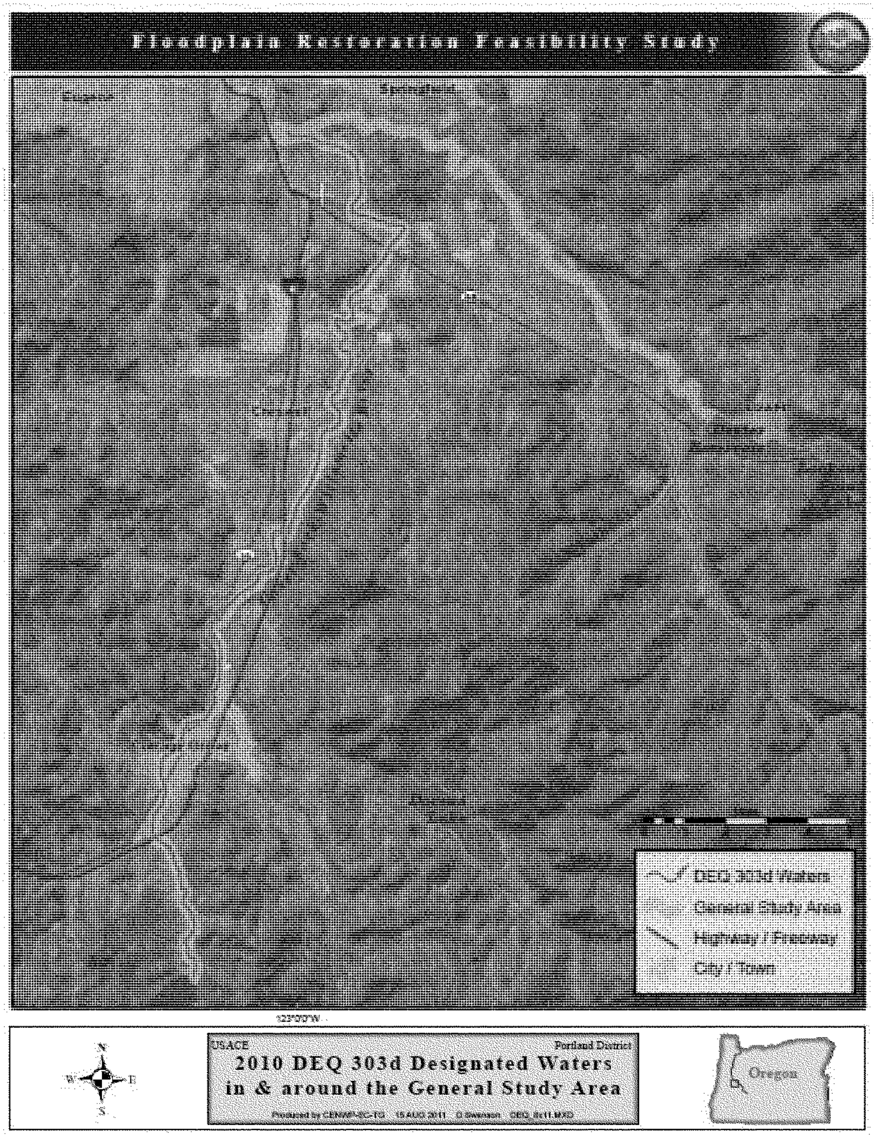


Figure 20. ODEQ-Designated 303(d) Waterbodies in the Study Area

3.2.4 Fish and Aquatic Habitat

Fish

A number of native and non-native fish species are present in the Coast and Middle Fork subbasins, including spring Chinook salmon, rainbow trout, cutthroat trout, bull trout, mountain whitefish, large-scale sucker, sculpins, longnose dace, leopard dace, northern pike minnow, Oregon chub, peamouth chub, redside shiner, speckled dace, three-spine stickleback, sand roller, Pacific lamprey, Western brook lamprey, river lamprey, common carp, largemouth bass, and smallmouth bass (Hulse *et al.* 2002).

Federally listed endangered, threatened, and species of concern in the Coast and Middle Fork subbasins are focal fish species for this feasibility study (Table 8, Figure 21). Cutthroat trout also was selected as a focal species in the Willamette Subbasin Plan (NPCC 2004a), and will be considered a focal species in this study because of their broad distribution and value as an indicator of habitat conditions.

Table 8. Focal Fish Species in the Middle and Coast Fork Subbasins

Species	Federal Status
Spring Chinook Salmon Upper Willamette River Evolutionarily Significant Unit *(Oncorhynchus tshawytscha)*	Threatened
Bull trout (*Salvelinus confluentus)*	Threatened
Oregon chub (*Oregonichthys crameri)*	Threatened
Malheur mottled sculpin (*Cottus bairdi ssp.)*	Species of Concern
Pacific lamprey (*Lampetra tridentate)*	Species of Concern
Coastal cutthroat trout (*Oncorhynchus clarkii spp.)*	Species of Concern

Altered natural watershed processes, modified riparian and aquatic habitat, and limited access to historical spawning and rearing areas in the Coast Fork and Middle Fork subbasins have affected the productivity, capacity, and diversity of resident cutthroat trout, bull trout, and spring Chinook populations. In addition, Oregon chub have lost habitat as backwater and off-channel areas have disappeared as a result of changes in seasonal flows associated with the construction of Corps dams in the subbasins (NPCC 2004a).

3.2.4.1.1 Coast Fork Willamette River

Focal species present in the Coast Fork subbasin include spring Chinook, Oregon chub, Malheur mottled sculpin, Pacific lamprey, and cutthroat trout.

Spring Chinook: Native spring Chinook salmon existed, but were never likely abundant, in the Coast Fork subbasin (Corps 2000a). The Dorena and Cottage Grove Dams currently block upstream access to spawning areas, although suitable spawning habitats were historically present in the lower river (McIntosh *et al.* 1990). Low flows and warm water discharge from the two dams are believed to reduce the productivity of Chinook salmon below the dams (Corps 2000a).

Oregon Chub: Oregon chub were found historically in the Coast Fork Willamette River (NPCC 2004a). Three records exist for chub presence near Cottage Grove (1950), Saginaw (1967), and Dorena (1958) in the Coast Fork subbasin. Currently, there is one natural and one introduced population near Creswell and in the upper Layng Creek drainage, respectively. The presence of nonnative predatory fish and bullfrog, and the loss of off-channel habitats limit chub recovery. No critical habitat has been designated in the Coast Fork subbasin.

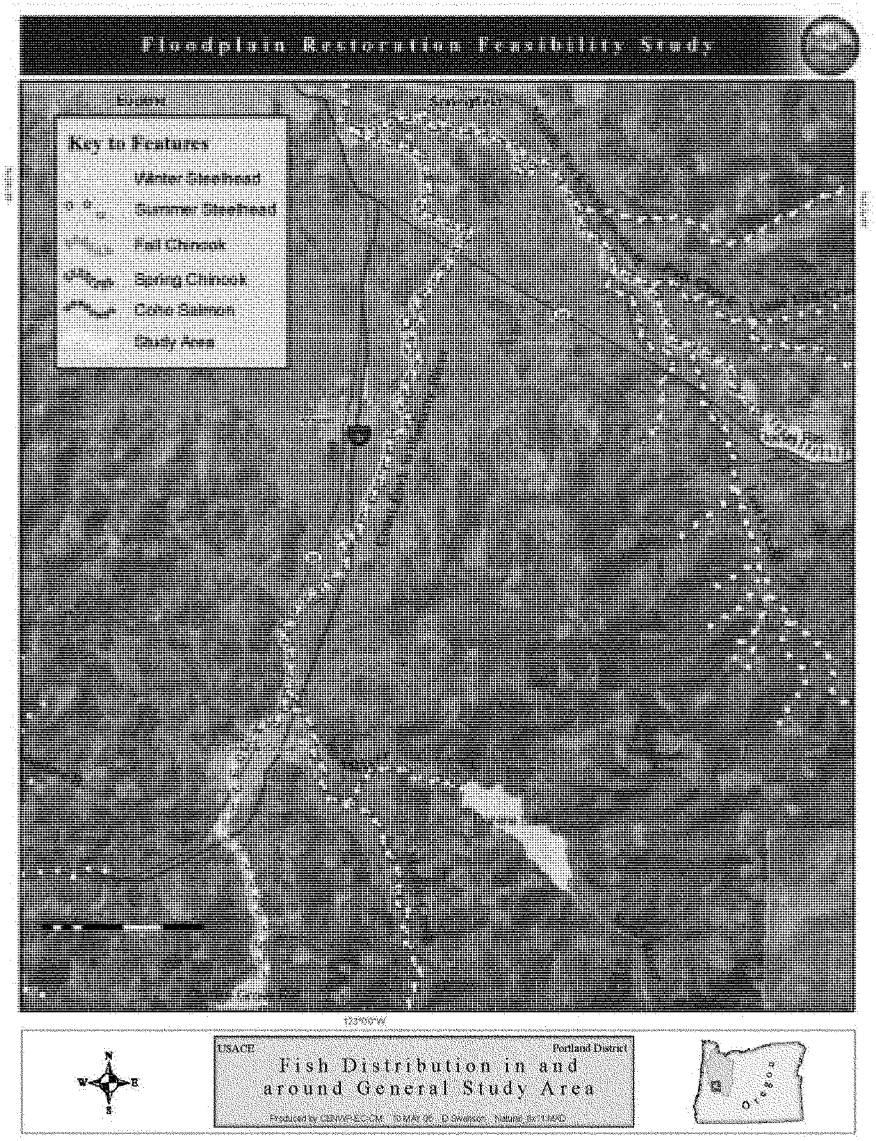


Figure 21. Salmonid Distribution in the Study Area

Malheur Mottled Sculpin: Sculpins are most abundant in clear, rapidly flowing freshwater streams, and are usually found in association with trout, dace, and other fish requiring clean water and low temperatures. Sculpins are bottom-dwellers, and seldom swim more than a few centimeters above the substrate. They are most commonly found resting beneath flat rocks. They are carnivorous, and prey primarily on insect larvae, crustaceans, and fishes (NANFA 1982). The Malheur mottled sculpin is mostly found in smaller tributaries and disconnected streams in Malheur, Snake and Columbia Basins.

Pacific Lamprey: Pacific lamprey are thought to have historically occurred wherever salmon and steelhead populations occurred. Their distribution has been reduced due to impassable dams and other barriers. Lamprey spawn in gravel bedded streams between March and July. Lamprey hatch in approximately 19 days and the ammocoetes drift downstream to areas of low velocity and fine sediments. They may reside for several years before metamorphosing into juveniles that move downstream and migrate to the ocean. Adults are parasitic on salmonids and other fish in the marine environment. After 1 to 3 years they return to freshwater to spawn. (USFWS 2010c)

Cutthroat Trout: Cutthroat trout have the widest distribution of any trout in the Willamette Basin and are the only trout native to west side tributaries draining the Coast Range (NPCC 2004a). The primary life history form of cutthroat trout above Willamette Falls, including the Middle Fork and Coast Fork subbasins, is the resident form with a migratory life history (NPCC 2004a). Compared to historical conditions, there have been dramatic changes to the distribution of cutthroat trout in the Willamette Basin, and the ability of the habitat to support abundant populations. Dams, road crossing culverts, and other fish passage barriers have limited the distribution of cutthroat and their access to spawning and rearing habitat. Historically, lowland streams were characterized by abundant side channels, large wood jams, and other complex and diverse habitats, and provided the most productive fish habitat.

3.2.4.1.2 *Middle Fork Willamette River*

The focal fish species currently or recently present in the Middle Fork subbasin include spring Chinook salmon, bull trout, Oregon chub, Malheur mottled sculpin, Pacific lamprey, and cutthroat trout. Table 9 shows the life stage timing for ESA-listed fish species in the Middle Fork subbasin, which is similar to the Coast Fork timing.

Spring Chinook: The Middle Fork subbasin was a major natural production area for spring Chinook salmon in the Willamette Basin. In 1947, the spring Chinook run into the Middle Fork Willamette was estimated to comprise 21 percent of the spawning population above Willamette Falls (Corps 2000a). Dexter and Fall Creek dams blocked approximately 80 percent of habitat historically accessible to spring Chinook salmon in the Middle Fork subbasin (ODFW 1990; Corps 2000a). Table 10 highlights the historical and current distribution of spring Chinook in the Coast Fork and Middle Fork subbasins.

Historically, spring Chinook salmon in the Middle Fork subbasin spawned in Fall Creek, Salmon Creek, the North Fork of the Middle Willamette River, Salt Creek, and the mainstem Middle Fork Willamette River (Parkhurst *et al.* 1950; NPCC 2004a). Mattson (1948) estimated that 98 percent of the 1947 run in the Middle Fork system spawned upstream of the Lookout Point Dam site. Construction of these dams restricted the population to only 20 percent of its historically accessible area, below Dexter/Lookout Point, which was not generally considered to have suitable spawning habitat (McIntosh *et al.* 1990). In 1998, 10 redds were observed in the reach between the town of Jasper and Dexter Dam, which was not used for spawning before the dams were built (Lindsay *et al.* 1999).

According to the Willamette Subbasin Plan (NPCC 2004a), hatchery Chinook were first released in the Middle Fork subbasin in 1919. The Willamette Hatchery, built as mitigation for lost production above

Corps dams, is located on the Middle Fork near the town of Oakridge. Stock for the Willamette Hatchery comes from collection facilities at Dexter and Foster Dams on the South Santiam River (Corps 1997).

ODFW (1995) concluded that the native spring-run population was extinct, although some natural production by hatchery-origin adults occurs. Of the 260 carcasses from the Middle Fork Willamette (including Fall Creek), 11 (4 percent) were estimated to be naturally produced (Schroeder *et al.* 2003).

Table 9. Life Stage Timing for ESA-listed Fish Species, Middle Fork Subbasin

Species	Life Stage/Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spring Chinook	Upstream Migration					▨	■	■	▨	▨			
	Spawning									■	▨		
	Incubation	▨	▨										
	Juvenile Rearing	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
	Smolt Outmigration			■	▨	▨						■	▨
Bull Trout	Upstream Migration						■	■	■	▨	▨		
	Spawning									■	■	▨	
	Incubation	▨	▨	▨	▨	▨				▨	▨	▨	▨
	Rearing	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Oregon Chub	Spawning				▨	▨	▨	▨	▨	▨			
	Incubation				Chub incubation is for approximately one week after spawning.								
	Rearing	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		■	Darker shade indicates peak times.										

Source: Adapted from Corps 2000a (compiled from ODFW 1990; Taylor and Reasoner 1998; Unthank 1999; Scheerer 1999).

Table 10. Pre-dam and Current Distribution of Spring Chinook

Location	1947 Distribution [a]	Current Distribution	
		Natural	Hatchery Releases
Coast Fork Subbasin			
Mainstem	Few [1]	None	
Row River	Few [1]	None	
Middle Fork Subbasin			
Mainstem	Present	Few [2]	Present [5]
Fall Creek	Present	Few [3]	Present [5]
Little Fall Creek	Unknown	Few [4]	
North Fork	Present	None	

Source: Corps 2000a (compiled from Mattson 1948 and Connolly et al. 1992a, 1992b).

Notes:

a. Locations shown are specifically mentioned in literature. Other locations also may have been production areas. Relative productivity is indicated where this information was provided.

[1] Probably never abundant (Willis et al. 1960).

[2] Successful spawning below Dexter Dam is minimal due to release of water above 12.8°C during egg incubation (Connolly et al. 1992a); spawning occurs upstream of reservoir by transported adults.

[3] Little spawning occurs because of sedimentation and alteration of water flow and temperature below Fall Creek Dam (Connolly et al. 1992a); spawning occurs upstream of reservoir by transported adults.

[4] Spawning may occur intermittently during high flow years and may be hatchery strays (Connolly et al. 1992a).

[5] Majority of escapement does not enter the collection facilities at Dexter / Fall Creek dams and may contribute to natural production downstream (Connolly et al. 1992a).

Bull Trout: Little information exists on the historical distribution and abundance of bull trout in the Middle Fork subbasin (NPCC 2004a). Buchanan *et al.* (1997) reported that historical distribution of bull trout included the mainstem Middle Fork Willamette from its confluence with the Willamette River upstream to its headwaters, including Salmon and Salt Creeks below Hills Creek Reservoir, as well as the Middle Fork Willamette above Hills Creek Reservoir, including Swift and Staley Creeks. It is likely that historical overwintering and foraging would have extended bull trout distribution into many other tributaries in the subbasin, including the North Fork of the Middle Fork Willamette River. The recent known distribution of bull trout occurs only in the upper Middle Fork subbasin from Chuckle Springs to Hills Creek Reservoir.

No bull trout were identified during extensive surveys in the Middle Fork subbasin in the early 1990s (NPCC 2004a). Buchanan *et al.* (1997) listed bull trout as probably extinct. A plan to rehabilitate bull trout in the upper Middle Fork subbasin was approved by the Willamette Basin Bull Trout Working Group in 1997. Beginning in 1997, bull trout fry from Anderson Creek in the McKenzie River subbasin were reintroduced into four cold-water springs and four creeks above Hills Creek Reservoir by the Forest Service and ODFW (NPCC 2004a). Monitoring has shown good growth and survival of juvenile bull trout in the release sites (ODFW 2001). Adult bull trout are once again present in the Middle Fork Willamette. In 2005, ODFW and Forest Service began spawning gravel augmentation near fry release sites to create spawning habitat in critical habitat areas. An increased monitoring program for juvenile production and spawning in 2005 resulted in 20 spawning redds identified in the Middle Fork Willamette River from FS Road 2143 Bridge to Tumblebug Creek. Bull trout were not observed on redds but further monitoring may document a naturally producing population of bull trout in the upper Middle Fork subbasin.

Oregon Chub: Oregon chub were found historically in the Middle Fork Willamette River at least up to Oakridge (NPCC 2004a; USFWS 1998). Currently, there are 8 populations in the Middle Fork subbasin with 500 or more individuals and over 16 sites of known occurrence (USFWS 2010a). Within the study area, Elijah Bristow State Park has three populations. Nonnative fish and amphibians and loss of off-channel habitats continue to inhibit Oregon chub recovery.

Malheur Mottled Sculpin: Sculpins are most abundant in clear, rapidly flowing freshwater streams, and are usually found in association with trout, dace, and other fish requiring clean water and low temperatures. Sculpins are bottom-dwellers, and seldom swim more than a few centimeters above the substrate. They are most commonly found resting beneath flat rocks. They are carnivorous, and prey primarily on insect larvae, crustaceans, and fishes (NANFA 1982). The Malheur mottled sculpin is mostly found in smaller tributaries and disconnected streams in Malheur, Snake and Columbia Basins.

Pacific Lamprey: Pacific lamprey are thought to have historically occurred wherever salmon and steelhead populations occurred. Their distribution has been reduced due to impassable dams and other barriers. Lamprey spawn in gravel bedded streams between March and July. Lamprey hatch in approximately 19 days and the ammocoetes drift downstream to areas of low velocity and fine sediments. They may reside for several years before metamorphosing into juveniles that move downstream and migrate to the ocean. Adults are parasitic on salmonids and other fish in the marine environment. After 1 to 3 years they return to freshwater to spawn. (USFWS 2010c)

Cutthroat Trout: Cutthroat trout are present throughout the Middle Fork subbasin and similar to the Coast Fork, as compared to historical conditions, there have been dramatic changes to their distribution and the ability of the habitat to support abundant populations. Dams, road crossing culverts, and other fish passage barriers have limited the distribution of cutthroat and their access to spawning and rearing habitat. Historically, lowland streams were characterized by abundant side channels, large wood jams, and other complex and diverse habitats, and provided the most productive fish habitat.

Aquatic Habitat

The Corps dams divide the Coast Fork and Middle Fork subbasins into upper and lower portions, thereby reducing the transport and delivery of large wood and substrate to downstream reaches (NPCC 2004a). Changes in the abundance and distribution of gravels and large wood (particularly in large jams) have reduced suitable spawning areas and limited areas for adult cutthroat trout and juvenile rearing habitat for spring Chinook salmon. Relative to the lower Coast Fork and Middle Fork subbasins, the forested upper subbasins above the dams have aquatic habitat that is closer to the historical baseline, with the highest proportion of functioning riparian areas, the largest amounts of large wood in the river and tributary channels, and the highest quality spawning areas (NPCC 2004a). However, the upper subbasins are generally inaccessible to anadromous fish.

In addition, the dams have changed flow regimes and water temperature patterns. The change in flow regimes has altered the availability and quality of Oregon chub habitat in backwater sloughs, floodplain ponds, and other slow-moving side-channel habitat. Compared to historical conditions, water temperatures below the dams are generally cooler in the summer and warmer in the fall and winter, which affects the upstream distribution of spring Chinook salmon adults, alters the timing of spawning, and affects the period of egg incubation (NPCC 2004a).

Proposed minimum instream flows under the Willamette Biological Opinion (NMFS 2008a) (Table 11) can be compared with flows recommended for upstream passage (Table 12), spawning (Table 13), incubation (Table 14), and rearing (Table 15) of salmonids, (Corps 1982, 2000a). The flows identified in Tables 12 to 15 are based on a number of biological and site-specific factors and reflect the minimum flow recommendations as reported by Hutchison *et al.* (1966).

Table 11. Required and BiOp Target Minimum Instream Flows, Middle Fork and Coast Fork Subbasins

Stream/Location	Period	Flow (cfs)	% Flow Equaled or Exceeded	Purpose
Middle Fork Willamette River (Oregon Water Resources Department Required Flows)				
Coast Fork confluence to 1 mile upstream	Year-round	640		Support aquatic life
North Fork confluence to 1 mile upstream	Year-round	285		Support aquatic life
Middle Fork Willamette River Target BiOp Flows				
Below Dexter Dam	Sept 1 – Oct 15	1200	99.9	Chinook spawning
Below Dexter Dam	Oct 16 – Jan 31	1200	99.9	Chinook
Below Dexter Dam	Feb 1 - June	1200	99.9	Rearing
Below Dexter Dam	Jul 1 – Aug 31	1200	99.9	Rearing
Coast Fork Willamette River (Oregon Water Resources Department Required Flows)				
Middle Fork confluence to 1 mile upstream	Year-round	40		Support aquatic life
Row River confluence to 1 mile upstream of MF/CF confluence	Year-round	15		Support aquatic life
Cottage Grove Dam to Row River	Nov 16 – Mar 31	125		Anadromous/resident fish life
Row River to mouth	Nov 16 – Mar 31	200		Anadromous/resident fish life
Row River (Oregon Water Resources Department Required Flows)				
Coast Fork confluence to 1 mile upstream	Year-round	40		Support aquatic life
Dorena Dam to mouth	Nov 16 – Apr 30	175		Anadromous/resident fish life

Table 12 Recommended Flows for Upstream Passage, Middle Fork and Coast Fork Subbasins

Location	Flow (cfs)	Time Period	Species	Regulation Point
Middle Fork below Dexter	900	Apr 15-Jun 30	Spring Chinook	Dexter Dam
	700	Mar 1-Apr 15	Steelhead	
Fall Creek [1] below Fall Creek Dam	170	Apr 15-Jun 30	Spring Chinook	Fall Creek Dam
	75	Mar 1-Apr 15	Steelhead	
Coast Fork mouth to Row River	200	Oct 15-Dec 1	Fall Chinook	Just below Row River
	175	Jan 1-May 15	Steelhead	
Row River below Dorena Dam	175	Oct 15-Dec 1	Fall Chinook	Dorena Dam
	150	Jan 1-May 15	Steelhead	

[1] Experience at Fall Creek in 1977-1978 showed that 150 cfs is sufficient to provide adult transport, and that this flow should not be interrupted frequently with lower flows. Considerable straying of marked fish was noted to have occurred when a week flow schedule of three days at 150 cfs and four days at 50 cfs was followed.

Source: Corps 1982, 2000a.

Table 13. Minimum Recommended Spawning Flows, Middle Fork and Coast Fork Subbasins

Location	Flow (cfs)	Time Period	Species	Regulation Point
Middle Fork below Dexter	1200	Sep 10-Oct 10	Spring Chinook	Dexter Dam
		Mar 1-Jun 1	Steelhead	
Fall Creek below Fall Creek Dam	150	Sep 10-Oct 10	Spring Chinook	Fall Creek Dam
		Mar 1-Jun 1	Steelhead	
Row River below Dorena Dam	200	Oct 15-Dec 10	Fall Chinook	Dorena Dam
		Mar 1-Jun 1	Steelhead	
Coast Fork mouth to Row River	250	Oct 15-Dec 10	Fall Chinook	Below Row River
		Mar 1-Jun 1	Steelhead	

Source: Corps 1982, 2000a

Table 14. Minimum Recommended Incubation Flows, Middle Fork and Coast Fork Subbasins

Location	Flow (cfs)	Time Period	Species	Regulation Point
Middle Fork Willamette River below Dexter	1 foot lower than flow level at spawning	Oct 1-Mar 15	Spring Chinook	Jasper
		Apr 1-Jun 15	Steelhead	
Fall Creek below Fall Creek Dam	150 cfs	Oct 1-Mar 15	Spring Chinook	Fall Creek Dam
	75 cfs	Apr 1-Jul 1	Steelhead	
Row River below Dorena Dam	150 cfs	Nov 15-Apr 1	Fall Chinook	Dorena Dam
		Apr 1-Jun 15	Steelhead	
Coast Fork Willamette mouth to Row River	250 cfs	Nov 15-Apr 1	Fall Chinook	Goshen
		Apr 1-Jun 15	Steelhead	

Source: Corps 1982, 2000a

Table 15. Minimum Flows Recommended for Salmonid Rearing, Middle Fork and Coast Fork Subbasins

Location	Flow (cfs)	Time Period	Regulation Point
Middle Fork Willamette River below Dexter Dam	1600	Jun 1-Oct 30	Dexter Dam
	800	Nov 1-Jun 1	
Middle Fork Willamette River from Hills Creek Dam to Lookout Point Reservoir	285	year-round	Hills Creek Dam
Fall Creek below Fall Creek Reservoir	150	Jun 1-Oct 30	Fall Creek Dam
	50	Nov 1-May 30	
Row River below Dorena Dam	300	Jun 15-Oct 30	Dorena Dam
	100	Nov 1-Jun 15	
Coast Fork Willamette mouth to Row River	350	Jun 15-Oct 30	Goshen
	200	Nov 1-Jun 15	

Source: Corps 1982, 2000a

3.2.4.1.3 Coast Fork Willamette River

In the Coast Fork subbasin, the release of warm water from Cottage Grove and Dorena reservoirs appreciably reduces the value of the lower Coast Fork and Row River for salmonid production (Corps 2000a). Temperatures in excess of 26°C have been measured downstream of the dams (Thompson *et al.* 1966). Warm water species are much more abundant than salmonids, indicating an unfavorable temperature regime for native species (Corps 2000a).

Historical removal of large wood from the Coast Fork and tributary streams reduced the overall transport of wood, and along with removal of riparian vegetation for various land uses, interacted to reduce the quantity and distribution of instream large wood. In the Coast Fork subbasin, approximately 97 percent of the upper Row River drainage has been harvested, and 76 percent of the upper Coast Fork Willamette drainage has been harvested at least once, which has contributed to riparian areas having primarily younger-aged conifers and hardwoods (NPCC 2004a). Also, many of the tributaries in the upper Coast Fork subbasin do not provide adequate shading or large wood recruitment. Limited wood in the river limits the formation of pools, thus reducing hiding areas for adult fish and restricting the quality and quantity of juvenile rearing habitat (NPCC 2004a).

The lower Coast Fork subbasin contains extensive agricultural, urban, and residential development that has limited the extent and composition of riparian vegetation. Further loss of riparian vegetation and function was caused by the construction of levees and revetments along the banks of the lower Coast Fork Willamette River to protect agricultural development from flooding and erosion. The construction of Interstate 5 also reduced riparian vegetation along major portions of the lower 25 miles of the Coast Fork Willamette River (NPCC 2004a).

Backwater habitats, including pool margins, side channels, and alcoves, have been reduced from historical levels in the Coast Fork subbasin (NPCC 2004a). Dykaar's investigation (2005) found that river-floodplain habitats have been substantially reduced. Declining rates were found for most geomorphic indicators (main channel migration, island development, gravel supply, and large wood) following dam construction. The main channels of the Coast Fork were found to be 6 percent shorter in the post-dam years. The amount of exposed gravel was down 20 percent and total island area was down 74 percent from a pre-dam average for the Coast Fork.

In the lower Coast Fork subbasin, the productivity, capacity, and diversity of cutthroat trout and spring Chinook salmon populations are limited by the following factors (NPCC 2004a):

- **Habitat Connectivity**. Cottage Grove and Dorena dams are complete barriers to adult and juvenile fish movement to historic spawning and rearing areas. Modification of the river's flow regime from dam regulation, channel and bank confinement, and reduced instream large wood have interacted to reduce backwater habitats important for juvenile rearing and winter refuge.
- **Habitat Modification**. Limited spawning areas and reduced levels of gravels/small cobbles are available in the lower rivers for spawning. Revetments along the lower Coast Fork Willamette and Row rivers have reduced habitat complexity. The lower subbasin has reduced floodplain forest extent and connectivity.
- **Large Wood**. Limited wood in the lower river and tributaries has modified gravel deposition patterns, reduced the frequency and depth of pools, and minimized hiding cover.
- **Water Quality**. The mainstem Coast Fork (mouth to RM 31) is listed as impaired for fish passage because of high mercury levels. There are water quality criteria exceedances of summer maximum temperatures below Cottage Grove and Dorena dams and in Camas Swale Creek. There is reduced canopy shade on many tributary streams, which leads to increased water temperatures. Changes in high and low water temperature regimes have affected adult spawning success and egg incubation and have limited the capacity of river and tributary streams to support juvenile fish.
- **Fish Passage Barriers**. Corps dams and fish passage barriers at road crossings on tributary streams prevent access into historical spring Chinook spawning areas, block the interchange between the upper and lower subbasin cutthroat trout populations, and limit juvenile access into rearing and refuge habitat.

- **Additional Factors**. Other factors that are limiting cutthroat trout and spring Chinook populations include competition with hatchery and introduced fish; lower numbers of salmon carcasses, which reduces nutrient inputs and thus food availability; and harassment of adult migrating and holding pre-spawning fish by recreational activities such as boating and fishing. All of these factors interact with modified habitats and other impacts to the aquatic system to limit fish populations.

The productivity, capacity, and diversity of Oregon chub populations in the lower (and upper) Coast Fork subbasin are limited by the following factors (NPCC 2004a):

- The frequency and magnitude of high flows is not sufficient to create and maintain channel complexity and provide nutrient, organic matter, and sediment inputs from floodplain areas. Loss of connectivity to floodplain and wetland habitats has affected availability of suitable habitat. Dams and other structures have changed river hydrology and reduced the amount of side channel habitat.
- The lower subbasin has reduced floodplain forest extent and connectivity.
- The presence of non-native predators (i.e., bluegill, smallmouth bass, and bullfrog) in this system inhibits Oregon chub recolonization of formerly occupied habitat.
- Camas Swale Creek near Creswell, which once contained numerous Oregon chub, has been so highly degraded as a result of industrial influences that few Oregon chub exist in the creek.

3.2.4.1.4 Middle Fork Willamette River

Rapid flow fluctuations are likely to adversely affect listed fish below Fall Creek Dam. Stranding of adults was noted to be substantial below Fall Creek when releases were dropped within a day from 150 cfs down to 50 cfs (Corps 1982, 2000a). The Willamette BiOp (NMFS 2008a) requires that down-ramping rates be minimized when flows are less than 700 cfs below Fall Creek Dam or below 3,000 cfs at Dexter Dam.

As a result of dam operations, water temperatures are cooler than historically occurred in spring and summer and warmer in fall and winter. Figure 22 shows the effects that construction of the Lookout Point/Dexter projects has had on the water temperature regime below Dexter Dam. Temperatures of the inflows to Hills Creek Dam are substantially different than the released water temperatures (much cooler in spring/summer and much warmer in fall/winter).

Lookout Point and Dexter reservoirs influence downstream water temperatures most of the year. Outflow temperatures are generally warmer than historic during the fall, winter, and spring months and colder during the summer months. Inflow temperatures peak in July at about 16.7°C while outflow temperatures peak at about 15°C two months later in September. Returns to the Dexter adult collection facility indicate that a thermal influence on migration does not occur below the dam; the peak of adult spring Chinook returns occurs in mid-May as expected and the number of adults returning annually has generally remained strong (Corps 1997). However, the release of warmer water in the fall has likely adversely affected spring Chinook offspring downstream of Dexter through accelerated embryo development and consequent premature emergence during the winter (Corps 2000a) when there is less invertebrate prey availability. The temperature regime downstream of Fall Creek Dam follows a similar pattern, although with a more pronounced release of cooler water in the spring. The Willamette BiOp (NMFS 2008a) requires the Corps to identify and implement measures to release flows with water temperatures that are more normative, but at this time, there is no requirement to install structural features at the Middle Fork subbasin dams to specifically modify temperatures.

Historical removal of large wood from the Middle Fork Willamette River and tributary streams reduced the overall transport of wood, and along with changes in riparian vegetation interacted to reduce the quantity and distribution of instream large wood. In the Middle Fork subbasin, approximately 74 percent of the riparian forests along the lower Middle Fork have reduced functions, including delivery of large wood (NPCC 2004a).

The lower Middle Fork subbasin contains extensive agricultural, urban, and residential development that has limited the extent and composition of riparian vegetation. Further loss of riparian vegetation was caused by the construction of levees and revetments along the banks of the lower Middle Fork Willamette River to protect agricultural development from flooding and erosion (NPCC 2004a).

Backwater habitats, including pool margins, side channels, and alcoves, have been reduced from historical levels in the Middle Fork subbasin (NPCC 2004a). Dykaar's investigation (2005) found that river-floodplain habitats have been substantially degraded for the lower Middle Fork. Declining rates were found for most geomorphic indicators (main channel migration, island development, gravel supply, and large wood) following dam construction. The amount of exposed gravel was down 70 percent from a pre-dam average for the Middle Fork and total island area was down 57 percent.

Key limiting factors in the Middle Fork subbasin for focal species (cutthroat and spring Chinook) as described above, and in the Willamette Subbasin Plan (NPCC 2004a) include the following:

- **Habitat Connectivity**. Corps dams block access to an estimated 80 percent of historical habitat. Modification of the river's high flow regime as a result of dam regulation, channel and bank confinement, and reduced large wood in the channels have interacted to reduce backwater habitats important for juvenile rearing and winter refuge.
- **Habitat Modification**. The frequency of flows is not of sufficient magnitude to create and maintain channel complexity and provide nutrients, organic matter, and sediment inputs from floodplain areas. Limited spawning areas and reduced levels of gravels/small cobbles have reduced the areas available for spawning. Revetments along the lower Middle Fork Willamette have reduced habitat complexity. The lower subbasin has reduced floodplain forest extent and connectivity. Riparian vegetation within 100 feet of the small tributaries of the lower subbasin is generally in poor condition.
- **Large Wood**. Changes in the delivery and transport of large wood in the river and tributaries has modified gravel deposition patterns, reduced the frequency and depth of pools, and minimized hiding cover for adult and juvenile fish.
- **Water Quality**. Compared to historical conditions, cooler summer mainstem temperatures and warmer fall temperatures below the dams disrupt normal migration and spawning behaviors. Changes in high and low water temperature regimes have affected adult salmonid spawning success and egg incubation and have limited the capacity of river and tributary streams to support juvenile fish.
- **Fish Passage Barriers**. Corps dams and fish passage barriers at road crossings on tributary streams prevent access to historical spring Chinook and cutthroat trout spawning areas, block the interchange between the upper and lower subbasin cutthroat trout populations, and limit juvenile access into rearing and refuge habitat.
- **Additional Factors**. Other, more moderate factors that are limiting cutthroat trout and spring Chinook populations include competition with hatchery and introduced fish; low numbers of salmon carcasses, which reduce nutrient inputs and thus food availability; and harassment of adult migrating and holding pre-spawning fish by recreational activities such as boating and fishing. All of these factors interact with modified habitats and other impacts to the aquatic system to limit fish populations.

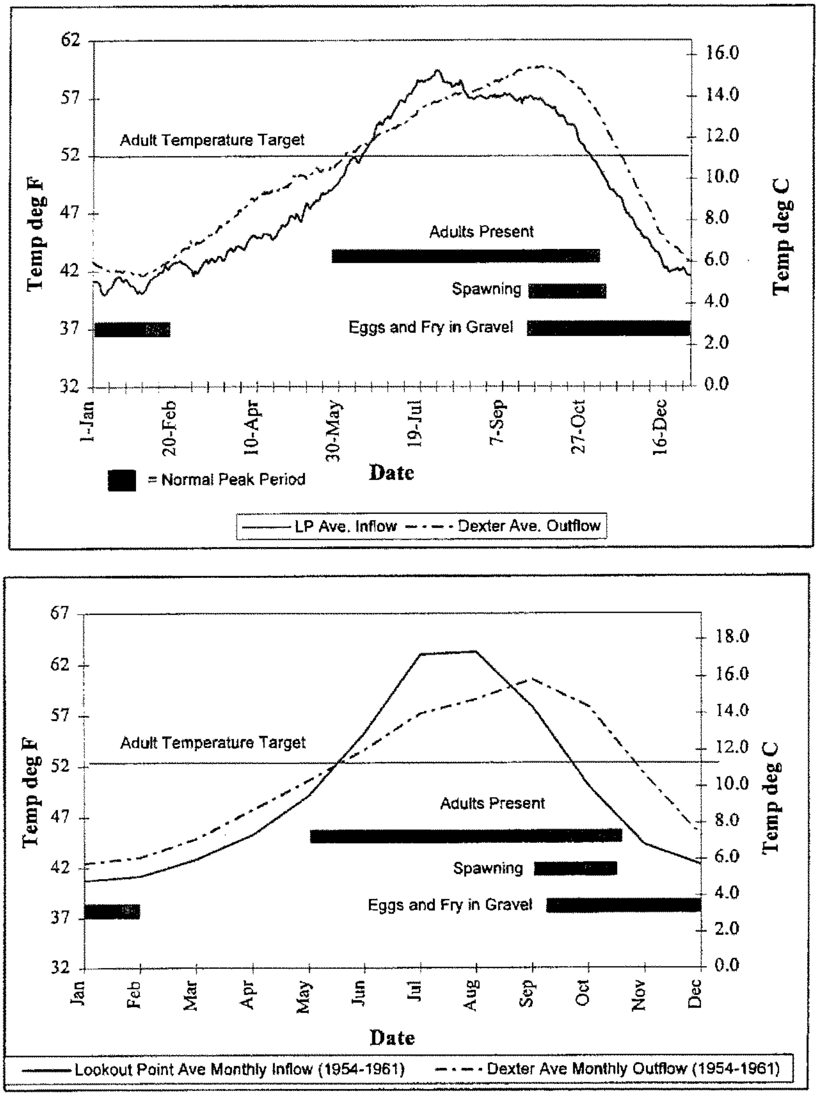


Figure 22. Daily (top) and Monthly (bottom) Average Water Temperatures, Middle Fork Willamette above Lookout Point and below Dexter Dam

The productivity, capacity, and diversity of Oregon chub populations in the lower Middle Fork subbasin are limited by the following factors:

- The frequency and magnitude of high flows is not sufficient to create and maintain channel complexity and provide nutrient, organic matter, and sediment inputs from floodplain areas. Loss of connectivity to floodplain and wetland habitats has affected availability of suitable habitat. Dams and other structures have changed river hydrology and reduced the amount of side channel habitat.
- The presence of non-native predators/competitors, such as bluegill and smallmouth bass, inhibits Oregon chub recolonization of formerly occupied habitat.
- Reduced water quality from upslope commercial timber operations.

Future without Project Fish/Aquatic Habitat

In the future without project condition, it is likely that habitat restoration and enhancement actions by a variety of agencies and groups will occur. The Willamette Subbasin Plan includes a number of recommendations to improve habitats; however, the rate at which these restoration actions may occur will be dependent upon state, local, and private funding, none of which are certain. The Corps will be required to take a number of restoration actions associated with compliance with the 2008 Biological Opinions (NOAA 2008; USFWS 208) as described in Section 2.1.4, although no specific restoration projects have yet been identified or implemented. Key Corps actions in the near-term are associated with temperature modifications and fish passage at the dams. Watershed councils will play a key role in establishing restoration priorities in the Coast Fork and Middle Fork subbasins. The Oregon Watershed Enhancement Board will continue to provide funding and technical assistance for watershed and stream restoration projects, although overall state funding is limited and primarily focused on habitat protection and riparian revegetation efforts. The Oregon CREP will provide incentives to landowners for shorter term riparian and wetland restoration, mainly through the use of vegetated filter strips and riparian buffers; this program does not provide funding for more costly engineering or large-scale restoration.

However, additional factors will continue to degrade habitats, such as continued growth and development, likely continued armoring of river and tributary channels to protect residences and infrastructure, and climate change. Even though the Corps will take actions to improve habitats as required for compliance with the 2008 Biological Opinions (NMFS 2008a; USFWS 2008), these actions will primarily be focused on spawning and rearing habitats that can directly compensate for adverse effects from dam operations (i.e., to provide surrogate habitats downstream of the dams while fish passage actions at the dams are being implemented). Without this separate ecosystem restoration study, more comprehensive actions to restore floodplains are not likely to occur. On balance, it is likely that the future without project condition will slightly improve in localized areas, but not likely to the level required to recover fish and wildlife species. The *Willamette River Basin Planning Atlas* (Hulse *et al.* 2002) scenarios predict that aquatic habitat quality and quantity will stay about the same, or improve somewhat (20-60 percent) depending on whether a development oriented or conservation oriented future scenario occurs.

Thus, the key assumptions that are made in this study regarding the likely future condition of habitat conditions is that trees and shrubs in the riparian zone and floodplain will continue to mature and get larger, but non-native invasive species such as blackberries, Japanese knotweed, and reed canary grass will also continue to expand their range, density and size. Large wood recruitment into the river will continue to be limited as compared to natural conditions as a result of land clearing and development, and the inability of native trees to recruit into areas dominated by non-native species. In areas where localized restoration occurs, these areas will contribute large wood to the rivers within the 50 year period of analysis, but this is expected to be much less than would occur with more extensive floodplain and riparian restoration. Temperatures in the rivers will likely remain similar to existing conditions or actually be increased somewhat during the summer/fall as a result of actions taken by the Corps at the dams to release water from varying levels in the reservoirs to mimic natural stream flows and temperature regimes. Climate change effects such as reduced snowpack may also increase water temperatures.

3.2.5 Terrestrial Species and Habitat

Terrestrial Species

The Willamette Basin has a rich variety of terrestrial animal and plant species. It is estimated that there are approximately 18 species of native amphibians, 15 reptile species, 154 bird species, and 69 mammal species currently present in the basin (Hulse *et al.* 2002). A number of species have dramatically declined and are the focus of conservation concerns. Factors contributing to these declines are frequently complex and poorly known, but include habitat loss, introduced species, contaminants, and human disturbance (Hulse *et al.* 2002).

Not all terrestrial species residing in the Willamette Basin are native. There are about 17 species that have been introduced (Hulse *et al.* 2000). Non-native species include wild turkey, ring-necked pheasant, California quail, European starling, house sparrow, eastern gray squirrel, nutria, and bullfrog (Hulse *et al.* 2000; NPCC 2004b).

Federal ESA-listed species, candidate species, and species of concern were used to compile a listing of terrestrial animals and plants that could serve as a focus for restoration opportunities in the Coast and Middle Fork subbasins. Table 16 shows the special-status wildlife species listed for the subbasins and Table 17 shows special-status plant species. Only those species likely to occur in the floodplain areas of the Coast and Middle Forks are described in more detail below.

3.2.5.1.1 Threatened and Endangered Species

Marbled Murrelet: The marbled murrelet is federally listed as threatened. Marbled murrelets are small seabirds of the family Alcidae that occur along the north Pacific coast from the Aleutian Islands and southern Alaska south to central California. Murrelets feed on small fish and invertebrates usually within 2 miles of shore in open but somewhat sheltered marine waters, such as bays or sounds where water depth is less than 330 feet (Carter 1984). The nesting period begins around the end of March and continues through mid-September (Hamer and Nelson 1995). Nest sites are restricted to stands of mature and old-growth forest (Carter 1984). Because of the scarcity of such stands, it is common for murrelets to fly inland many miles to nest; over 40 miles in some studies (Cooper *et al.* 2006, 2007). Marbled murrelets only fly to and from their nest sites during crepuscular hours, spending their diurnal hours foraging. The loss of old growth forests is the main cause for the decline of this species. In addition, it is believed that forest fragmentation forces nests closer to forest edges making them vulnerable to predation by jays, crows, ravens, and great horned owls. Other threats to this species include fishing nets and oil spills.

Northern Spotted Owl: The northern spotted owl is a federal and state threatened species. Spotted owls are generally associated with old-growth forests and require multilayered canopies. Some upland coniferous forests in the Coast and Middle Fork subbasins may be suitable nesting habitat for the spotted owl. Other habitats may provide foraging or dispersal habitat for the species. Several spotted owls have been located near Fall Creek Lake. Additional spotted owl activity centers are likely found at or near the Hills Creek project on Willamette National Forest lands (Corps 2000a).

Bald Eagle: The bald eagle is a state threatened species but was delisted from the Federal ESA on July 9, 2007. Bald eagles breed and reside year-round throughout the Willamette Basin, and are mostly associated with forested rivers and lakes; during some months eagles can occur extensively in open areas with livestock (NPCC 2004b). They nest mainly in large Douglas fir or cottonwood trees. During summer, Oregon eagles feed mainly on fish (live or dead), then augment this in other seasons with waterfowl and sheep (carrion). The increased nesting success and population increase for bald eagles in recent years can be attributed largely to the reduction of some persistent contaminants (DDT) and to increased protection of nest and roosting sites from harvesting and human visitation (Isaacs and Anthony 2001). The wintering population is stable or increasing, and is not necessarily composed of the same individuals present in summer.

Eagle Rock is a 200-acre sensitive area managed for the protection of bald eagles near the Lookout Point Reservoir. The eagles frequently forage in Dexter Lake especially in the winter months and in the nest initiation season. They also have been observed flying over Lowell Butte to forage in Fall Creek Lake and fishing in the river below Dexter Dam. Bald eagles have been observed at Fall Creek but no nest sites have been identified. Bald eagle territories also are found on Forest Service land at Hills Creek, on BLM land at Dorena, and on private land at Cottage Grove (Corps 2000a).

Table 16. Special-status Wildlife Species, Middle Fork and Coast Fork Subbasins

Species Name	Federal Status	State Status
Marbled murrelet (*Brachyramphus marmoratus)*	T	T
Northern spotted owl (*Strix occidentalis caurina)*	T	T
Fender's blue butterfly (*Icaricia icarioides fenderi)*	E	
North American wolverine (*Gulo gulo luscus*)	C	T
Red tree vole (*Arborimus longicaudus*)	C	
Streaked horned lark (*Eremophila alpestris strigata*)	C	C
Oregon spotted frog (*Rana pretiosa*)	C	
Pallid bat (*Antrozous pallidus pacificus*)	SoC	
White-footed vole (*Arborimus albipes*)	SoC	
Townsend's western big-eared bat (*Corynorynus townsendii townsendii*)	SoC	
Silver-haired bat (*Lasionycteris noctivagans*)	SoC	
Long-eared myotis bat (*Myotis evotis*)	SoC	
Fringed myotis bat (*Myotis thysanodes*)	SoC	
Long-legged myotis bat (*Myotis volans*)	SoC	
Yuma myotis bat (*Myotis yumanensis*)	SoC	
Camas pocket gopher (*Thomomys bulbivorus*)	SoC	
Northern goshawk (*Accipiter gentilis*)	SoC	
Western burrowing owl (*Athene cunicularia hypugaea)*	SoC	
Black tern (*Chlidonias niger*)	SoC	
Olive-sided flycatcher (*Contopus cooperi*)	SoC	
Harlequin duck (*Histrionicus histrionicus*)	SoC	
Yellow-breasted chat (*Icteria virens*)	SoC	
Acorn woodpecker (*Melanerpes formicivorus*)	SoC	
Lewis' woodpecker (*Melanerpes lewis*)	SoC	
Mountain quail (*Oreortyx pictus*)	SoC	
Band-tailed pigeon (*Patagioenas fasciata*)	SoC	
Oregon vesper sparrow (*Pooecetes gramineus affinis*)	SoC	
Purple martin (*Progne subis*)	SoC	
Northern Pacific pond turtle (*Actinemys marmorata marmorata*)	SoC	
Coastal tailed frog (*Ascaphus truei)*	SoC	
Oregon slender salamander (*Batrachoseps wrighti*)	SoC	

Species Name	Federal Status	State Status
Northern red-legged frog (*Rana aurora aurora*)	SoC	
Foothill yellow-legged frog (*Rana boylii*)	SoC	
Cascades frog (*Rana cascadae*)	SoC	
Southern torrent (seep) salamander (*Rhyacotriton variegatus*)	SoC	
Tombstone Prairie farulan caddisfly (*Farula reaperi)*	SoC	
Tombstone Prairie oligophlebodes caddisfly (*Olgophlebodes mostbento)*	SoC	
One-spot rhyacophilan caddisfly (*Rhyacophila unipunctata)*	SoC	
American peregrine falcon (*Falco peregrinus anatum*)	DM	
Bald eagle (*Haliaeetus leucocephalus)*	DM	

E = Endangered T = Threatened C = Federal Candidate SoC = Federal Species of Concern.
DM = Delisted taxon, recovered, being monitored first 5 years.
SC = State 'critical' - listing as T or E appropriate if immediate conservation actions not taken.
SV = State 'vulnerable' – species not in imminent danger of being listed.
SU = State 'undetermined' are those species for which status is unclear.

American Peregrine Falcon: The American peregrine falcon was removed from Federal ESA listing in 1999. Peregrine falcons have been observed near several Corps' Willamette projects. There are 22 known aeries on the Willamette National Forest. Peregrine falcons are likely to forage along the Coast and Middle Forks and prey may include riparian species and waterfowl (Corps 2000a).

Table 17. Special-status Plant Species, Middle Fork and Coast Fork Subbasins

Species	Federal Status	State Status
Willamette daisy *(Erigeron decumbens* var. *decumbens)*	E	E
Bradshaw's desert parsley*(Lomatium bradshawii)*	E	E
Kincaid's lupine *(Lupinus sulphureus* var. *kincaidii)*	T	T
Crenulate grape fern (*Botrychium crenulatum)*	SoC	C
Cliff paintbrush (*Castilleja rupicola)*	SoC	
Cold-water corydalis (*Corydalis aquae-gelidae*)	SoC	C
Willamette valley larkspur (*Delphinium oreganum*)	SoC	C
Peacock larkspur (*Delphinium pavonaceum*)	SoC	E
Wayside aster (*Eucephalus vialis)*	SoC	
Shaggy horkelia (*Horkelia congesta* ssp. *congesta*)	SoC	C
Thin leaved peavine (*Lathyrus holochlorus*)	SoC	
Whitetop aster (*Sericocarpus rigidus)*	SoC	
Hitchcock's blue-eyed grass (*Sisyrinchium hitchcockii*)	SoC	

E = Endangered T = Threatened SoC = Federal Species of Concern C = State Candidate

Fender's Blue Butterfly: Fender's blue butterfly occurs in native grassland habitats within the Willamette Valley. The historic range of this insect is not well known, due to the limited information collected prior to 1931. Fender's blue butterfly populations are present at 31 remnant prairie sites in Polk, Yamhill, Benton, and Lane counties. The butterfly's host plant is primarily Kincaid's lupine but will also use spurred lupine and sickle keeled lupine if Kincaid's is not present. Adult butterflies lay their eggs on perennial Lupinus species (USFWS 2000a). After larvae hatch, they feed on their host plant for a short time, reaching their second instar in the early summer (USFWS 2000a). Diapause begins following development into the first instar and may last for one or more seasons, depending on environmental and individual conditions. Through this stage, larvae remain in the leaf litter near the base of the host plant through fall and winter, at a minimum, and typically become active in March or April of the following year. When diapause ends, larvae continue to feed and grow through an additional four instars. At this point, larvae enter their pupal stage and adults emerge in April and May. A complete life cycle can occur in one year.

Willamette Daisy: Willamette daisy is state and federally listed as endangered. This perennial herb is endemic to the Willamette Valley and historically was likely widespread in native prairie habitat. It is currently known only from a few small remnants, including sites in Lane County. Willamette Valley prairie is considered to be among the rarest habitats in western Oregon and is threatened by fragmentation, agriculture and urban growth (USFWS 2002b).

Bradshaw's Desert Parsley: Bradshaw's desert parsley is state and federally listed as endangered. This perennial herb occurs on seasonally saturated or flooded prairies, adjacent to creeks and small rivers in the southern Willamette Valley. Endemic to and once widespread in the wet, open areas of the Willamette Valley, Bradshaw's desert parsley is now limited to a few sites in Lane, Marion, and Benton counties. In Lane County, the greatest concentrations of remaining sites where plants occur are in and adjacent to the Eugene metropolitan area. Most of this plant's habitat has been destroyed by land development for agriculture, industry, and housing. In addition, water diversions and flood control structures have changed historic flooding patterns, which may be critical to seedling establishment (USFWS 2003a).

Kincaid's Lupine: Kincaid's lupine is state and federally listed as threatened. This perennial species is typically found in native upland prairie. The plant's distribution implies a close association with native upland prairie sites that are characterized by heavier soils and mesic to slightly xeric soil moisture levels. There are known populations of this plant in Lane County. Willamette Valley prairie is considered to be among the rarest habitats in western Oregon and is threatened by fragmentation, agriculture and urban growth (USFWS 2003b).

3.2.5.1.2 Candidate Species

North American Wolverine: The North American wolverine is a carnivorous mammal that typically occurs in open forests at higher elevations and in alpine areas. They feed on small mammals and carrion. They den in caves or hollow logs. Prior to 1973, wolverines were considered furbearers in Oregon. They were always rare in Oregon, although sightings, tracks and road kill document their continued presence at low densities (Csuti *et al.* 2001).

Streaked Horned Lark: The streaked horned lark is a federal candidate species and a state critical species. This bird is a grassland species and the large loss of native grasslands in the Willamette Valley is the most likely reason for its decline. They were formerly very common breeders in western Oregon, but are now severely depleted in population numbers. These birds need sparsely vegetated open fields and will inhabit disturbed areas such as overgrazed pastures; they dig a nest cavity in dry ground with sparse vegetation. Urban development and agriculture are likely reasons for this species' decline. Potentially suitable breeding habitat exists below Fall Creek, below Dorena at Schwarz Park, and at Row Point on Dorena Lake (Corps 2000a).

Oregon Spotted Frog: The Oregon spotted frog is a federal candidate species and a state critical species. This species has been lost from at least 78 percent of its former range and currently is known to occur in Lane County (USFWS 2002a). Most populations are small and isolated. It is found near perennial bodies of water that include zones of shallow water and abundant emergent or floating aquatic plants, which it uses for basking and escape cover. Many factors are believed to have caused the frog's decline, including loss of marsh habitats, predators such as bullfrogs, changes in hydrology and water quality, development, and livestock overgrazing, which continue to result in habitat loss, alteration, and/or fragmentation (USFWS 2002a). The Oregon Natural Heritage Information Center database (2004) contains only two documented records from the upper McKenzie watershed. This species has not been documented on Corps' project lands (Corps 2000a).

3.2.5.1.3 Species of Concern

Pallid Bat: The pallid bat occurs in southwestern Oregon (including western Lane County) and most of eastern Oregon and is known to inhabit portions of the Coast Range near Tillamook State Forest. It occurs in open forested areas (ponderosa pine, oak) and desert areas. It uses cliffs, caves, mines or abandoned buildings for roosts. This bat is known to eat crickets, beetles, grasshoppers, and some moths as well as small vertebrates such as lizards and mice (Csuti *et al.* 2001).

White-footed Vole: The white footed vole occurs in western Oregon south of the Columbia River, more commonly in the Coast Range but it has been found in the Cascades of southern Lane County. It most often occurs in riparian zones within larger areas of coniferous forest. It feeds on leaves and roots of a variety of plants and is presumed to be a burrowing rodent. It is uncommon in Oregon (Csuti *et al.* 2001).

Red Tree Vole: Red tree vole is a federal species of concern. This small, highly specialized rodent resides mainly in the mountainous portions of the Willamette Basin (NPCC 2004b). The preferred habitat is moist, old growth coniferous forest, especially Douglas fir. To a lesser degree, it uses mid-aged closed-canopy forests that have stands of large-diameter trees (larger than 21 inches). Red tree voles also are associated with high percent canopy cover, high stump density, and shorter snags and logs. The species is at risk because of the loss of formerly widespread old-growth coniferous forests, as well as habitat fragmentation.

Townsend's Western Big-Eared Bat: Townsend's big-eared bat is a federal species of concern and a state critical species. Like many bats, its main requirement is for cool roosting and hibernation sites; such as the bark and cavities of large trees (NPCC 2004b). This need also is met by caves, large rock outcrops, and some abandoned buildings or mine tunnels. They forage primarily over water, riparian areas, wetlands, and small canopy gaps in forests. Disturbance and habitat destruction are reasons for their decline. Solitary Townsend's big-eared bats have been observed in an old quarry along Fall Creek Road at Fall Creek Lake, and a single bat was observed in the right abutment of Dorena Dam (Corps 2000a). This individual was removed and the opening secured to preclude further entrance. Small groups of this species have been observed day roosting and hibernating in caves near Lookout Point Lake on lands owned by the Weyerhaeuser Company (Corps 2000a).

Silver-haired Bat: Silver-haired bats occur throughout most of North America, except along the Gulf of Mexico. They prefer forested areas, particularly old-growth forests. They forage around ponds and streams and roost under loose bark. They prey on moths and other soft-bodied insects. They need drinking water and are typically found near waterbodies (Csuti *et al.* 2001).

Long-eared Myotis Bat: Long-eared myotis is a federal species of concern and inhabits coniferous forest and arid grasslands in a wide elevation range. This forest-dwelling bat uses buildings, bark and rock crevices for day roosts, caves and mine entrances for night roosts, and buildings for small maternity colonies. This species is at risk due to disturbance and habitat loss (relies on snags, decadent trees, and coarse woody debris). This species has been documented at the Fall Creek and Cottage Grove projects (Corps 2000a).

Fringed Myotis: Fringed myotis is a federal species of concern and a state vulnerable species. This bat uses a variety of habitats including forests, woodlands, and grasslands. This colonial species is known to roost in tightly packed clusters in caves, mines, snags, rock crevices, bridges, buildings, and under bark.

They are considered at risk due to general rarity and susceptibility to human disturbance. During surveys in 1997, fringed myotis were captured night-roosting at the Fall Creek project (Corps 2000a).

Long-legged Myotis: Long-legged myotis is a federal species of concern and prefers mature conifer forests but also can be found in agricultural, riparian, and oak woodland habitats. It uses rock crevices, buildings, fissures in bark or the ground for day roosts, and emerges early in the evening to feed. In winter, it hibernates in caves and mines. This species is at risk because of human disturbance and the bat's dependence on snags, decaying trees, old/abandoned buildings, bridges, and caves for roosting and hibernacula since most of these components are declining in terms of presence and availability. Surveys conducted in 1997 identified long-legged myotis at the Fall Creek and Hills Creek projects (Corps 2000a).

Yuma Myotis Bat: The Yuma myotis range extends across western North America, from central Mexico to British Columbia, Montana, and New Mexico. The wintering range is unknown. In Oregon, the Yuma myotis is found in older Douglas fir forests, Sitka spruce forest, and in open oak or Ponderosa pine woodland, and is known to roost in caves, abandoned buildings, and other structures. Food consists of mostly moths and a variety of other small insects, including dipterans, primarily caddis flies, crane flies, and midges, and even some ground beetles (Csuti *et al.* 2001).

Camas Pocket Gopher: The Camas pocket gopher is endemic to the Willamette Valley and adjacent Columbia River habitats. It lives in grassy areas where burrows can be dug and various herbaceous species can be eaten. It occurs in both prairies and agricultural lands. (Csuti *et al.* 2001). There are no recorded sightings of the Camas pocket gopher in the Eugene/Springfield area.

Northern Goshawk: The northern goshawk is federal species of concern and a state critical species. This bird is found in a variety of mature forests, and nests in areas with dense overhead foliage or high canopy cover created by tall trees (typically old-growth). They occur in the Willamette Valley during migration and winter, where they sometimes migrate over or stop in non-forested habitats. Reasons for decline include loss of large habitat patches and the need for mature/old-growth forest. Northern goshawks have been documented at Mt. Pisgah.

Western Burrowing Owl: The Western burrowing owl is a grassland specialist distributed throughout Western North America, primarily in open areas with short vegetation and bare ground in desert, grassland, and shrub-steppe environments. Burrowing owls are dependent on the presence of fossorial mammals (primarily prairie dogs and ground squirrels), whose burrows are used for nesting and roosting (Klute *et al.* 2003). Burrowing owls are protected by the Migratory Bird Treaty Act in the United States and Mexico. It is a rare winter visitor in the Rogue and Willamette valleys, along the coast, and occasionally in eastern Oregon.

Black Tern: Black terns are holoarctic breeders from Alaska/Canada south to California and across Siberia and Scandinavia south to the Mediterranean. They nest in marshes along lakes or rivers and forage in wetlands, pastures, agricultural lands and shallow water. Diet includes insects or all kinds as well as aquatic invertebrates and small fish. In Oregon, they are known to nest in Malheur National Wildlife Refuge and other desert marshes as well as some Cascade lakes. A few pairs have nested at Fern Ridge Reservoir in Lane County (Csuti *et al.* 2001).

Olive-Sided Flycatcher: The olive-sided flycatcher is a federal species of concern and a state vulnerable species. This species has been documented in all counties in the Willamette Valley. These birds nest along the edges of lakes and rivers and in open-forest sites. In the valley, they are typically found in a large habitat patch with older trees on the edges, a clearing in the middle, and one or more tall snags on which to perch. Potential causes for decline include fire suppression, urban development, and deforestation (Corps 2000a).

Harlequin Duck: The harlequin duck is federal species of concern. This medium-sized diving duck is a rare summer resident in the northern and central Cascade Mountains, breeding along swiftly flowing, rough, turbulent mountain streams, typically nesting under shrubs, debris, or rocks along these streams. It also may nest in rock crevices among boulders or in tree cavities. Harlequin ducks feed primarily on crustaceans, mollusks, aquatic insects, and fish. Breeding has not been documented on Corps' project lands (Corps 2000a). The riparian area of Fall Creek in the Willamette National Forest provides nesting habitat for this species.

Yellow-Breasted Chat: The yellow-breasted chat is federal species of concern and a state critical species. This bird breeds in second growth, shrubby old pastures, thickets, bushy areas, and low wet areas near water sources. Threats to this species include habitat loss due to conversion to agricultural and urban land uses, and cowbird parasitism. Yellow-breasted chats have been documented at the Fall Creek and Hills Creek projects.

Acorn Woodpecker: The acorn woodpecker is a federal species of concern. This non-migratory, cavity-nesting species seldom occurs above 1,000 feet in elevation (NPCC 2004b). A main requirement seems to be a relatively open area, such as lawn or heavily grazed pasture, beneath a high canopy that contains some oaks. Granary trees (required for storing acorns) are generally of large diameter. Possibly the greatest threats are the gradual loss (due to fire suppression) of oak stands having at least a few larger-diameter trees, and increased traffic on roads between suitable oak stands thus endangering dispersing birds.

Lewis' Woodpecker: The Lewis' woodpecker is a federal species of concern and a state critical species. They are sometimes associated with post-burn areas. These birds are declining throughout their range, probably due to oak/Ponderosa pine and cottonwood habitat loss; they need open areas for foraging and large trees for nesting. Lewis's woodpeckers have been documented at Mt. Pisgah and at Waldo Lake in the Willamette National Forest.

Mountain Quail: The mountain quail is a federal species of concern. This secretive bird typically inhabits dense brushy slopes and foothills of conifer forest. They breed in higher elevations during spring and summer and retreat to lowlands during winter to avoid the snow. They are abundant west of the Cascades and are legally hunted. They are the only native quail in Oregon. Recent improvements in riparian condition may be improving their population (USFWS 2010b).

Band-tailed Pigeon: The band-tailed pigeon breeds from British Columbia to Baja California and east to Colorado and New Mexico. They prefer coniferous or mixed coniferous-deciduous forests and also use oak woodlands. They nest in the tops of trees usually near water. They feed on nuts and berries and some insects and seeds. They are a game species in Oregon and occur in forested areas of Lane County (Csuti *et al.* 2001).

Oregon Vesper Sparrow: The Oregon vesper sparrow is a federal species of concern and a state critical species. This sparrow was formerly common in the Willamette Valley and bred in upland prairie-savanna; as this habitat diminished, it adapted to nesting in lightly grazed pastures and young conifer plantations with extensive weeds and grasses (NPCC 2004b). Vesper sparrows have been documented at Mt. Pisgah and the Fall Creek project.

Purple Martin: The purple martin is a federal species of concern and a state critical species. Formerly common in the Willamette Valley, it is now uncommon to rare and localized (NPCC 2004b). Martins historically nested in cavities of old-growth trees located near water bodies or other open areas. With widespread reduction of this habitat, the species adapted to nesting in artificial structures (bird houses, hollow pilings in rivers). The greatest threats are continued loss of old growth snags of the proper proportions in suitable landscapes, and lack of maintenance of artificial nesting structures. Also, the artificial nest sites are sometimes usurped by exotic species (European starling, house sparrow). Like other swallows, martins are wide ranging aerial foragers and are vulnerable to collisions with vehicles and reductions in insect prey. Purple martins have been documented at the Cottage Grove and Dorena projects and in the Creswell area (Corps 2000a).

Northern Pacific Pond Turtle: The Northern Pacific pond turtle is a federal species of concern and a state critical species. These turtles occur in a wide variety of both permanent and ephemeral wetlands, including lakes, ponds, streams, rivers, and altered habitats including reservoirs, stock ponds, and sewage treatment plants (Corps 2000a). The most important habitat component appears to be the presence of aquatic vegetation and/or physical structure such as overhanging ledges, crevices, and large floating logs for basking in the sunshine. The nesting period begins around June 1 in the Willamette Valley and lasts approximately 6 weeks. Reasons for decline include nest destruction from farm and development practices; aquatic and upland (nesting) habitat destruction; and human actions. Dams, drainage, channelization, and other hydrologic alterations are other possible reasons, generally resulting in simplified ecosystems.

Pond turtles are found at numerous locations in the Willamette Valley, primarily on private lands, although the Willamette Greenway and Row River have important sites for pond turtles (Adamus 2003). Fall Creek Lake supports a small and presumably dwindling population of northwestern pond turtles. Northwestern pond turtles also have been documented at the Dexter, Lookout Point, and Dorena projects. Historical sightings exist at the Cottage Grove project.

Coastal Tailed Frog: The coastal tailed frog is a moderately small slender-bodied frog with rough skin. They are present year-round in and near streams. They are mostly nocturnal, but often seen on creek banks in daylight. Adults are usually active from April to October, depending on the locality. To escape predators, they will tuck in their limbs and let the water carry them downstream. Adults are relatively long-lived, with speculation that they can live up to 15 to 20 years. Their range includes the Cascade Mountains of Oregon.

Oregon Slender Salamander: The Oregon slender salamander occurs in the North and central Cascades of Oregon, typically in old-growth forests or younger forests with high concentrations of downed logs. They also occur in moist talus (Corkran and Thoms 1996).

Northern Red-Legged Frog: The northern red-legged frog is a federal species of concern and a state vulnerable species. This frog inhabits moist forests, wetlands, and riparian habitats, and slow-moving streams (Corps 2000a). Red-legged frogs are highly terrestrial and forage in forests near water. They breed and lay eggs in relatively slow-moving water in ponds, along rivers, in reservoirs, lakes, springs, and marshes in January or February. Possible reasons for decline include displacement by bullfrogs and pesticide/herbicide runoff. This frog species has been documented at the Fall Creek and Lookout Point projects (Corps 2000a).

Foothill Yellow-Legged Frog: The foothill yellow-legged frog is a federal species of concern and a state vulnerable species. This frog is found in and around permanent open, low-gradient streams with rocky, gravelly, or sandy substrates (Corps 2000a). It breeds from mid-March to June in low-velocity tributary streams. In 1997 and 1998, surveys were conducted at multiple historic known sites for yellow-legged frogs, including two tributaries upstream of Fall Creek, and two tributaries upstream of Dorena. Foothill yellow-legged frogs were not found at any of these locations, which may be due to inundation of the historic habitats. (Corps 2000a)

Cascades Frog: Cascades frogs occur throughout the Cascades Range in Oregon and Washington. They typically occur above 3,000 feet in elevation in mountain lakes and meadows and moist forest (Corkran and Thoms 1996).

Southern Torrent (Seep) Salamander: The southern torrent salamander occurs in the Oregon Coast Range, Klamath Mountains, Willamette Valley and Southern Cascades. They live in very cold streams, springs, seeps, and waterfall splash zones. They are aquatic and live in gravel and debris within and adjacent to streams (Corkran and Thoms 1996).

Tombstone Prairie Farulan Caddisfly: Tombstone prairie farulan caddisfly larvae are found in small (one quarter to one full meter in width) cold spring-fed streams shaded by old growth. Currently known from three collection localities in Oregon: Tombstone Prairie, Linn County; Ennis Creek, Lane County; and Jackson Creek, Douglas County. It is likely to occur throughout the Oregon Cascades at elevations above 4,000 feet (NatureServe 2011).

Tombstone Prairie Oligophlebodes Caddisfly: Tombstone prairie oligophlebodes caddisfly have been collected in two locations in Oregon. Adults were collected in riparian vegetation zones. Larvae of the genus occur in cold mountain streams (large and small) from sea level to alpine communities throughout western North America. Streams are perennial, cool or cold, free of fine sediment and filamentous algae, with moderate to strong current and are well-oxygenated (NatureServe 2011).

One-spot Rhyacophilan Caddisfly: This caddisfly is currently known from two sites in the Oregon Cascades: Hemlock Butte Pass, Lane County; and Barlow Pass, Hood River County. The species may exist throughout higher elevations of the Cascades (NatureServe 2011).

Crenulate Grape Fern: A moonwort that primarily occurs within and at the margins of seeps, springs, fens, wet meadows, dry meadows, and other wetlands at elevations from 3,935 to 8,200 feet. They tend to occur in historically disturbed habitats, where some mineral soil has been exposed within the last 10-30 years. They are seldom found in abundance in mature old growth forests without recent disturbance.

Cliff Paintbrush: Cliff paintbrush is a short, herbaceous perennial that occurs in rock crevices and on rocky ridges and slopes, talus, and scree at high elevations in the subalpine to primarily alpine vegetation zones. The plant is likely a facultative parasite, and likely on different host species. Cliff paintbrush is believed to be pollinated by hummingbirds and bees. Reproduction is solely by seeds, which are likely dispersed by wind, birds, and small mammals (Cliff Paintbrush Recovery Team 2009).

Cold-water Corydalis: Cold-water corydalis is a federal species of concern. It occurs along perennial streams and springs with a gravel bed. In Oregon, it most frequently occurs in headwater or first and second order streams with moderately dense high canopy cover. It typically occurs within a few feet of the stream edge and occurs along streams with temperatures below 14°C (BLM 1998).

Willamette Valley Larkspur: Willamette Valley larkspur is a perennial forb in the buttercup family that occurs in native prairies. It is endemic to the Willamette Valley.

Peacock Larkspur: Peacock larkspur is a perennial forb in the buttercup family. It is endemic to the Willamette Valley and occurs in well-drained native prairies. Existing populations primarily occur along roadsides with limited disturbance (Benton County 2010).

Wayside Aster: Wayside aster is a federal species of concern and is state listed as threatened. This perennial plant blooms from July to early August and can be found in open woodlands of Lane County. This rare plant was thought to be extinct until it was re-discovered near Eugene in 1980 (Eastman 1990). Wayside aster occurs near Cottage Grove reservoir.

Shaggy Horkelia: Shaggy horkelia is a federal species of concern and a state candidate species. This plant is a small, low-growing herbaceous perennial in the rose family and occurs in wet prairies and oak savannahs. There is a population of shaggy horkelia at Dorena Lake (Corps 2000a).

Thin Leaved Peavine: Thin-leaved peavine is a prairie-woodland species that occurs in the Willamette Valley in Oregon and in remnant prairie habitat in Washington (Washington Department of Natural Resources 2010).

White topped Aster: White-topped aster is a federal species of concern and is state listed as threatened. This small perennial is limited to the open grassy prairies of the Willamette Valley and is threatened by loss of habitat because of urban and agricultural development. Most of the existing populations are centered in the Eugene area in Lane County.

Hitchcock's Blue-eyed Grass: Hitchcock's blue-eyed grass occurs in wet prairie habitats in the Willamette Valley.

Terrestrial Habitats

According to the Willamette Subbasin Plan (NPCC 2004a, 2004b), the loss of habitat has been and continues to be among the most important factors that limit terrestrial animal and plant populations in the Willamette Basin. In particular, the loss of vital habitats has been accompanied by the decline of many wildlife, plant, and butterfly species that use these habitat types. Other factors that likely limit terrestrial species populations include roads and other barriers, vegetation change, diminished supply of dead wood, water regime change, pollution, water temperature change, soil degradation, harassment, and invasive species, pathogens, and parasites. Together, these limiting factors degrade terrestrial habitat and often tend to fragment and simplify the internal structure of habitats making them less able to support viable plant and animal populations (NPCC 2004b).

Six vital natural habitats are found in the Coast and Middle Fork subbasins including: upland prairie-savanna, oak woodlands, wetland prairie and seasonal marsh, ponds and their riparian zones, stream riparian zones, and old growth conifer forest. These habitats are dramatically reduced from their historic distribution due to conversions to other land uses and historically supported exceptional wildlife or plant diversity, and/or had consistent use by a relatively large number of plant and wildlife species of concern (NPCC 2004b). Acreage estimates of historical (circa 1850s) and current (circa 1990s) land cover types in the Middle Fork and Coast Fork subbasins are shown in Table 18. Because old-growth conifer forests did not historically occur in the floodplain of the Coast and Middle Fork subbasins, this habitat type will not be discussed in detail in this report.

Upland Prairie-Savanna: This habitat type includes communities where native grasses and forbs are dominant, with little or no woody vegetation (NPCC 2004b). When shrubs and/or trees also are present, but comprise less than 30 percent canopy cover, the habitat is termed 'savanna.' Upland native prairie is among the rarest of North American ecosystems. Upland prairie/savanna has been identified as a priority for protection and restoration in ecological assessments for the Willamette Basin. Much of the recent attention directed at this habitat has been due to its hosting three federally listed species: golden paintbrush, Kincaid's lupine, and Fender's blue butterfly. In addition, this habitat hosts species of concern such as the streaked horned lark and Oregon vesper sparrow.

Historically, prairies, savanna, and oak woodlands formed a successional mosaic throughout lower-elevation portions of the Willamette Basin. Many such areas were maintained by fire, often set intentionally by indigenous tribes. Upland prairies were among the first habitats to be plowed by early settlers of the valley because they were so easy to clear. As shown in Table 17, the west side grasslands land cover type had the overall largest acreage losses in the lower Middle Fork and Coast Fork subbasins.

Oak Woodlands: Oak woodlands include stands of Oregon white oak (*Quercus garryana*), with either closed canopies (oak forest) or with open canopy but with tree densities generally greater than about 100 trees per acre (NPCC 2004b). Likely as a result of fire suppression, oak woodlands have increasingly become denser forests with Douglas fir as a common co-dominant. Oak woodland has been identified as a priority for protection and restoration in ecological assessments for the Willamette Basin. Compared with other habitat types, oak woodlands in good condition provide the best habitat for 37 wildlife species, and are used regularly by at least an additional 100 wildlife species (NPCC 2004b). Species of concern that are associated with this habitat include Kincaid's lupine and Fender's blue butterfly, and Oregon vesper sparrow (occur along oak woodland edges), and Lewis' and acorn woodpeckers. Oaks are a critical feature of acorn woodpecker habitat. Unfortunately, in oak woodlands that are regulated by the Oregon Forest Practices Act, harvested oaks must be replaced with conifers (150/acre) unless prior exemption is requested (NPCC 2004b).

Table 18. Estimated Historical and Current Land Cover Types

Location	Land Cover Type	Historical Acres	Current Acres	Acreage Change
Lower Middle Fork Subbasin	Agriculture	0	14,288	+14,288
	Herbaceous wetlands	59	0	-59
	Montane mixed conifer forest	6,305	16,552	+10,247
	Open water – lakes, rivers, streams	1,991	6,066	+4,075
	Ponderosa pine/interior white oak forest & woodlands	0	26	+26
	Urban or residential	0	5,248	+5,348
	Westside grasslands	19,032	142	**-18,890**
	Westside lowland conifer-hardwood forest	368,764	378,662	+9,898
	Westside oak/dry Douglas fir forest & woodlands	14,234	546	**-13,688**
	Westside riparian wetlands	12,075	958	**-11,117**
Lower Coast Fork Subbasin	Agriculture	0	37,220	+37,220
	Herbaceous wetlands	66	0	-66
	Montane mixed conifer forest	24	2899	+2,875
	Open water – lakes, rivers, streams	1,057	2,868	+1,811
	Ponderosa pine/interior white oak forest & woodlands	0	376	+376
	Urban or residential	0	5,008	+5,008
	Westside grasslands	51,268	438	**-50,830**
	Westside lowland conifer-hardwood forest	202,832	241,870	+39,038
	Westside oak/dry Douglas fir forest & woodlands	35,670	4,515	**-31,155**
	Westside riparian wetlands	8,374	4,208	**-4,166**

Data source: NPCC (2004b)

Wetland Prairie: Wetland prairie and seasonal marsh habitat includes areas that are outside of the annual floodplain of rivers, are inundated or saturated for only part of the year by lentic (non-flowing) water, are dominated by vegetation characteristically associated with wetlands, and contain hydric soils (NPCC 2004b). Wetland prairie and seasonal marsh habitats have been identified as a priority for protection and restoration in ecological assessments for Willamette Basin (NPCC 2004b). Species of concern that are associated with this habitat include fringed myotis, Bradshaw's lomatium, Willamette daisy, bald eagle, peregrine falcon, purple martin, streaked horned lark, western pond turtle, and red-legged frog.

Along with upland prairies and oak woodlands, wetland prairies were a prominent feature of the lower elevations of the basin until the late 1800s. As was true of the upland prairies, the dominance of herbaceous vegetation was maintained largely by frequent fires set by indigenous tribes. Loss of wetland prairie in the Willamette Valley since pre-settlement times has been estimated at 99 percent, and loss of other herbaceous wetlands is estimated at 57 percent (NPCC 2004b). As shown in Table 17, the west side riparian wetlands land cover type has had large acreage losses in the lower Coast and Middle Fork subbasins.

Perennial Ponds and Riparian Areas: This habitat type includes all lentic (non-flowing) areas that are inundated year-round, extending spatially to include riparian and floodplain areas that are inundated seasonally by other lentic water bodies or by rivers. It includes natural ponds, sloughs, lakes, and perennially-inundated marshes, as well as lakes, regulated reservoirs, irrigation ponds, log ponds, beaver-created ponds, and other human-created ponds. This habitat type also includes riparian vegetation (woody or herbaceous) (NPCC 2004b).

Ponds and most other lentic waters have not been accorded a priority for protection and restoration in ecological assessments for the Willamette Basin. This may be due to their relative abundance, lack of evidence of major decline from historical extent, apparent absence of any endemic species, and lack of ecological survey effort. Nevertheless, ponds and their riparian areas provide a remarkable contribution to regional biodiversity. Species of concern that are associated with this habitat include fringed myotis, bald eagle, peregrine falcon, purple martin, red-legged frog, Oregon spotted frog, and western pond turtle (NPCC 2004b).

Ponds, lakes, sloughs, and other lentic waters of the Willamette Basin have been ecologically degraded to varying degrees. Exotic species of fish (especially bass, carp) and wildlife (bullfrog, nutria) are believed to be at least partly responsible for decline of some native species (e.g., Oregon spotted frog). Some of the ponds also have become degraded by invasive aquatic weeds (NPCC 2004b).

Riparian Areas of Rivers and Streams: This habitat type includes all lotic (flowing water) areas and their adjoining riparian areas, as well as natural and artificial channels (rivers, streams, and ditches; NPCC 2004b). The importance of perennial streams, rivers, and riparian areas for aquatic animals (notably salmon and trout) are widely recognized by laws, policies, and science for the Willamette Basin (NPCC 2004b). Less often noted is the importance of this habitat type for wildlife. Species of concern that are strongly associated with this habitat include bald eagle, harlequin duck, foothill yellow-legged frog, and western pond turtle.

As a result of river regulation and land development, major changes in wildlife habitat have occurred within the channels and riparian zones of many of the basin's rivers and streams. In addition, although there has been considerable success in protecting and restoring riparian areas on public lands (e.g., the Willamette River Greenway), riparian protection on private lands not under active forest management has been limited (NPCC 2004b).

Future without Project Terrestrial Wildlife and Habitat

In the future without project condition, there is likely to be some restoration of terrestrial habitats, primarily on public lands. Additionally, forest areas will likely age and become higher quality in many areas. The Corps, state and local parks and federal landowners are conducting some restoration actions, particularly to restore pond turtle habitats and prairies and for USFWS to recover listed wildlife and plant species. However, with continuing population growth and development, it is likely that some existing habitats on private lands will be converted to residential or other land uses and wildlife habitats on agricultural lands will remain degraded. The *Willamette River Basin Planning Atlas* (Hulse *et al.* 2002) scenarios identify a potential benefit to wildlife species and terrestrial habitats if conservation actions are undertaken. Particularly, coniferous forest habitats and amphibian/reptile habitats could improve if the region commits to restoring and conserving habitats and corridors for migration of terrestrial wildlife. If the development scenario occurs, then terrestrial habitats will likely worsen as existing habitats are further fragmented and reduced in size.

3.2.6 Socio-Economic Conditions

The Willamette River Basin has been important to the region since initial settlement, fostering the socioeconomic development of the region. The basin is the most populated area in Oregon and its water resources have been developed to provide and support many economic uses including:

- Flood risk management
- River-related recreation
- Water supply for irrigation and municipal and industrial use
- Hydropower
- Navigation

Demand for these economic services is a function of population and economic activity in the Basin. This section provides a summary of population trends in the Middle and Coast Forks followed by a discussion of the two primary elements that could be affected by this project, flood risk management and river-related recreation. As this study is not proposing to modify dam operations, water supply, hydropower and navigation will not be discussed further, except navigation in the recreational context.

Coast Fork Willamette River Subbasin Population

Incorporated cities in the Coast Fork Willamette River subbasin are Creswell and Cottage Grove. Unincorporated communities include Goshen, Pleasant Hill, Saginaw, Dorena, London, and Culp Creek. Population data for incorporated cities is shown in Table 19.

Table 19. Population Data for Incorporated Cities, Coast Fork Subbasin

City	2010 Population Estimate	April 1, 2000 Census Population	Population Change 2000-2009	Percentage Change 2000-2010
Creswell	5,031	3,579	1,452	41%
Cottage Grove	9,686	8,445	1,241	15%

Source: Cai 2005; US Census 2012: http://2010.census.gov/2010census/popmap/ipmtext.php?fl=41

The City of Creswell is located approximately 10 miles south of Eugene-Springfield along Highway 99 and Interstate 5. Creswell is situated in a relatively flat river valley with a backdrop of forested foothills to the east and west. Hills Creek flows through town north toward the Coast Fork of the Willamette River and Camas Swale Creek lies to the north of town. Creswell has grown from a farming community into a small city with close ties to the Eugene-Springfield area. Creswell currently has a diverse economic base and higher-end commercial and residential development activity. Foster Farms and Creswell Forest Products account for about one-third of Creswell's employment (LCOG 2000d). Other employers include Bald Knob Land & Timber Company, a veneer mill; RENS Manufacturing, a metal detector manufacturer; Northwest Fir Products, a producer of specialty timber products; and numerous retail and cottage industries. Over half of Creswell workers currently commute to jobs in the Eugene-Springfield area (LCOG 2000d).

The City of Cottage Grove is located about 17 miles south of Eugene. The city is bisected by Interstate 5, with its downtown situated west of the interstate. Cottage Grove is situated just above the confluence of the Coast Fork and Row Rivers. Cottage Grove is the largest city along Interstate 5 between Eugene and Roseburg; it is the largest city in the Coast Fork subbasin and serves as the area's major trade center. About 69 percent of workers in Cottage Grove commute to the Eugene-Springfield area along Highway 99 and Interstate 5. The largest employment sectors in Cottage Grove are retail trade and services. Education is the next largest sector followed by other professional services and timber-related industries. Examples of small local manufacturing companies in Cottage Grove include panelized housing, model-building kits, and handmade hardwood crafts (LCOG 2000e).

Middle Fork Willamette River Subbasin Population

Incorporated cities in the Middle Fork Willamette River subbasin include portions of south Springfield and Pleasant Hill, Lowell, Westfir, and Oakridge. Unincorporated communities include Jasper, Fall Creek, Trent, and Dexter. Population data for incorporated cities in the subbasin are shown in Table 20.

Table 20. Population Data for Incorporated Cities, Middle Fork Subbasin

City	2010 Population Estimate	April 1, 2000 Census Population	Population Change 2000-2010	Percentage Change 2000-2010
Lowell	1,045	880	165	19%
Westfir	253	280	-27	-10%
Oakridge	3,205	3,172	67	2%

Source: Cai 2005; US Census 2012

The City of Lowell is approximately 20 miles southeast of Eugene and borders the north shore of Dexter Lake. According to the Lane Council of Governments (LCOG 2000a), the majority of workers living in Lowell commute to the Eugene-Springfield area. The major route to the city is on Interstate 5 by way of Highway 58, passing Dexter and Pleasant Hill. Highway 58, a major freight route, continues past Lowell, southeast through Oakridge, and later intersects with Highway 97 in eastern Oregon. Employment in Lowell is provided by the Forest Service, two manufacturers, the high school, and several small retailers. Employment oriented around forestry and forest products has declined in recent years, and small, independently owned businesses have grown. Specialty agriculture also has growth potential for the local economy. Lowell enjoys ready access to water-oriented recreational such as boating, fishing, swimming, and kayaking (LCOG 2000a).

The City of Westfir is located in the forested hills along the western slopes of the Cascade Mountains and is a small residential community. The town centers on the North Fork of the Middle Fork Willamette River, which flows through town before converging with the Middle Fork Willamette. Surrounded by the Willamette National Forest, the area has historically supported the wood products industry and now supports expanding recreational activities. Highway 58 links Westfir to the Eugene-Springfield area about 40 miles to the northwest, and to the City of Oakridge about 5 miles to the southeast. Travel to Oakridge or to Eugene-Springfield is necessary for access to goods, services, and jobs. Most Westfir residents are employed in manufacturing, agriculture/forestry/fisheries, retail, or construction trades. The largest employers in the area are the Oakridge/Westfir School system and the Forest Service (LCOG 2000b).

The City of Oakridge is located about 45 miles east of Eugene-Springfield and is bordered along the south by the Middle Fork Willamette River. Hills Creek Reservoir lies just south of Oakridge and Salt Creek

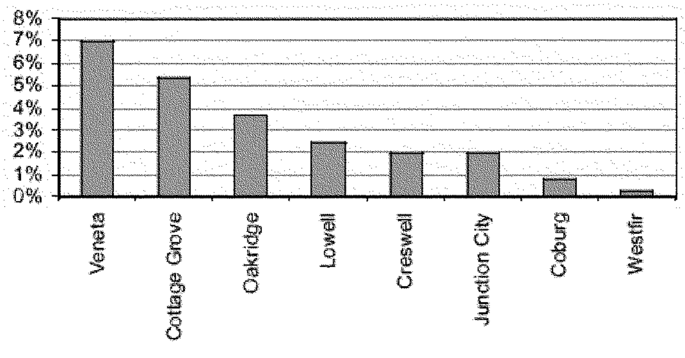
Falls, the second highest waterfall in Oregon, is 16 miles east on Highway 58. State Highway 58 links Oakridge to points east including the Willamette Pass ski area and State Highway 97, and points west including Interstate 5 and the Eugene-Springfield area. The Aufderheide National Scenic Byway links the Oakridge area with the McKenzie River corridor and the Three Sisters Wilderness Area (LCOG 2000c).

The city's position as a gateway to Willamette Pass continues to define its economic and community development. Thousands of people pass through Oakridge each year to enjoy Willamette Pass recreational opportunities. The city also serves as the basic services center for residents of Oakridge, Westfir, and the surrounding rural area. Oakridge continues to be well-positioned to host secondary wood products industries and recreational vehicles manufacturing, as well as to attract tourists and serve as a hub for recreation. The main industries include manufacturing, retail, agriculture, forestry, fisheries, and construction. The largest manufacturers are Armstrong Wood Products, Oakridge Sand and Gravel, Davidson Construction, and Diamond Traffic Products. The largest local employer is School District 76 (LCOG 2000c).

Future without Project Population

According to the Lane Council of Governments Region 2050 study (LCOG 2001), there are about 16,174 undeveloped acres within urban growth boundaries (UGBs) in the southern Willamette Valley region; about 26 percent of the total UGB land area (includes Eugene and Springfield). Of these, about 10,613 acres (66 percent) are designated residential in comprehensive plans, 21 percent are designated industrial, 5 percent commercial, and 8 percent for other uses including parks and open space. However, much less land than this is available for development because some undeveloped land is not buildable due to physical constraints such as floodways, steep slopes, and unstable soils.

The population of the southern Willamette Valley region is projected to nearly double in the next 50 years, from 297,811 to 515,000 in the year 2050. For the most part, these new residents will reside in cities. The UGBs of Eugene and Springfield contain the largest share of the region's undeveloped residential land, about 48 percent and 30 percent, respectively, followed to a lesser extent by Veneta, Cottage Grove, and Oakridge (Figure 23). New residents also will live on rural residential lands; there are as many as 3,000 undeveloped residential parcels in the region outside UGBs, based on a tax lot analysis and current zoning (LCOG 2001).



Note: Not all undeveloped land is suitable for residential or commercial development. Source: LCOG April 2001.

Figure 23. Regional Share of Undeveloped Residential Land in Non-metro UGBs, 2000

As the population grows, the increased pressure to develop floodplain lands will likely place more infrastructure at risk from flooding. Increased development of tributary watersheds would increase peak flows and volume of runoff to the floodplain areas of the Coast Fork and Middle Fork Willamette, as well as to the floodplain on the mainstem Willamette River. Flood damages would likely increase. Climate change scenarios with increased rainfall predictions could also cause flood damages to increase.

Urban growth also will likely result in the potential for increased point and non-point water quality impacts. The effect of continued use and development of watershed management plans (local, state, federal) in offsetting these impacts is uncertain.

Population pressures will increase demand for water for drinking, irrigated agriculture, recreation uses, and other demands affecting flow quantity and therefore quality, particularly during low-flow (summer) periods. At the same time, it is likely that community concern to protect and restore indigenous wildlife habitat, and to be able to enjoy high-quality native landscapes from an aesthetic and recreational viewpoint, would increase.

According to the *Willamette Basin Planning Atlas* (Hulse *et al.* 2002), changes in the basin have been substantial since Euro-American settlement. By 1990, 42 percent of the Willamette Valley had been converted from natural vegetation to agricultural use and 11 percent to structures. The acreage of older coniferous forests (older than 80 years) was reduced by two-thirds. As a result of these and other landscape changes, indicators of natural resource condition were generally 30 percent to 90 percent higher prior to Euro-American settlement than today. Although the number of people living in the basin is expected to nearly double over the next 50 years, more landscape change, and thus more environmental effects, occurred from 1850 to 1990 than stakeholders considered plausible from 1990 to 2050, regardless of the future scenario.

Floods and Flood Damages

As previously described, annual flooding was common in the Middle Fork and Coast Fork subbasins before the construction of the dams. Flood risk management is the primary purpose of the Corps' Willamette projects. The five Corps dams upstream of the study area play an important role in controlling local flooding and also controlling flood stages downstream along the Willamette River. In the future without project condition, flood risk management will remain the primary purpose of the Corps' Willamette projects. Dam operations are being evaluated for changes that can be made to comply with existing and future requirements under the recent Biological Opinions (NMFS 2008a; USFWS 2008).

3.2.6.1.1 *Coast Fork Willamette River*

Two Corps projects in the Coast Fork Basin provide storage for flood risk management (Cottage Grove on the Coast Fork and Dorena on the Row River). Cottage Grove has provided over $1 billion (unadjusted) in estimated flood risk management benefits since it began operating in 1942. Dorena has provided over $3 billion (unadjusted) in estimated flood risk management benefits since it began operating in 1949. (Corps 2005 unpublished data).

On the Coast Fork Willamette River, gage data is available from two gage stations, one located at Goshen, which is active today; and the other located at Saginaw. Historical peak flows were highest in 1907 and 1910 when flows measured above 57,000 cfs. Mean annual peak flows at Goshen were 20,810 cfs, pre-dam construction and 13,110 cfs, post-dam construction in 1951. Flooding occurs when flows exceed bankfull flows of approximately 12,000 cfs.

3.2.6.1.2 *Middle Fork Willamette River*

Three Corps projects (Dexter/Lookout Point and Hills Creek on the Middle Fork and Fall Creek on Fall Creek) in the Middle Fork Basin provide storage for flood risk management. The Dexter/Lookout Point project has provided over $4.8 billion (unadjusted) in estimated flood risk management benefits since it began operating in 1954. The Hills Creek project has provided over $3 billion (unadjusted) in estimated flood risk management benefits since it began operating in 1961. The Falls Creek project has provided over $2.3 billion (unadjusted) in estimated flood risk management benefits since it began operating in 1965 (Corps 2000b).

Two gauging stations provide discharge data for the lower Middle Fork Willamette River; Jasper and Dexter. Natural flows before dam operations went online in 1954 show the highest peak flows exceeding 90,000 cfs occurring in 1908 and 1910. Peak flows greater than 40,000 cfs were common during this period (MFWWC 2002a), which is twice the bankfull discharge of 20,000 cfs maintained today.

3.2.6.1.3 *Willamette River Forks Typical Flood Control Operations*

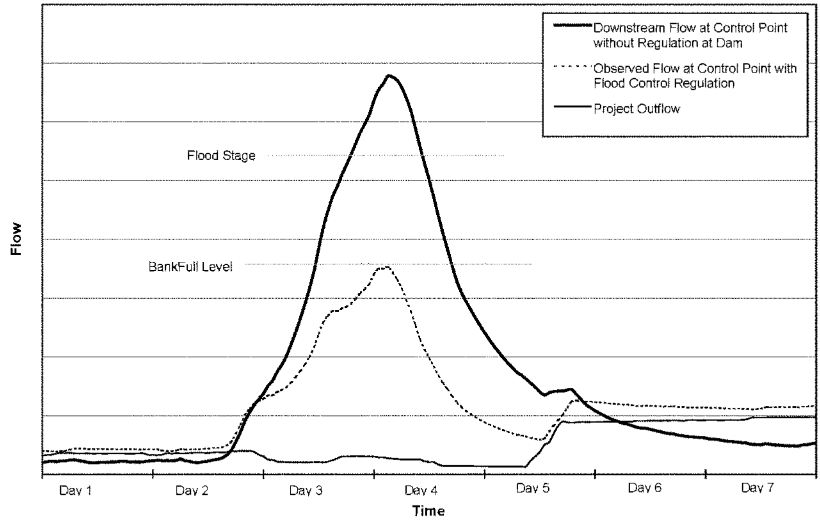
The reservoirs are drawn down to minimum flood control pool beginning in September according to established operating criteria. Releases are made under the normal operating criteria and by considering negotiated discretionary minimum releases made for state water management objectives. For example, there is salmon spawning activity downstream from Dexter (Lookout Point) from mid-September to mid-October; state water management objectives include attempting to keep flow levels constant and within specific flow ranges to prevent salmon redds from being dewatered.

The major flood control season in the Willamette Basin occurs primarily from early December to the end of January. During the flood control season, each reservoir is maintained at a minimum flood-control level to store water during flood events for subsequent controlled release. A normal operation during a flood event usually requires quick reductions in project releases, sometimes in a matter of hours, in order to prevent overbank or flooding conditions at control points located immediately downstream of each project and on the mainstem Willamette River (bank-full discharge). A representative flood control operation is depicted in Figure 24.

Bank-full discharge is an important operational guideline for the Willamette projects. In general, when flow forecasts predict that the flow at a control point will exceed the bank-full discharge, reservoir operations are modified in an attempt to keep flow below the bank-full discharge. The bank-full discharge on the Middle Fork of the Willamette River at the Jasper control point is 20,000 cfs. The bank-full discharge on the Coast Fork Willamette River at the Goshen control point is 12,000 cfs. However, specific bank-full discharges are only general operation guidelines because the Willamette projects are operated as a system. During system-wide flood operations, the bank-full discharge at an upstream control point may be exceeded or the flow may be kept lower to address other downstream concerns and reduce overall basin-wide flood damages.

Given the rain-driven nature of the Willamette Basin and how quickly river levels can rise, timing of flow reductions is of crucial importance in reducing the peak flow and flood damages. The large size of the basin may influence which projects have their releases controlled during a flood event, depending on storm track and subbasin-specific conditions, and project-specific features may constrain how each project is operated. Continuous monitoring of hydrometeorological conditions in and near the basin is accomplished with a real-time data collection system. The real-time data are used to prepare flood forecasts and schedule project releases, generally for the next 72 hours.

Inflows are generally passed through each project until flood forecasts predict that a reduction in outflows is necessary to prevent project releases from combining with uncontrolled local flow to exceed flood regulation goals at the downstream control points. The effect of these reductions from one or multiple projects at a control point is a function of travel time and the rate of rise of flood waters. After flows have receded and the danger of flooding has passed, release of stored flood water is coordinated among the projects to prevent overbank flow conditions downriver, and to return the reservoir to the minimum flood control pool in anticipation of the next flood event.



Source: Corps 2000a

Figure 24. Typical Flood Control Operating Strategy for the Willamette Projects

Figure 25 shows the Federal Emergency Management Agency (FEMA) floodplain and floodway for the study area along the Coast and Middle Forks. More detailed maps of the FEMA floodplains are shown in Appendix E for Reaches C1, C3, M1 and M2. The majority of the areas being considered for restoration are located within the 100-year floodplain. There are still large areas within the floodplain, in spite of the dams. In the 1996 flood, the southern Willamette Valley was not hit as hard as the northern Willamette Valley. The only location within the study area of substantial flood damages was in Cottage Grove at the confluence of the Row River with the Coast Fork. Bank erosion occurred in several locations. Controlled outflows from the dams on the Coast and Middle Forks generally prevented flooding of structures and infrastructure, but many of the undeveloped floodplain areas considered in this study were flooded.

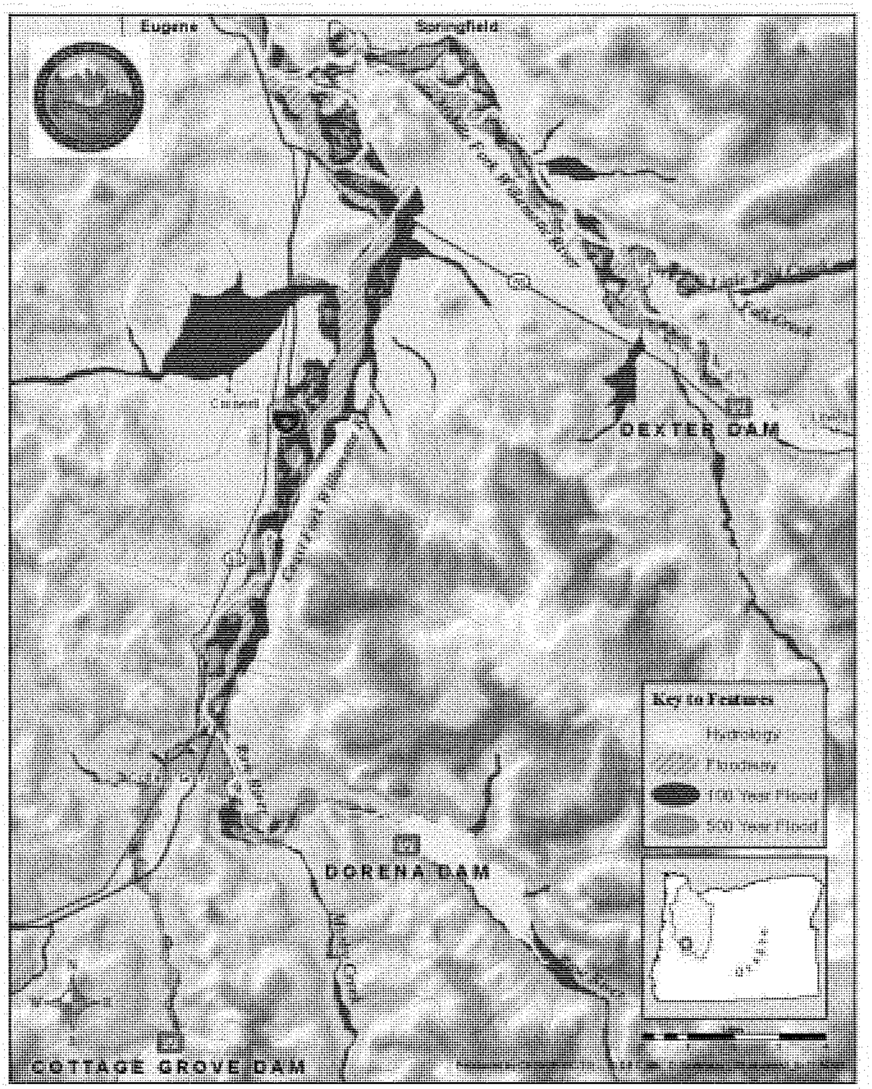


Figure 25. FEMA Floodplain and Floodway along the Lower Coast and Middle Forks

Future without Project Flooding

In the future without project condition, flooding will still be managed by the Corps and others at the upstream dams, although the ultimate level of flood reduction is limited by the available storage capability of the dams so very intense storm events can still cause flooding downstream and also in localized areas on tributaries not protected by upstream dams. Further development is also likely to occur in the floodplain that could increase flood damages when major flood events do occur. Additionally, as climate change is likely to increase the intensity of storm events, there could be increased flood frequencies or flood water surface elevations.

River-Related Recreation

A wide variety of river corridor recreational opportunities are available in the Middle Fork and Coast Fork subbasins. The primary providers of recreational facilities are the Corps, Lane County Parks, Oregon Parks and Recreation Department, and the Forest Service's Willamette National Forest (Middle Fork subbasin) and the Umpqua National Forest (Coast Fork subbasin). Recreational sites in the Middle Fork and Coast Fork Willamette subbasins are expected to see increasing visitation pressures in the future as the population in the area grows. Table 21 presents the major river related recreation sites in the study area and identifies the managing entity, recreation features, and approximate location of each.

3.2.6.1.4 Coast Fork Recreational Visitation

Cottage Grove Lake: Cottage Grove Lake is popular for water-skiing, fishing, lakeside camping, and day use associated with waterborne recreation. Approximately 559,000 recreation visits were made to Cottage Grove recreation areas in 1996.

Dorena Lake: Dorena Lake offers a variety of recreation activities, and is a popular boating lake with a higher percentage of sailboats and sailboards and a smaller percentage of water skiers than Cottage Grove Lake. Approximately 433,000 recreation visits were made to Dorena recreation areas in 1996.

3.2.6.1.5 Middle Fork Recreational Visitation

Fall Creek Lake: Fall Creek Lake has a moderate level of recreational facilities. Approximately 249,000 recreation visits were made to Fall Creek recreation areas in 1996. The lake is heavily used for water-based recreation, especially boating, fishing, swimming, and water-skiing.

Dexter Lake: Dexter Lake is popular for day-use recreation activities and boating. Approximately 347,000 recreation visits were made to Dexter recreation areas in 1996.

Lookout Point Lake: Lookout Point supports a relatively low amount of recreational use. Recreational use is constrained by a lack of facilities, difficult access, and high degree of reservoir fluctuation. Approximately 127,000 recreation visits were made to Lookout Point recreation areas in 1996.

Hills Creek Lake: Recreational use at Hills Creek is constrained by a lack of facilities, difficult access, and high degree of reservoir fluctuation. Visitors are attracted mainly for fishing and camping. Approximately 71,000 recreation visits were made to Hills Creek recreation areas in 1996. The lake is surrounded by the Willamette National Forest and all parks are operated by the Middle Fork Ranger District.

The reservoirs and the rivers provide opportunities for recreational boating including water-skiing (reservoirs only), fishing, kayaking, and canoeing. Potential modifications to the reservoirs are not included in this study and thus boating on the reservoirs will not be affected by any potential restoration activities. Boating on the rivers could be affected by the placement of in-stream structures, but as the plans are formulated, the designs will take consideration of the potential effects on boating in order to minimize any conflicts.

Table 21. River-Oriented Recreation in the Study Area

Recreation Site	Managing Agency	Recreation Features	Approximate Location*
Coast Fork Willamette River			
Buford Recreation Area	Lane County	Restrooms, Picnicking, Hiking, Water	RM 2 to 6
Seavey Landing	OPRD	Boat Access, Camping	RM 4.5 to 5
Camas Swale Landing	OPRD	Boat Access	RM 9 to 9.5
Bristow Landing	OPRD	Boat Access	RM 10 to 11
Cinderella Park	Lane County	Undeveloped	RM 12
Cloverdale Access	OPRD	Vehicle Access, Restrooms	RM 12.75
Cougar Mountain Access	OPRD	Vehicle Access, Restrooms, Picnicking, Hiking	RM 15- 15.5
Coast Fork Access	OPRD	Boat Access	RM 16.5
Lynx Hollow Access	OPRD	Vehicle Access, Restrooms, Boat Ramp, Hiking	RM 16.75 to 17.25
Giddings Creek Landing	OPRD	Boat Access	RM 17.3
North Regional Park	City of Cottage Grove	River Access, Biking, Hiking	RM 21
Riverside Park	Corps	Picnicking, River Access	RM 29
Lakeside Park	Corps	Day Use, Restrooms, Boat Ramp, Picnicking, Water	Cottage Grove Lake (East Bank)
Shortridge Park	Corps	Day Use, Restrooms, Picnicking, Water	Cottage Grove Lake (West Bank)
Pine Meadows Campground	Corps	Restrooms, Showers, Camping, Picnicking, Water, Swim Area	Cottage Grove Lake (West Bank)
Primitive Campground	Corps	Restrooms, Camping, Water	Cottage Grove Lake (West Bank)
Wilson Creek Park	Corps	Day Use, Restrooms, Boat Ramp, Picnicking, Water	Cottage Grove Lake (West Bank)
Row River			
Schwarz Park	Corps	River Access, Camping, Water Restrooms, Showers, Picnicking, Children's Play Area	Just downstream from Dorena Lake
LaSells Stewart Park	Lane County	Access	Row River
Currin Covered Bridge	Lane County	Nationally designated historic landmark	Row River
Vaughan Park	Lane County	River Access	Lower Dorena Lake
Bake-Stewart Park	Corps	Day Use, Picnicking	Dorena Lake
Harms Park	Corps	Picnicking, Boat Launch, Camping	Dorena Lake

Recreation Site	Managing Agency	Recreation Features	Approximate Location*
Baker Bay Park	Lane County	Day Use, Picnicking, Boat Ramp, Parking, Hiking Access to Row River Trail	Dorena Lake
Dorena Bridge Park	Lane County	Nationally designated historic landmark	Just upstream of Dorena Lake
Middle Fork Willamette River			
Dorris Ranch Living History Farm	Willamalane Park District	Restrooms, Picnicking, Hiking, Water	RM 187 to 188
Glassbar Island	OPRD	Boat Access, Swimming	RM 187
Clearwater Boat Ramp	Willamalane Park District	Restrooms, Boat Ramp, Picnicking, Hiking,	RM 191
Pisgah Landing	OPRD	Boat Access	RM 192.8
Log Jam Landing	OPRD	Boat Access, Camping	RM 194
Log Jam Access	OPRD	Car Access, Restrooms, Hiking	RM 194.75
Jasper Bridge Ramp	Lane County	Boat Ramp	RM 195
Jasper Bridge Access	OPRD	Car Access, Hiking	RM 195.2
Jasper State Recreation Site	OPRD	Restrooms, Picnicking, Hiking, Water	RM 195.6 to 196.2
WRG Parcel - Middle Fork Access	OPRD	Boat Access	RM 196.8
Green Island Landing	OPRD	Boat Access	RM 199
Pengra Access	OPRD	Restroom, Parking, Boat Launch, Picnicking,	
Elijah Bristow State Park	OPRD	Car Access, Restrooms, Picnicking, Hiking, Water, Bicycling, Horse Trail	RM 200.5 to 203.5
Dexter State Recreation Area	OPRD	Picnicking, Swimming, Boating, Camping, Fishing, Horse Trail, Disc Golf Course	Dexter Lake
Lowell State Recreation Site	OPRD	Picnicking, Swimming, Boating, Boat Slips, Marina, Boat Ramp, Walking Trail, Fishing	Dexter Lake
North Shore Boat Ramp	Corps	Boat Ramp	Near Lookout Point Dam
Meridian Park	Corps	Day Use, Boat Ramp, Courtesy Dock	Lookout Point Lake
Ivan Oakes Park	Corps	Currently closed for renovation	Lookout Point Lake
Signal Point	Corps	Day Use Boat Ramp, Courtesy Dock, Picnicking	Lookout Point Lake
Hampton Campground	U.S. Forest Service	Camping, boating, swimming, fishing, water skiing	Upper end of Lookout Point Lake
Black Canyon Campground	U.S. Forest Service	Camping, picnicking, swimming, fishing, hiking, boating	Upper end of Lookout Point Lake
Cline-Clark Picnic Ground	U.S. Forest Service	Picnicking, Fishing	Hills Creek Lake

Recreation Site	**Managing Agency**	**Recreation Features**	**Approximate Location***
C.T. Beach Picnic Ground	U.S. Forest Service	Picnicking, Fishing, Hiking, Boating, Bicycling	Hills Creek Lake
Bingham Boat Ramp	U.S. Forest Service	Boat Ramp	Hills Creek Lake
Sand Prairie Campground	U.S. Forest Service	Camping, RV Camps, Utilities,	Hills Creek Lake
Packard Creek Campground	U.S. Forest Service	Camping, RV Camps, Utilities, Swimming Beach, Boating, Picnicking, Fishing, Hiking, Bicycling,	Hills Creek Lake
Fall Creek			
Fall Creek Park (Unity)	Lane County	Picnicking, Barbecue, Horseshoe Pits, Riverfront Access	Approximately 1 mile downstream of Fall Creek Dam
Fall Creek State Recreation Area - Winberry Creek	OPRD	Day-use boating, Boat Ramp, Restrooms, Waterskiing, Fishing, Swimming, Picnicking	Fall Creek Lake
Fall Creek State Recreation Area - Northshore Park	OPRD	Day-use boating, Waterskiing, Fishing, Swimming, Picnicking	Fall Creek Lake
Fall Creek State Recreation Area -Cascara Campground	OPRD	Swimming, Boat Ramp, Camping, Restrooms, Water	Fall Creek Lake
Fall Creek State Recreation Area - Fisherman's Point Campground	OPRD	Swimming, Boating, Camping, Group Camp	Fall Creek Lake
Free Meadow	OPRD	Picnicking, Restrooms, Parking, Boat Launch	Fall Creek Lake
Lakeside I and II	OPRD	Picnicking, Restrooms, Parking, Boat Launch	Fall Creek Lake
Drinkwater Park	Corps	Day Use, Picnicking	Fall Creek Lake
Tufti Park	Corps	Day Use, Picnicking	Fall Creek Lake
Nelson Creek park	Corps	Day Use, Picnicking	Fall Creek Lake
SKY Camp	Private	Outdoor Youth and Recreation Facility	Fall Creek Lake

Notes:
*River Mile (RM) locations for the Coast Fork start at RM 0 (corresponding to the confluence with the Middle Fork) and extend upstream. When referencing RM locations for the Middle Fork, the confluence of the Coast Fork and Middle Fork is referred to as RM 187 and increase moving upstream along the Middle Fork.

Sources:
Willamette River Recreation Guide, 1988. Published by Oregon State Marine Board and Oregon Department of Recreation.
Water Resources in Oregon, 2000. Corps, Portland District.
Lane County Parks and Open Space Draft Master Plan Update, 2006. Lane County Parks.
Corps Willamette Valley Projects Website, 2006; url: *http://www.nwp.usace.army.mil/op/v/home.asp*.
Oregon Parks and recreation Department, State Parks. Explore the Willamette Valley Website, 2006. URL: *http://www.oregonstateparks.org/searchpark.php?region=willamette_valley*.

3.2.6.1.6 Potential Economic Impact of Recreation

Based upon the above visitation estimates, the above Middle Fork Corps projects combine to provide an estimated total of 794,000 annual visits. The Coast Fork Corps projects combine to provide an estimated 992,000 annual visits. Combining both basins results in total estimated annual visitation of 1,786,000 visitor days.

Corps Economic Guidance Memorandum EGM-12-03 provides the range of unit day values to be applied for valuation of recreation visits in Fiscal Year 2012. These values range from a minimum of $3.72 per user day for low quality general recreation to a maximum of $11.17 for the highest quality general recreation activities. Based upon these ranges, recreational visitation in the parks listed above could have National Economic Development (NED) annual economic value of between $6,644,000 and $19,950,000.

The recreational visitation also provides substantial Regional Economic Development (RED) benefits to the study area through local direct spending by recreationists at hotels, restaurants, sporting goods stores, and guide services. Indirect contributions to local and regional economies include room, meal, and other taxes.

3.2.6.1.7 Regional Trails

Eugene to Pacific Crest Trail: The Eugene-to-Pacific Crest Trail is a 108-mile-long, multi-purpose recreation trail connecting the City of Eugene with the Pacific Crest National Scenic Trail in the Cascade Mountains. While portions of the trail are complete, there are still several key sections that are missing. The trail starts in Alton Baker Park in Eugene, follows along portions of the Middle Fork Willamette River, and ends southeast of Waldo Lake. The trail links a myriad of federal, state, and private lands, and the communities of Eugene, Springfield, Jasper, Dexter, Lowell, and Oakridge. Established as part of a statewide comprehensive trails plan in the 1970s, the trail became a reality through a series of public and private cooperative efforts.

Row River Trail, Cottage Grove: The Row River Trail is 15.6 miles long and connects the City of Cottage Grove to Dorena Lake, Culp Creek and the Umpqua National Forest. The trail traverses a variety of landscapes that include urban lands; pasture and farm land; timber lands; Dorena Lake shoreline; and the Row River. Management of the Row River Trail is a coordinated effort between the Bureau of Land Management, the City of Cottage Grove, and other federal and state agencies, nonprofit organizations and businesses in Cottage Grove. The trail attracts an estimated 100,000 visitors annually and the majority of these visits are from Cottage Grove and the surrounding rural communities in Lane County. The trail is a keystone project that has helped with the economic recovery of Cottage Grove, Culp Creek, Oakridge, and surrounding rural communities.

Future without Project Recreation

Recreation demand is likely to continue increasing in the future and continued development of trails and parks will likely occur, although may not keep pace with demand.

3.2.7 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 requires Federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by ACHP. Revised regulations, Protection of Historic Properties (36 CFR Part 800), became effective January 11, 2001 and August 5, 2004.

As noted at the time of Euro-American contact, the Upper Willamette Valley was populated by Native American peoples who spoke languages belonging to the Kalapuyan language family. At least 13 distinct "bands" or "tribes" were present that roughly correspond with the major tributary subbasins of the Willamette River. The Winefelly band occupied the lower Coast and Middle Forks area including the confluence area (Minor and Toepel 1981; Minor et al. 1980; and Zenk 1990 cited in Heritage Research Associates 2012).

The Kalapuyan bands used a variety of fish, wildlife, and vegetable resources in riverine, lowland and upland habitats. Because Willamette Falls restricted anadromous fish access to the Upper Willamette River Basin to Chinook and steelhead, the Kalapuyan bands were not as reliant on salmon as other Northwestern native populations. Kalapuyan settlement and subsistence patterns were closely tied to two primary seasonal patterns (wet winters and dry summers) each year. The rainy seasons were spent at permanent winter villages that consisted of multifamily winter dwellings composed of bark or plank houses, which were often excavated into the ground. Villages also commonly included a dome-shaped sweathouse. Winter subsistence activities included hunting, fishing and use of stored vegetable resources. Dry seasons were spent in temporary camps near concentrations of specific resources such as camas shoots and bulbs. Camas bulbs were collected in large quantities which were roasted in large subterranean rock ovens and then formed into large cakes and dried for storage for winter use or trade. Other vegetable resources such as Wapato were collected in late fall. Hunting and fishing occurred year-round. The practice of burning prairies improved the habitat for camas and other vegetable resources and also provided forage for game animals (Heritage Research Associates 2012).

Archaeological research has been conducted at several sites in the Upper Willamette Valley during the past decades. Artifacts such as large fluted and stemmed projectile points, as well as other stone tools have been found in multiple locations by both amateur and professional archaeologists, but have not been dated. The oldest known sites along the Long Tom River have been radiocarbon dated to between 9660 and 9130 years before present (BP) (Heritage Research Associates 2012). Other Early Archaic Period materials such as roasted camas bulbs and charcoal have been dated to 7750-6525 BP. Middle Archaic Period (6000-2000 BP) artifacts include broad-necked projectile points, milling stone technology and features such as camas ovens, pit houses, and burial sites. The Late Archaic Period (2000-200 BP) is evidenced by the introduction of small, narrow-necked projectile points, which are believed to reflect a change from atlatl and dart technology to bow and arrow use. By about 5000 BP, there was an increase in plant processing using rock ovens. The intensification of processing and storage of food resources has been interpreted as a possible catalyst that led to a substantial increase in population, greater social complexity, and increased sedentism (O'Neill et al. 2004).

A review of records at the Oregon State Historic Preservation Office (SHPO) indicates that one prehistoric archaeological site may be located within the study area near the confluence of the Coast and Middle Forks. The site was reported by a local landowner but the presence of archaeological materials was not confirmed in the field by a professional archaeologist. Furthermore, two recent inspections of the location by professional archaeologists did not result in the discovery of artifacts. Although the purported site area is located within the broader study area, the location is not expected to be impacted by the proposed restoration work.

Historic settlement in the study area, as indicated by numerous donation land claims, began in the 1840s. In 1847, Richard Robinson became the Coast Fork subbasin's southernmost settler when he staked his claim just north of present day Cottage Grove (CFWWC 2005). Further settlement in the Coast Fork valley was spurred by emigration along the nearby Oregon Trail and Applegate Trail. For much of the late

1800s and early 1900s, the subbasin's floodplain area was used for a variety of agricultural purposes including fruit and nut orchards, hay production, hops, alfalfa, vegetable crops, as well as livestock grazing. Gold was discovered in the Bohemia Mountains above Cottage Grove in 1858 resulting in a substantial increase in settlement in Cottage Grove (Cottage Grove Historical Society 2012). In 1872, the Southern Pacific Railroad line connecting Southern Oregon to Portland was completed.

Historic settlement in the Middle Fork valley followed a similar course as numerous donation land claims were filed for agricultural use of floodplain and prairie areas. Early settlers included Elijah Bristow, for whom the State Park located upstream of Jasper is named. Logging has been a major industry for the area from the earliest historic settlement period up to the present day.

Future without Project Cultural Resources

In the future without project condition, there would be no specifically identified changes to cultural or historic resources, although there would be continued population growth and development that would increase the potential for removal of historic structures or development of areas where cultural resources could be located. Existing regulations are likely to promote identification and preservation of cultural resources.

3.2.8 Hazardous Materials

Heavy metals can be toxic to humans who ingest contaminated fish, resident fish and aquatic life. Bioaccumulation is the process of chemicals becoming progressively concentrated from small organisms to larger fish and mammals as they move through the food chain. The bioaccumulation of mercury and polychlorinated biphenyls (PCBs) in fish is a recognized environmental problem throughout much of the United States.

Mercury occurs naturally in the environment and can also be released into the air through industrial pollution. Mercury falls from the air and can accumulate in streams and oceans and is turned into methyl mercury in the water. Fish absorb the methyl mercury as they feed in these waters (EPA 2004).

PCBs are colorless and odorless chemicals that were once widely used in electrical equipment such as transformers and capacitors before their production was banned in 1976. Of the 1.2 billion pounds of PCBs produced in the U.S. before 1976, about half has entered the environment through discharges to the air, land, and water. In addition, products that contain PCBs are still often being disposed of improperly. Most PCBs that have entered the environment end up in rivers, lakes, and ultimately the ocean where they enter the food chain (OHA 2011).

Coast Fork Willamette River

The Oregon Public Health Division (OPHD 2011) has issued fish consumption advisories for mercury and PCBs in the Coast Fork Willamette Basin. These advisories warn consumers of fish of the health risks associated with eating fish caught from these waters. The Coast Fork Willamette River from RM 0 to 31.3 has high mercury and PCB levels. Dorena and Cottage Grove Reservoir have high and very high mercury levels, respectively (OPHD 2011). These consumption advisories represent an impairment of the beneficial use of fishing in the Willamette Basin and demonstrate that mercury and PCBs are bioaccumulating in fish tissue to levels that adversely affect public health. The ODEQ has listed the Coast

Fork Willamette River on the 303(d) list from RM 0 to 31.3, which includes Cottage Grove Reservoir for mercury in the past and has since developed a TMDL for mercury in 2006 (ODEQ 2006).

An environmental database records search and Level 1 Environmental Assessment were conducted in Reaches C1 and C3 (see Appendix F for more detail). The results of these two evaluations are briefly summarized in this section.

Many of the larger floodplain areas in reaches C1 and C3 have been used for gravel extraction in past decades, but remain generally undeveloped otherwise. In reach C1, there are two high voltage transmission lines present, but no evidence of contaminants. There are current and former commercial businesses and a BPA substation present along the I-5 and Highway 99 corridor including a former Brownfields site that was cleaned up. The BPA substation had several releases of various pollutants including oil, lead, ethanol, PCBs, and other materials in the past, and BPA has been working to clean up and resolve all issues. Lane Community College has had some past notices of non-compliance for handling of used oil, as well as documented releases of volatiles and disposal of paint waste into storm drains; however, all issues are resolved at this time. Overall, it is unlikely that any of these potential pollutant sources have released hazardous materials that could have reached the floodplain.

In reach C3, five potential pollutant sources were identified in the study area. One potential source is the Cottage Grove-Eugene Sportsman's Club (shooting range) where shells and bullets on the shooting range could be a source of lead and arsenic. The State of Oregon conducted a compliance assistance visit in 2010, but there have been no recorded spills or releases. A small manufacturing facility is also located within the study area that is a RCRA conditionally exempt small quantity generator of hazardous materials. They store fuel and toluene in aboveground tanks. There are no reports of spills or releases. The Saginaw Disposal Site is within the study area and is a registered facility with no reports of spills or releases. A lumber facility is also located in the study area and had a leaking underground fuel storage tank that was cleaned up in 1999. The ODOT Gettings Creek rest area is located within the study area and has an NPDES permit for discharge of stormwater. It is unlikely that any of these potential pollutant sources have discharged any hazardous materials that could have reached the floodplain. No further investigation or sampling is proposed as the Level 1 Assessment did not yield any potential contaminants, nor did site visits conducted during this study. If any future discovery of contaminants occurs during the design phase, further investigation would occur at that time.

Middle Fork Willamette River

No major issues have been identified with toxics in the Middle Fork Willamette River. A review of the ODEQ water quality data show that standards for toxics have been met in this watershed (ODEQ 2010).

The above referenced database search and Level 1 Assessment also included reaches M1 and M2 on the Middle Fork. The study area in these reaches is focused on the 100-year floodplain and floodway and most of these areas have been used for gravel extraction in past decades. Two high voltage powerlines are present in these reaches. There are a number of commercial and industrial facilities located in Springfield north of the floodplain in these reaches. However, the Springfield Utility Board drinking water well field is located between the potential pollutant sources and the study area and no reports of contaminants have occurred in that area; thus, it is unlikely that any discharges of hazardous materials or pollutants from the potential sources could have reached the study area. Some of the former Wildish property was used for agricultural purposes prior to the 1980s and there could have been use of herbicides and pesticides, but no spills or drums have been observed. The potential for contaminants in the study area is low. No further investigation or sampling is proposed as the Level 1 Assessment did not yield any potential contaminants, nor did site visits conducted during this study. If any future discovery of contaminants occurs during the design phase, further investigation would occur at that time.

Future without Project Hazardous Materials

In the future without project condition, the existing regulations governing the use, storage, and disposal of hazardous materials are likely to prevent the discharge of hazardous materials, except in the cases of accidental spills or illegal dumping. Such incidents could occur in the future, but are unlikely to cause substantial effects to floodplain resources in the study area.

3.2.9 Air Quality

The EPA has established health-based National Ambient Air Quality Standards for six air pollutants (criteria pollutants): particulate matter (PM10 and PM2.5), ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. Three of the six pollutants are monitored in Lane County: particulate matter, ozone and carbon monoxide. Air Quality in the study area is managed by the Lane Regional Air Protection Agency (LRAPA).

Historically, LRAPA had designated the Eugene-Springfield Urban Growth Area as a non-attainment area for PM10 (particulate matter less than or equal to 10 microns). Currently, Eugene meets the PM10 and PM2.5 standards and is in the process of regaining attainment status. Lane County entirely is in attainment with the federal ozone standards. The Eugene/Springfield area was designated a "non-attainment" area for CO in the late 1970s, but was later redesignated as an attainment area in 1994 (LARPA 2009).

Currently, the majority of undeveloped floodplain sites in the study area are used for open space, parks, limited gravel mining, and/or agricultural uses. There are limited sources of air quality pollutants from the use of heavy equipment (excavators, tractors, etc.), as well as the potential generation of dust from agricultural activities. These activities and sources are currently considered in the overall ratings of air quality for Lane County.

Future without Project Air Quality

In the future without project condition, population growth is likely to increase pollutant sources overall from increased vehicular traffic and commercial/industrial development. However, existing air quality regulations would continue to regulate new sources so that overall air quality does not substantially degrade. It is expected that air quality would be relatively similar to existing conditions in the future.

3.2.10 Noise

Lane County noise ordinances (Code 6.5) prohibit noise that: 1) exceeds 50 dBA at any time between 10 p.m. and 7 a.m. of the following day; 2) exceeds 60 dBA at any time between 7 a.m. and 10 p.m. of the same day; 3) is plainly audible at any time between 10 p.m. and 7 a.m. of the following day; 4) is within a noise sensitive unit which is not the source of the sound; or 5) is on a public right-of-way at a distance of 50 feet or more from the source of the sound.

Generally, the use of construction equipment is allowed between the hours of 7 a.m. and 7 p.m. at normal operating levels. The project sites in the restoration plan are primarily zoned for sand, gravel and rock materials, thus allowing excavation and removal of materials. Some rural residences are located in proximity to Sites C3A and C3B.

Future without Project Noise

In the future without project condition, some existing uses of the floodplain such as gravel mining will likely be reduced as gravel deposits are used up. Additional development in the floodplain would likely occur, increasing residences and local roadways that would generate low levels of noise. Overall, it is unlikely that noise levels would increase in the future other than for temporary construction activities.

4. PROBLEMS AND OPPORTUNITIES

4.1 INTRODUCTION

As discussed in the previous chapters, a number of ecosystem degradation problems and floodplain restoration opportunities are present in both the Coast and Middle Forks of the Willamette River. This chapter presents a summary of the problems that have been identified and both general and specific opportunities that are available to restore natural processes and habitats.

4.2 PROBLEMS AND OPPORTUNITIES

This study is a major component of broader actions being contemplated by the State of Oregon and other stakeholders in the watershed. The Willamette Subbasin Plan (WRI 2004) and the Upper Willamette Chinook and Steelhead Recovery Plan (ODFW 2011) provide watershed-scale restoration considerations that emphasize a holistic, multidisciplinary approach to evaluating and restoring ecosystem function and structure. The concepts of ecosystem function and structure are closely intertwined and include abiotic and biotic elements and processes. This philosophy emphasizes the need for improving or re-establishing both the structural components and the functions of the riverine ecosystem to restore the conditions necessary to create and maintain habitat benefiting a range of species in dynamic environments.

Table 22 identifies the major problems in the basin, as derived from the limiting factors analysis, that have caused a loss of habitats, the goals and objectives that were formulated to address each of these problems, and then specific types of opportunities that could address those problems, with potential locations to conduct restoration activities. The opportunities were identified in a series of workshops with project stakeholders using large-scale maps to identify key restoration areas.

4.3 NATIONAL PLANNING OBJECTIVES

Ecosystem Restoration is one of the primary missions of the Corps Civil Works program. Guidance document ER 1165-2-501 states:

> *"The purpose of the Civil Works ecosystem restoration activities is to restore significant ecosystem function, structure, and dynamic processes that have been degraded... The intent of restoration is to partially or fully reestablish the attributes of a naturalistic, functioning, and self-regulating system."*

The Federal objectives for the ecosystem restoration mission differ slightly from other missions. Evaluation and comparison of ecosystem restoration alternatives necessitates both monetary and non-monetary metrics. As such, the guidance ER 1165-2-501 states:

> *"Consistent with the analytical framework established by the P&G, plans to address ecosystem restoration should be formulated and recommended, based on their monetary and non-monetary benefits. These measures do not need to exhibit net national economic development (NED) benefits and should be viewed on the basis of non-monetary outputs compatible with the P&G selection criteria."*

Floodplain restoration is consistent with the Corps ecosystem restoration mission as well as the ecosystem restoration federal objective.

Table 22. Specific Restoration Problems and Opportunities

Ecosystem Problems	Goals/Objectives from Table 2	Opportunities	Potential Locations
Loss of Natural Floodplain Processes	**Restoration Goal: Restore natural floodplain ecosystem function and conditions to the Coast and Middle Fork Subbasins.**		
Lack of Floodplain Connections and Storage	Restoration Objective 2. Restore connectivity of the river to floodplain habitats.	- Remove or setback levees and revetments - Remove fill or structures in floodplain - Reconnect side-channels and oxbows - Restore floodplain wetlands and storage areas - Reconfigure/restore gravel ponds for storage and habitat	- Remove or setback revetments in MF reaches M2 and M4; CF reach C2. - Gravel ponds at MF/CF confluence area (reaches M1 and C1), CF reach C3, Row River confluence.
Lack of Natural Sediment Erosion/Deposition	Restoration Objective 1. Increase channel complexity and diversity. Restoration Objective 2. Restore connectivity of the river to floodplain habitats.	- Remove or setback levees and revetments - Mimic high velocity flows to promote natural scouring - Transport gravel from above the dams - Add in-stream structures (wood, etc.) to promote localized scour and deposition	- Remove or setback revetments in MF reaches M2 and M4; CF reach C2, confluence with Row River. - Potential to place gravel on bends immediately downstream of dams for future recruitment. - Instream wood at MF/CF confluence (reaches M1 and C1); in MF reaches M2, M4, M5; CF reaches C2, C3.
Loss of Habitat Quantity and Quality	**Restoration Goal. Restore natural floodplain ecosystem function and condition to the Coast and Middle Fork Subbasins.**		
Channelization / Loss of Channel Complexity	Restoration Objective 1. Increase channel complexity and diversity.	- Reconnect side-channels and oxbows - Add in-stream structures (wood, etc.) - Restore riparian zone	- Instream wood at MF/CF confluence (reaches M1 and C1); in MF reaches M2, M4, M5; CF reaches C2, C3. - Riparian restoration throughout study area
Lack of Large Woody Debris & Sediment	Restoration Objective 1. Increase channel complexity and diversity. Objective 3. Restore native floodplain habitats, including cottonwood gallery forests, riparian and wet prairie habitats.	- Replace or retrofit rock revetments with LW structures and bioengineering - Place wood in the rivers - Restore riparian areas to provide source for recruitment of wood in rivers - Transport wood and sediment from above the dams	- Instream wood at MF/CF confluence (reaches M1 and C1); in MF reaches M2, M4, M5; CF reaches C2, C3. - Riparian restoration throughout study area

Ecosystem Problems	Goals/Objectives from Table 2	Opportunities	Potential Locations
Invasive Exotic Plant & Animal Species (Aquatic & Terrestrial)	Objective 3. Restore **native** floodplain habitats, including cottonwood gallery forests, riparian and wet prairie habitats.	- Remove non-native plants and replant with native species - Restore natural cold-water habitats - Restore seasonality of off-channel habitats to discourage non-native species	- Riparian zone throughout study area - Floodplains throughout study area.
Fish Passage Barriers	Objective 2. Restore connectivity of river to floodplain habitats.	- Remove fish blocking culverts - Allow overbank flows to promote groundwater recharge to increase low flows in summer	- No culverts on main rivers - Promote groundwater recharge via floodplain reconnections in MF reaches M1, M2, M4, M5; CF reaches C1, C2, C3.
Loss of Floodplain and Riparian Vegetation Communities	Objective 3. Restore native floodplain habitat, including cottonwood gallery forests, riparian and wet prairie habitats.	- Restore riparian zone with native species - Remove revetments - Reconnect off-channel habitats - Remove non-native plants and replant with native species - Fencing and alternative water supplies for livestock	- Riparian zone throughout study area - Floodplain throughout study area.

4.4 CONSTRAINTS AND ASSUMPTIONS

Constraints were developed to encompass the physical and policy/programmatic planning constraints. The following bulleted list defines the range of constraints on aquatic ecosystem restoration in the study area.

- Proposed restoration actions must not increase flood water surface elevations or flood damages.
- Proposed restoration actions must not degrade water quality conditions.
- The recommended plan must have willing landowner participation; condemnation will not be utilized.
- Dam Operations
  - The design of restoration measures must account for the current and future changes to dam operations on both the Coast and Middle Forks and be designed to function with these potential changes.
  - This study will not include changes to dam operations, as changes are being evaluated separately as part of the Sustainable Rivers Project (SRP) that seeks to modify dam operations throughout the Willamette basin to provide environmental and habitat benefits. Some of the actions to date have included providing environmental flows on the Middle Fork Willamette River during rainfall or other runoff events to mimic more naturally occurring peaks, while still meeting flood risk management requirements. These flows will support the on-the-ground floodplain restoration actions by providing flows that will inundate the newly-connected habitats at the project sites. In addition, the environmental flows are expected to generate geomorphic changes such as gravel/sediment movement in the river, which will support formation of habitat features
- Costs
  - The local sponsor has requested that the overall total project cost of the recommended restoration plan be limited to $40-50 million, to limit their cost share to approximately $15-20 million.
- Construction
  - Construction will need to occur during the designated in-water work windows for each subbasin.
- The formulation of alternatives must avoid adverse impacts to cultural resources; and if avoidance is not feasible, then adverse impacts to cultural resources must be minimized. Unavoidable adverse impacts to cultural resources must be mitigated.
- The formulation of alternatives should avoid areas that are either known or suspected to be contaminated and/or contain hazardous, toxic, and radiological waste.
- The project must adhere to Corps Environmental Operating Principles and be environmentally, economically, and socially sustainable to the greatest extent practicable.

5. PLAN FORMULATION

5.1 PRIORITY REACHES

Early in the plan formulation process, the project delivery team and stakeholders identified priority reaches as a subset of the reaches identified for the entire study area (see Figure 26 for starred priority reaches). The criteria used to prioritize the reaches include: 1) difficulty/ease to reconnect floodplain areas; 2) presence of Corps' revetments that could be considered for modification; 3) land ownership (public lands prioritized); 4) level of development already existing in the floodplain (fewer structures or other infrastructure prioritized); and 5) the potential to create large connected blocks of habitat. The reaches not selected as priority reaches have substantial development or infrastructure in the floodplain and no large floodplain areas that could be restored. For example, the City of Cottage Grove and I-5 occupy substantial areas of the floodplain in Reach C4, thus it is not a priority reach for floodplain restoration.

5.1.1 C1 and M1, Coast Fork/ Middle Fork Confluence

The confluence area includes the lower reach of both the Coast and Middle Forks and has high potential for successful restoration because there are extensive publicly owned lands, few structures present in the floodplain (except at the development on right bank immediately downstream of confluence), several gravel ponds that could be restored, existing western pond turtle population, and a moderate amount of existing braiding and gravel bars. The confluence is a natural braided deltaic zone and is located just upstream of the urbanized areas of Eugene and Springfield. There is room to allow natural processes on a moderate scale without disrupting land uses substantially. A key need for further analysis is to identify the most cost effective and beneficial way to restore gravel pits within the context of natural floodplain function without unduly capturing the main river flow, but still providing high quality habitat that is connected to the rivers.

5.1.2 C2, Coast Fork RMs 6-10, Camas Swale Area

A portion of reach C2 is of high priority interest-the Camas Swale area that extends from approximately RMs 6 to 10 on the Coast Fork and includes several tributary confluences, including Camas Swale, Hill and Bear Creeks. There is a high potential for successful restoration because this was an area of extensive historic channel meandering and floodplain connections, there are several remnant oxbows and other floodplain features, there are multiple Corps' revetments that could be considered for modification, there are some areas of high quality riparian/floodplain vegetation that could be expanded, and there are few structures in close proximity to the river.

5.1.3 C3 and R1, Coast Fork RMs 17-21, Row River Confluence

Reach C3 as well as reach R1 include the Row River confluence area. The area extends from the Row River confluence north on the Coast Fork for 2-3 miles. There is a high potential for successful restoration in this reach because there are large areas of publicly owned land including North Regional Park, there are multiple gravel ponds that could be restored, several remnant side-channels and oxbows, and fairly wide stretches where there are limited structures in the floodplain. A key constraint is that roads constrain this reach in several locations.

5.1.4 M2, Middle Fork RMs 191-194, Below Jasper

This reach extends from just below Jasper to the gravel ponds immediately northeast of Mt. Pisgah. There is a high potential for successful restoration in this reach because there are virtually no structures in the floodplain, this was an area of historic meandering and gravel bar deposition/erosion, there is a large amount of riparian/floodplain vegetation that could be expanded, and there are some key revetments that could be removed/modified to spur natural processes where landowners are willing.

5.1.5 M4, Middle Fork RMs 197-200, Fall Creek Confluence Area

This reach includes the Fall Creek confluence and the Middle Fork to the north for a couple of miles. There is a high potential for successful restoration in this reach because the Fall Creek confluence area is a natural deltaic zone with a high potential for braiding and meandering, there are several remnant side-channels and oxbows, there are several areas of riparian/floodplain vegetation that could be expanded, and there are few structures in the floodplain. A limiting factor for salmonids in this reach is the high temperatures during fall as a result of reservoir drawdowns. However, an increase in floodplain hyporheic flow and groundwater recharge could benefit water temperatures and hence, salmonid habitats.

5.1.6 M5, Middle Fork RMs 200-204, Elijah Bristow State Park

This reach has a high potential for restoration of natural processes that can be implemented fairly easily because almost the entire reach is publicly owned. There is substantial existing historic braiding in this reach, but it has been dampened considerably by the operation of Dexter/Lookout Point Dams. This historic meandering and the high quality riparian vegetation could be enhanced substantially by removing some existing bank protection and moving some park features further away from the river to allow meandering without endangering infrastructure. This park also provides excellent opportunities for public education about restoration and enhancement of recreational features (particularly trails). A limiting factor for salmonids in this reach is the high temperatures during fall as a result of reservoir drawdowns. However, an increase in floodplain hyporheic flow and groundwater recharge could benefit water temperatures and, hence, salmonid habitats.

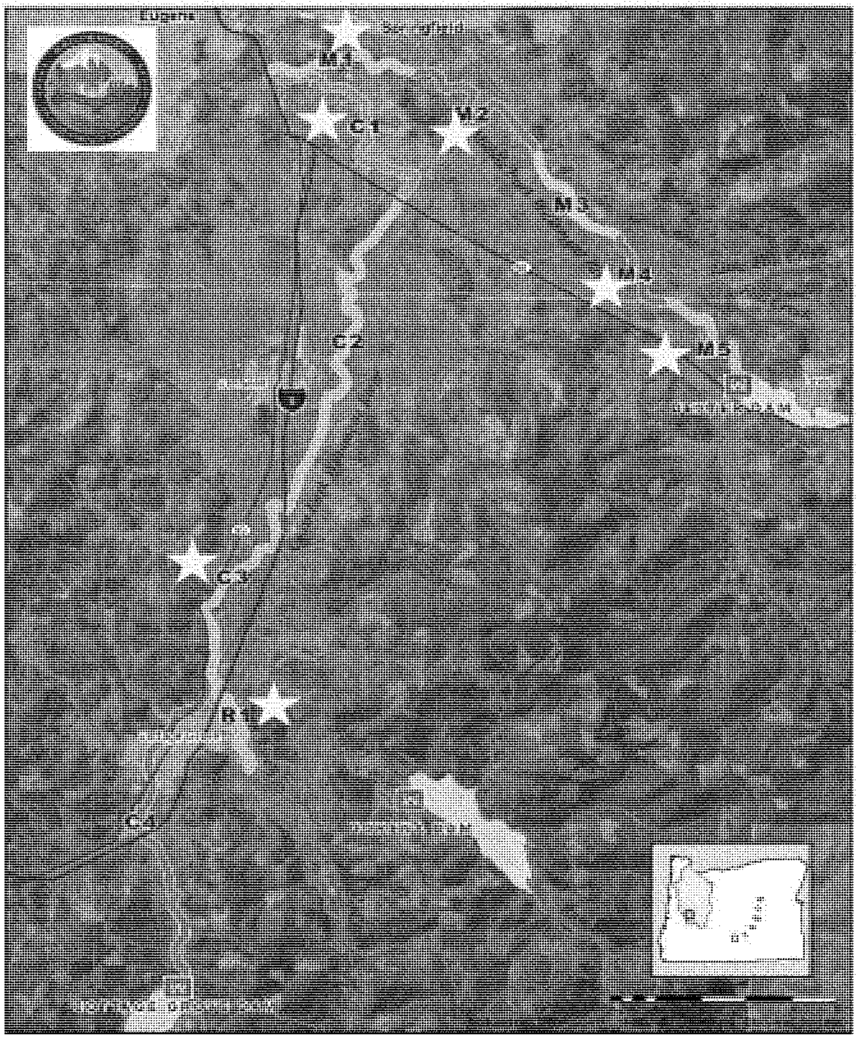


Figure 26. Coast Fork and Middle Fork Priority Reaches

5.2 POTENTIAL RESTORATION MEASURES

Based on the problems and opportunities identified in Chapter 4 and the priority reaches identified in this chapter, there are a number of potential restoration measures that could be undertaken that would each address one or more of the key problems in the watersheds (Table 23). These measures have been formulated initially based entirely on their potential floodplain habitat restoration benefits. All measures were considered in each priority reach.

While the transport of wood and sediment from the upstream watersheds (i.e. around the dams) was identified as an opportunity in Chapter 4, this measure was not carried forward as a potential restoration measure because of concerns about the potential for inducing flooding and large-scale channel migration resulting from the potential placement of large volumes of sediment or wood into the river. Separate from this study, the passage of sediment through the dams is being evaluated by the Corps in relation to their Willamette Projects Biological Opinion compliance (NMFS 2008, USFWS 2008), and by other stakeholders. The small-scale placement of gravel downstream of the dams was evaluated.

Table 23. Potential Restoration Measures

Potential Restoration Measures	Key Problems Addressed
Remove or Modify Revetments and Levees to Reconnect River to Floodplain and Off-Channel Features	Restores Natural Processes Restores Channel Complexity Increases Floodplain Storage Increases Sediment/Wood Recruitment Increases Hyporheic Flows/Groundwater Recharge
Remove Structures or Fill From Floodplain	Increases Floodplain Storage Increases Habitat Quantity/Quality Provides Riparian/Floodplain Vegetation Restoration Site
Riparian/Floodplain Vegetation Restoration	Increases Wood Recruitment Provides Shading/Cover Reduces Water Temperatures Provides Wildlife Habitat/Corridors
Remove Non-Native Vegetation	Increases Habitat Quantity/Quality Increases Wood Recruitment Provides Shading/Cover Improves Wildlife Habitat/Corridors
Construct Off-Channel/Floodplain Features	Increases Floodplain Storage Increases Habitat Quantity/Quality Increases Hyporheic Flow/Groundwater Recharge Spurs Natural Processes
Placement of Wood In-Channel and Floodplain	Spurs Natural Processes Increases Habitat Quality Provides Cover for Fish and Wildlife
Placement/Scouring of Gravel Bars	Spurs Natural Processes Increases Habitat Quality

5.2.1 Remove or Modify Revetments or Levees

This restoration measure could remove existing rock or concrete revetments on the banks of the rivers to allow the rivers to naturally migrate and create new habitats. If any existing Federal revetments or levees were considered, this measure could require an existing project to be de-authorized or the operations and maintenance (O&M) agreement to be changed and would only be implemented on sites where the landowners protected by a revetment or levee agreed to allow natural floodplain processes to occur. In areas where benefits provided by the revetment or levee are still required, revetments or levees could potentially be modified to allow controlled flow through a notch or culvert into a side channel or other off-channel habitat. It might also be possible to set back a levee or revetment to allow continued protection of critical structures while allowing floodplain reconnection on a portion of a site.

5.2.2 Remove Structures or Fill from Floodplain

This restoration measure would remove specific structures or fill (such as old roads and abandoned gravel piles) from the floodplain to allow the river to flood and/or migrate without causing any economic damages to the floodplain. This measure would most appropriately be done in conjunction with revetment removal or modification. It could also be implemented in areas where there is active channel migration heading towards existing structures but it would be more economical to move the structure rather than install bank protection.

5.2.3 Riparian/Floodplain Revegetation

This restoration measure would include plantings of native riparian, wetland and upland species in floodplain areas and riparian zones. This could involve complete revegetation in areas where there is little to no existing native vegetation, or underplantings in areas with native tree canopy. This measure would most typically be done in conjunction with the removal of non-native vegetation, since most riparian areas along the rivers have a dominant understory of invasive species currently (i.e., Himalayan blackberry).

5.2.4 Remove Non-Native Vegetation

This restoration would involve the active removal of non-native vegetation from the riparian zone and floodplain. Non-native species present include Himalayan blackberry, Japanese knotweed, reed canary grass, yellow flag iris, holly, English ivy, teasel, and other invasive species. A number of invasive aquatic species are also present including Eurasian milfoil and Brazilian milfoil. This measure would most typically be done in conjunction with riparian/floodplain revegetation and/or gravel pit restoration. Removal could be done by mechanical means (plowing, disking, and mowing), hand removal (cutting), and/or spot applications of pesticides where the risk of contamination of waterways is limited. In aquatic areas, removal may be difficult; it may be better to smooth banks out with placement of fill and change the hydrologic connections to eliminate suitable habitat for these species.

5.2.5 Construct Off-Channel Features

This restoration measure would include the engineering and construction to reconnect existing remnant side-channels, backwaters, and oxbows that are currently disconnected (or partially disconnected) from the river, excavate new side channels in geomorphically appropriate areas, restore gravel mined ponds/pits by reshaping and partial fill, reconnect gravel mined ponds as backwaters, and enhance existing off-channel features by the removal of constrictions such as undersized culverts or fill. Because a key concern is to maintain connections to these features this measure would most typically be done in conjunction with the placement of large wood or jams (engineered log jams or ELJs) to promote scour at the openings. This measure would also be done in conjunction with riparian/floodplain revegetation. The construction of channels in some locations could require the installation of culverts to allow continued access for vehicles or pedestrians to other portions of a site.

5.2.6 Placement of Wood In-Channel or Floodplain

This restoration measure would include the placement of clumps of LWD or ELJs along the banks, floodplain or within the main channel and side-channels of the rivers. The purpose of this measure is to provide natural scouring and deposition of sediments to create pools, side-channels, bars, and other features, provide complex cover for aquatic species, provide perching habitat for birds, and provide basking habitat and cover for amphibians and reptiles. This measure could be conducted entirely as a stand-alone measure or in conjunction with any other restoration measure.

5.2.7 Placement/Scouring of Gravel Bars

This restoration measure would include either the placement of relatively small quantities of gravel (i.e. less than 5,000 CY) downstream of the dams to allow natural sediment transport to convey it downstream to create spawning habitat or gravel bars, or would include grading of vegetated gravel bars to remove vegetation and "reset" them for potential transport into the system to form spawning and other habitats downstream.

5.3 DEVELOPMENT OF CONCEPTUAL ALTERNATIVES

Within each of the priority reaches identified above, all of the restoration measures identified above may be appropriate to provide large-scale floodplain reconnection and restoration. A workshop with the key stakeholders was held in May 2008 to help identify potential restoration alternatives based on aerial photography and the experience and knowledge of participants. This workshop resulted in a number of sites identified for potential restoration and a variety of restoration measures that could be implemented at each site. These restoration sites were consolidated into 43 distinct project sites and were then visited by Corps and Tetra Tech staff in the fall of 2008 at a reconnaissance scale to further identify appropriate restoration measures and to determine if any sites should be eliminated or added as a result of on-the-ground observations. The stakeholders were also interested in considering "passive" restoration approaches such as removal of non-native species and plantings, as well as considering "engineered" restoration approaches such as excavation of channels and restoration of gravel-mined ponds.

Table 24 below lists the conceptual alternatives developed following the field reconnaissance. Sites are coded by reach number and then in alphabetical order from downstream to upstream (for example, site C1A is located in Reach C1 and is the furthest downstream site considered in that reach). At nearly every site, a passive (Minimum) versus a more engineered (Maximum) alternative were developed to allow further evaluation of the range of measures that could be undertaken. The passive alternatives include only measures such as removal of invasive plant species (i.e., Himalayan blackberry), riparian revegetation, and placement of wood in the floodplain. The engineered alternatives include both the passive measures and additional engineered measures that were selected based on the field reconnaissance that identified the most appropriate types of measures that would work on each site. The nomenclature of Minimum and Maximum are not intended to imply that the Minimum plan is the least restoration that could be done or that the Maximum plan is every possible measure that could be accomplished. Rather, the Minimum plans include the passive measures that would restore natural vegetation communities and contribute to the eventual recruitment of large wood to the system, but would not actively reconnect floodplain areas. The Minimum plans would allow for continued large events to flood the sites and perhaps the eventual "natural" capture of gravel pits or old side channels during floods, but would not provide for immediate or more frequent connections. The Maximum plans would include the passive measures from the Minimum plans but also provide for winter/spring connections to off-channel and floodplain habitats such as side-channels and ponds.

Appendix A includes the conceptual plans for each of the initial array of alternatives. These conceptual plans were developed based on their potential floodplain habitat restoration benefits. Other considerations such as landowner willingness, effects on structures, etc. are considered after the initial evaluation.

Table 24. Initial Array of Conceptual Alternatives

Alternative	Restoration Measures Included	Location
C1A Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	State land on left bank and island at confluence of CF and MF; public lands only.
C1A Maximum	Measures from minimum plus reconnect gravel pits, gravel pit restoration, restore side channel and install 2 ELJs	Same as for minimum.
C1B Minimum	Remove invasives, riparian revegetation, place wood in floodplain	Lane County gravel pits on left bank at confluence of CF and MF; public lands only
C1B Maximum	Measures from minimum plus reconnect and restore and reshape ponds	Same as for minimum
C1C Minimum	Remove invasives, riparian revegetation	Wildish ponds on left bank of Coast Fork at RM 1.2
C1C Maximum	Measures from minimum plus reconnect to Coast Fork and reshape gravel pits	Same as for minimum
C1D Minimum	Remove revetment, setback protection to road, remove invasives, riparian revegetation	Lane County land at Buford Park right bank downstream of Seavey Loop Road Bridge at RM 3
C1D Maximum	Measures from minimum plus reconnect existing sloughs for backwater and install ELJs	Same as for minimum
C1E	Bioengineer existing revetment along left bank below Seavey Loop Road Bridge	Left bank downstream of Seavey Loop Road Bridge at RM 2-3.
C1F Minimum	Remove invasive species and revegetate riparian zone and floodplain	Berkshire/Oxley Slough from RM 4.3 to RM 1.3
C1F Maximum	Measures from minimum plus install culvert inlet at Coast Fork, excavate to reconnect entire length of slough and reconnect at outlet through either Wildish pond or Lane County ponds	Same as for minimum
C1G Minimum	Install 8 ELJs in Reach C1	RM 0 to 6.4 on Coast Fork
C1G Maximum	Install 12 ELJs in Reach C1	Same as for minimum
C2A Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Right bank at RM 8.5 to 9.5 on Coast Fork, private lands
C2A Maximum	Measures from minimum plus remove revetment, reconnect two side channels, install four ELJs	Same as for minimum
C2B Minimum	Remove invasives, riparian revegetation,	Left bank RM 8.2 to 9 on Coast Fork,

Alternative	Restoration Measures Included	Location
	place LWD in floodplain portion of site	Lane County land
C2B Maximum	Measures from minimum plus place 2 ELJs	Same as for minimum
C2C Minimum	Remove invasives, riparian revegetation, place wood in backwater	Right bank at RM 10.2 on Coast Fork, primarily State Parks land
C2C Maximum	Measures from minimum plus reconnect side channels, bioengineer revetment and install 5 ELJs	Same as for minimum
C2D Minimum	Remove invasives, riparian revegetation, place buried revetment on east side of site	Right bank at RM 11
C2D Maximum	Measures from minimum plus install 3ELJs, remove 3 structures, remove revetment	Same as for minimum
C2E Minimum	Remove invasives, riparian revegetation	Along left bank slough at RM 11
C2E Maximum	Measures from minimum plus install 2 ELJs and bioengineer revetment on downstream left bank	Same as for minimum
C3A Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Lynx Hollow State Park at RM 17; public lands only
C3A Maximum	Measures from minimum plus connect ponds to river, gravel pit restoration, place 3 ELJs	Same as for minimum
C3B Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Right bank and islands at RM 17.5
C3B Maximum	Measures from minimum plus reconnect ponds as backwater, gravel pit restoration, install 5 ELJs	Same as for minimum
C3C Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Right bank at RM 19
C3C Maximum	Measures from minimum plus reconnect ponds as backwater, gravel pit restoration, install 5 ELJs	Same as for minimum
C3D Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Right and left bank immediately upstream of I-5 at RM 16.
C3D Maximum	Measures from minimum plus install 2 ELJs	Same as for minimum
R1A Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Row River confluence right and left banks; public lands
R1A Maximum	Measures from minimum plus reconnect oxbow on right bank and install 3 ELJs	Same as for minimum
R1B Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Left bank immediately upstream of I-5 at RM 1; public lands
R1B Maximum	Measures from minimum plus restore side channel and install 2 ELJs	Same as for minimum
R1C Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Left bank at South Regional Park at RM 2.5; public lands
R1C Maximum	Measures from minimum plus reconnect gravel ponds as backwaters, gravel pit restoration, install 5 ELJs	Same as for minimum
M1A Minimum	Remove invasives, riparian revegetation, connect to Middle Fork	Wildish downstream-most gravel ponds and forested peninsula between MF and CF at RM 188.
M1A Maximum	Measures from minimum plus reconnect to Coast Fork and reshape banks to restore gravel pits	Same as for minimum
M1B Minimum	Remove invasives and revegetate	Wildish large gravel ponds left bank at RM 189
M1B Moderate	Measures from minimum plus remove	Same as for minimum

Alternative	Restoration Measures Included	Location
	concrete and rock revetment, reshape banks of north pond and reconnect to Middle Fork	
M1B Maximum	Measures from moderate plus reshape banks of south pond and reconnect to Middle Fork	Same as for minimum
M1C Minimum	Install 12 ELJs	Reach M1 from RM 187 to 190.8
M1C Maximum	Install 20 ELJs	Same as for minimum
M1D Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	City property at right bank RM 190.3 (GP property)
M1D Maximum	Measures from minimum plus remove wood chips, restore side channel and chutes, connect pond as backwater, install 5 ELJs	Same as for minimum
M2A Minimum	Remove invasives, riparian revegetation	Left bank gravel pits at RM 191.
M2A Maximum	Measures from minimum plus reconnect ponds, reshape banks, install 5 ELJs, install LWD clumps in ponds	Same as for minimum
M2B Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Right bank at RM 192
M2B Maximum	Measures from minimum plus restore side channel, install 5 ELJs	Same as for minimum
M2C Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Left bank at RM 192.4
M2C Maximum	Measures from minimum plus restore side channels, backwater connection to Pudding Sl., install 6 ELJs	Same as for minimum
M2D Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Right bank at RM 193
M2D Maximum	Measures from minimum plus restore side channels, install 4 ELJs	Same as for minimum
M2E Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Left bank at RM 194
M2E Maximum	Measures from minimum plus restore side channel and install ELJs	Same as for minimum
M2F	Restore long side channel, install one vehicle bridge, install 2 ELJs, 100-ft buffer for removal of invasives and riparian revegetation	Right bank at RM 193.5
M2G Minimum	Install 8 ELJs	Reach M2 from RM 190.8 to 195
M2G Maximum	Install 13 ELJs	Same as for minimum
M3A Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Left bank at RR bridge, RM 197.3
M3A Maximum	Measures from minimum plus install 5 ELJs, reconnect side channel around island	Same as for minimum
M4A Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Confluence of Fall Creek, right bank and islands at RM 198.5
M4A Maximum	Measures from minimum plus remove revetment on right bank, install 3 ELJs	Same as for minimum
M4B Minimum	Remove invasives, riparian revegetation, reconnect oxbow through notch in revetment	Right bank at RM 199
M4B Maximum	Measures from minimum except remove revetment and add 1 ELJ	Same as for minimum
M4C Minimum	Remove invasives, riparian revegetation, remove revetment at upper end	Left bank at RM 199, old meander
M4C Maximum	Measures from minimum plus reconnect side channel, install 4 ELJs, place LWD in side channel	Same as for minimum

Alternative	Restoration Measures Included	Location
M4D Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Left bank at RM 200, old meander
M4D Maximum	Measures from minimum plus reconnect side channel and pond, install 2 ELJs	Same as for minimum
M4E Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Right bank at RM 200.5
M4E Maximum	Measures from minimum plus restore side channels and install 4 ELJs	Same as for minimum
M4F	Restore side channel to connect to Fall Creek at bridge, 100-ft buffer for removal of invasives, riparian revegetation, install 2 vehicle bridges	Right bank at RM 200.5
M4G Minimum	Install 8 ELJs	Reach M4 from RM 198.3 to RM 200.5
M4G Maximum	Install 12 ELJs	Same as for minimum
M5A Minimum	Remove invasives, riparian revegetation, restore side channel, install 2 ELJs	Left bank at RM 201.8, Elijah Bristow
M5A Maximum	Measures from minimum plus restore additional side channel, install 2 more ELJs, place wood in channels	Same as for minimum
M5B Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Left bank at RM 201, Elijah Bristow
M5B Maximum	Measures from minimum plus reconnect long slough, install 1 ELJ, place LWD in slough	Same as for minimum
M5C Minimum	Remove invasives, riparian revegetation, place LWD in floodplain	Left bank and islands at RM 202-203, Elijah Bristow
M5C Maximum	Measures from minimum plus install 3 ELJs	Same as for minimum
M5D Minimum	Place 2,500 CY of gravel on left and right bank	RM 204, below dam
M5D Maximum	Measures from minimum plus install 2 ELJs, reconnect backwater on left bank	Same as for minimum
M5E Minimum	Install 8 ELJs	Reach M5 RM 201-204
M5E Maximum	Install 12 ELJs plus excavate two connections for old meander on left bank at RM 202.5	Same as for minimum

5.4 EVALUATION OF ALTERNATIVES

In order to evaluate potential restoration alternatives for this study, it was necessary to develop a method to measure the benefits expected from the restoration projects identified above. Further, the Corps of Engineers requires that a cost-effectiveness and incremental cost analysis (CE/ICA) be conducted on all restoration plans to help inform the decision on what level of environmental outputs is "worth it." An evaluation method that quantifies habitat benefits is necessary to conduct the CE/ICA. Existing methods, commonly used, that quantify habitat benefits include the Habitat Evaluation Procedures (HEP) developed by the USFWS (1980), the Hydrogeomorphic Method (HGM) for assessing wetland functional values, and Ecosystem Diagnosis and Treatment (EDT). HGM has been regionally adapted in many states, including Oregon (Brinson 1993). The Oregon Wetland and Riparian Assessment (OWRA) project was the regional adaptation of HGM to classify wetland and riparian sites in Oregon, based on their hydrogeomorphic features, and to assess their level of functioning in comparison to reference sites and standards (Adamus and Field 2001; Adamus 2001a, 2001b). EDT was developed by fishery managers and tribes in the Pacific Northwest to estimate fish species productivity and abundance in a watershed (or portion of a watershed) based on the quantity and quality of the habitat (Lichatowich, *et al.* 1995;

Lestelle, *et al.* 2004). The EDT model and data are in the public domain; both are maintained by Jones & Stokes Associates (formerly Mobrand Biometrics, Inc.).

Initial planning for a comprehensive ecological response model was discussed in several previous reports for this study including the *Willamette River Basin Floodplain Restoration Feasibility Study Ecological Response Model Recommendations* (Primozich *et al.* 2004); *An Approach for Synthesis of Willamette Floodplain Aquatic and Terrestrial Attributes* (McConnaha *et al.* 2005); and the *Analysis of the Potential Benefits of Floodplain Habitats in the Middle Fork Willamette River Using Geomorphic Splice Analysis* (McConnaha *et al.* 2006). These previous reports defined functions that floodplains provide and included the use of expert panels to recommend the types of indicators that could be used to represent those functions. It was recommended that indicators of geomorphic functions, terrestrial and aquatic habitats be used in the model to provide a comprehensive evaluation of the potential benefits that could be gained by restoring floodplain habitats. Indicators are fish and wildlife species, plant communities, or functions. Indicator attributes are the actual physical or biological features or processes that can be measured either in the field or via GIS analysis. Attributes can include channel length, floodplain habitat types, temperature, pieces of large woody debris, etc.

The approach recommended by those previous reports was considered to be too time-consuming and costly to apply to both the Coast and Middle Forks watershed (the development of an entirely new EDT model for cutthroat trout would have been necessary for the Coast Fork). However, the EDT model that had been developed for the Middle Fork Willamette River during the subbasin plan was updated with detailed geomorphic data and survey data to identify the reaches where restoration is most needed and would be most effective. The results of the EDT analysis indicated that restoration measures would be most beneficial in the reaches below the Fall Creek confluence because temperature is a primary limiting factor for spring Chinook in the subbasin. This information was used in the prioritization of reaches M1 and M2 in this study and in the formulation of restoration measures.

The approach that is used in this report has been to classify riverine and floodplain environments into major habitat types and address the response of each habitat type through Habitat Suitability Indices (HSIs) following the HEP methodology, for species closely associated with each habitat type (Figure 27). The results from each of the component suitability indices can be examined independently and/or combined into a single overall index of floodplain function we have termed the Floodplain Habitat Index. Each of the component HSIs are described in detail in Appendix B.

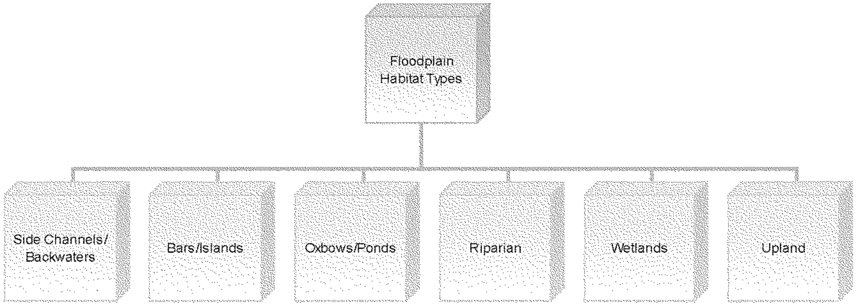


Figure 27. Floodplain Habitat Types

The HEP is a procedure developed by the U.S. Fish and Wildlife Service (1980a and 1980b) to facilitate the identification of impacts from various types of actions on fish and wildlife habitat. The basic premise of HEP is that habitat quantity and quality can be numerically described. HEP can provide a comparison of habitat quality between different sites or between different time periods at one site (for example, pre-construction versus post-construction). A key assumption in HEP is that an individual species "prefers" (or survives/reproduces better) in habitats with certain physical characteristics that can be measured. For example, if yellow warblers typically nest in deciduous shrubs, then sites with greater deciduous shrub cover are more suitable for yellow warblers than sites which have little or no deciduous shrub cover.

A HSI is the typical format used in HEP, which is a mathematical relationship between a physical, chemical, or biological habitat attribute and its suitability for a single species or assemblage of species. The Suitability Index is a unitless number between 0 and 1 that describes the requirements of a species for certain attributes such as cover, distance to foraging, water temperature, etc. A set of one or more Suitability Indices that represent key habitat requisites for the species during one or more life history stages are combined into an overall HSI by adding or multiplying the individual indices. The attributes are measured in the field or via GIS analysis and their corresponding index values are inserted into the model to produce a score that describes existing habitat suitability. The overall HSI value is also an index score between 0 and 1. This index value can be multiplied by the area of the site to yield Habitat Units (HUs), or it can be used as an index score for a habitat quality comparison only.

HSIs for several species were utilized to capture the range of benefits, across the multiple floodplain habitat types that could be provided by the proposed floodplain restoration project. The HEP model includes the following species or guilds: 1) western pond turtle; 2) Oregon chub; 3) beaver; 4) wood duck; 5) yellow warbler (highly riparian associated); 6) native amphibians (red-legged frog, Pacific tree frog, rough-skinned newt); 7) native salmonids (Chinook, steelhead, cutthroat); and 8) American kestrel (grasslands/ag lands). The western pond turtle and Oregon chub are both species of concern in the study area and utilize backwaters and ponds. The beaver is a mammal species dependent on native riparian species for food (cottonwood, willow and alder). The wood duck is a cavity nesting waterfowl species that utilizes riparian areas for nesting. The yellow warbler is highly associated with riparian habitat for nesting. The red-legged frog, Pacific tree frog, and rough-skinned newt are native amphibians that represent both aquatic and terrestrial amphibians utilizing riparian and wetland habitats. Chinook salmon, steelhead and cutthroat trout utilize off-channel aquatic habitats for rearing and refuge. American kestrel are raptors that utilize open grasslands and agricultural lands for foraging, as well as riparian and woodlands for nesting and perching.

Other species were considered for the HEP model, such as using the non-native bullfrog HSI as a negative component in the model (benefits to bullfrogs would be subtracted from the other HSI scores so that projects that result in negative effects to bullfrogs would score more highly). However, it was determined by the project team that this negative score was making it difficult to differentiate between alternatives (the negative score tended to cause all scores to be reduced by a similar amount that made it more difficult to identify beneficial restoration actions). Thus, the bullfrog was instead used as a consideration later in the design to reduce bullfrog habitat (i.e., permanent, calm waters with temperatures generally from 18 to 32°C are preferred, water level fluctuations are not desirable [Graves and Anderson 1987]). Oregon chub also require perennial ponds or sloughs, but generally use waters less than 6 feet in depth, so the focus to reduce bullfrog habitat is to design features that reduce the depth of perennial ponds or slough channels, and provide more seasonal water fluctuations and habitats.

An HSI will result for each individual species or guild. To combine the individual species' HSIs into one HSI suitable to use in a cost-effectiveness and incremental cost analysis, the following equation was developed:

$$HSI_{Combined} = (HSI_{turtle} + HSI_{chub} + HSI_{beaver} + HSI_{wood\ duck} + HSI_{yellow\ warbler} + HSI_{native\ amphibians} + HSI_{salmon} + HSI_{kestrel}) / 8$$

Other equations for the combinations of the individual HSI scores can be used. For example, the chub and salmon HSIs could be multiplied by two to give those species more effect on the ranking. The method of combining the individual HSI scores into the combined score will change the potential ranking of individual alternatives. The project team determined that all native species should be weighted equally because there is an interest in providing benefits to a wide variety of fish and wildlife species that utilize floodplain habitats.

The scores that result from applying the HEP to the proposed restoration alternatives are shown in Table 25. The combined HSI score for each alternative was multiplied by project acres to yield Habitat Units. Project acres were calculated based on the concept designs and included the entire project footprint at each site as removal of invasive species and riparian/floodplain revegetation is proposed to occur on the entire site for each alternative. The existing condition quality was evaluated via field reconnaissance of the sites. Then, likely scores for the future without project condition (No Action) were developed, along with future with project conditions for each alternative. The existing condition scores were considered to be representative of the quality of habitat for the base year when the first projects are constructed (2015) and the next ten years (Years 1-10), then vegetation growth/maturity and other likely impacts were considered to develop scores for Years 11-25, and then finally for Years 26-50 for the future without project condition. Because riparian vegetation such as willows and alders are fast growing species, it is presumed that functions provided by these species will be fully provided starting at Year 11. Additional maturity of tree species for the long-term recruitment of large wood will occur over the 26-50 year range. The overall HSI score shown is the area under the curve of the annual scores during each of the three time increments (Years 0-10, Years 11-25, and Years 26-50) divided by the 50-year period of analysis[2]. The net increase in HUs shown are the average annual habitat units (AAHUs). Because of the multiple species included in the HEP model, in a few cases, alternatives formulated primarily to benefit one species (i.e., salmon) could potentially show reduced scores for other species that could make a zero score or even a negative score possible. But, for the most part, the alternatives were formulated to benefit all of the species included in the model.

Table 25. Habitat Scores for Restoration Alternatives

Alternative	Future Without Project HSI	Project Acres	Future Without Project AAHUs	Future With Project HSI	Future With Project AAHUs	Net Increase in AAHUs
C1A Minimum	0.54	52	27.81	0.67	33.78	5.97
C1A Maximum	0.54	52	27.81	0.78	39.44	11.63
C1B Minimum	0.52	86	43.79	0.63	52.95	9.16
C1B Maximum	0.52	86	43.79	0.84	69.91	26.13
C1C Minimum	0.47	114	50.17	0.66	71.52	21.34
C1C Maximum	0.47	114	50.17	0.82	89.48	39.31
C1D Minimum	0.52	99	50.66	0.57	55.51	4.85
C1D Maximum	0.52	99	50.66	0.69	66.86	16.20
C1E	0.4	12	4.64	0.6	6.99	2.35
C1F Minimum	0.43	220	95.3	0.66	140	44.7

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[2] AAHUs are calculated in the software via a definite integral of the form AAHU = [∫(0,50) f(x)dx / 50], where f(x) is defined by linear interpolation based on the three time increments of known habitat output input by the user.

Alternative	Future Without Project HSI	Project Acres	Future Without Project AAHUs	Future With Project HSI	Future With Project AAHUs	Net Increase in AAHUs
C1F Maximum	0.43	220	95.3	0.8	176.	80.7
C1G Minimum	0.47	50	22.86	0.57	27.49	4.63
C1G Maximum	0.47	50	22.86	0.59	28.53	5.67
C2A Minimum	0.47	296	137.11	0.59	167.80	30.69
C2A Maximum	0.47	296	137.11	0.75	214.18	77.07
C2B Minimum	0.46	84	38.6	0.58	48.4	9.8
C2B Maximum	0.46	84	38.6	0.75	63.2	24.6
C2C Minimum	0.63	79	49.27	0.72	55.91	6.64
C2C Maximum	0.63	79	49.27	0.79	61.13	11.86
C2D Minimum	0.61	147	85.5	0.75	106.22	20.72
C2D Maximum	0.61	147	85.5	0.8	112.94	27.44
C2E Minimum	0.57	76	42.44	0.69	50.87	8.43
C2E Maximum	0.57	76	42.44	0.75	55.38	12.94
C3A Minimum	0.53	70	34.83	0.62	41.72	6.89
C3A Maximum	0.53	70	34.83	0.79	52.68	17.85
C3B Minimum	0.5	199	96.91	0.62	119.6	22.69
C3B Maximum	0.5	199	96.91	0.81	155.48	58.57
C3C Minimum	0.54	83	42.65	0.67	53.54	10.89
C3C Maximum	0.54	83	42.65	0.79	62.99	20.34
C3D Minimum	0.57	51	28.73	0.67	33.45	4.72
C3D Maximum	0.57	51	28.73	0.78	38.79	10.06
R1A Minimum	0.69	97	64.23	0.79	75.08	10.85
R1A Maximum	0.69	97	64.23	0.8	75.27	11.04
R1B Minimum	0.56	15	8.33	0.7	10.30	1.97
R1B Maximum	0.56	15	8.33	0.79	11.49	3.16
R1C Minimum	0.48	60	28.9	0.58	35	6.1
R1C Maximum	0.48	60	28.9	0.79	47.6	18.7
M1A Minimum	0.46	147	60.47	0.64	90.18	29.71
M1A Maximum	0.46	147	60.47	0.82	115.05	54.58
M1B Minimum	0.45	170	72.03	0.58	93.22	21.19
M1B Moderate	0.45	170	72.03	0.71	115.58	43.56
M1B Maximum	0.45	170	73.32	0.74	120.15	48.12
M1C Minimum	0.48	36	16.96	0.53	18.67	1.71
M1C Maximum	0.48	36	16.96	0.57	19.86	2.9
M1D Minimum	0.57	69	38.78	0.67	44.56	5.78
M1D Maximum	0.57	69	38.78	0.78	52.17	13.39
M2A Minimum	0.47	68	31.36	0.69	45.51	14.15
M2A Maximum	0.47	68	31.36	0.76	49.87	18.51
M2B Minimum	0.48	42	18.9	0.55	22.23	3.33
M2B Maximum	0.48	42	18.9	0.79	31.57	12.67
M2C Minimum	0.61	259	155.48	0.65	164.08	8.6
M2C Maximum	0.61	259	155.48	0.8	200.4	44.92
M2D Minimum	0.48	60	27.91	0.56	32.84	4.93
M2D Maximum	0.48	60	27.91	0.74	43.23	15.32
M2E Minimum	0.48	86	40.07	0.56	46.71	6.64

Alternative	Future Without Project HSI	Project Acres	Future Without Project AAHUs	Future With Project HSI	Future With Project AAHUs	Net Increase in AAHUs
M2E Maximum	0.48	86	40.07	0.74	62.0	21.93
M2F	0.57	6	3.32	0.77	4.47	1.15
M2G Minimum	0.48	50	23.33	0.53	25.71	2.38
M2G Maximum	0.48	50	23.33	0.6	29.32	5.99
M3A Minimum	0.53	30	15.55	0.66	19.08	3.53
M3A Maximum	0.53	30	15.55	0.72	20.9	5.35
M4A Minimum	0.47	73	33.88	0.57	40.13	6.25
M4A Maximum	0.47	73	33.88	0.67	47.31	13.43
M4B Minimum	0.54	9	4.77	0.64	5.61	0.84
M4B Maximum	0.54	9	4.77	0.74	6.44	1.67
M4C Minimum	0.62	110	66.78	0.71	75.82	9.04
M4C Maximum	0.62	110	66.78	0.75	80.99	14.21
M4D Minimum	0.57	64	36.28	0.69	43.11	6.82
M4D Maximum	0.57	64	36.28	0.71	44.45	8.17
M4E Minimum	0.4	64	24.85	0.5	30.78	5.93
M4E Maximum	0.4	64	24.85	0.66	40.47	15.62
M4F	0.51	31	15.58	0.61	18.45	2.87
M4G Minimum	0.51	24	12.14	0.57	13.33	1.19
M4G Maximum	0.51	24	12.14	0.6	14.11	1.97
M5A Minimum	0.62	117	72.4	0.73	85.8	13.4
M5A Maximum	0.62	117	72.4	0.75	87.9	15.5
M5B Minimum	0.63	117	73.81	0.74	85.42	11.61
M5B Maximum	0.63	117	73.81	0.77	87.38	13.57
M5C Minimum	0.59	239	140	0.7	166.8	26.8
M5C Maximum	0.59	239	140	0.78	187	47
M5D Minimum	0.56	5	2.76	0.56	2.74	-0.02
M5D Maximum	0.56	5	2.76	0.6	2.93	0.17
M5E Minimum	0.53	36	22.79	0.57	19.92	-2.87
M5E Maximum	0.53	36	22.79	0.65	27.79	5.0

5.5 COST-EFFECTIVENESS AND INCREMENTAL COST ANALYSIS

In order to evaluate the restoration alternatives for selection of a recommended plan, the Corps of Engineers is required to conduct a cost-effectiveness and incremental cost analysis (CE/ICA)(described in Section 5.6.1, below) that compares the cost of an alternative to its habitat benefit. This requires that preliminary costs be developed for each of the restoration alternatives. Table 26 shows the costs developed for the restoration alternatives, including total costs (present value) and average annual costs over the lifetime of the project (50 years), along with the net increase in average annual habitat units for each alternative. The net AAHUs were calculated using the benefit calculator module within IWR-Plan that calculates the "area under the curve" over the 50-year period of analysis.

The CE/ICA is the first step in plan selection to identify the most cost effective and incrementally justified plans. Following the CE/ICA, other considerations were applied, such as the total cost of the plans (the non-Federal sponsor can only cost-share up to a total cost of about $40-50 million, thus plans that cost more than this would not be implementable). Landowner willingness is also a major consideration.

The preliminary cost estimates were developed using a spreadsheet format and based on data from other recent projects, recent quotes for materials, and RS Means. Price levels are for 2011. The key cost tables are provided in Appendix C. A unit cost table was developed that includes key bid items for each measure identified in Section 5.3. Each of these bid items includes materials, labor, contractor overhead and profit. Other standard cost items such as mobilization/demobilization, permitting, dewatering, traffic control, etc. were included at a standard percentage of the construction cost. A 25 percent contingency was applied to all alternatives. Design and construction management are included at 20 percent and 15 percent, respectively. Standard real estate costs were applied at $20,000/acre for private lands and $5,000/acre for publicly owned lands. The bid items are then included for each alternative site and scale as appropriate based on the work proposed. Quantities were calculated for each item using the conceptual plans developed in GIS for each site and are shown in Appendix C. Additionally, operation and maintenance costs were also estimated based on the type of restoration measures included at each site based on the engineer's experience with similar projects. The O&M costs were included in the total project cost for the cost effectiveness and incremental cost analyses. The cost estimate for each alternative is then annualized over the 50 year period of analysis using the FY13 discount rate of 3.75%[3], yielding an average annual cost that can be used for comparison with the average annual habitat units. These preliminary costs provide a comparable conceptual level cost for each alternative so that they can be compared against each other, in combination with the habitat output scores to identify which plans provide more benefit for the cost.

It is typical that when the recommended restoration plan is selected and additional feasibility level designs and analysis are conducted in more detail that the cost estimates may change. However, this does not affect the results of the CE/ICA because all of the plans were initially compared using the same unit costs.

The total implementation cost per acre for restoration ranges from $26,000 to $180,000 per acre for the alternatives proposed. O&M costs (Net Present Value) are generally about $550 per acre per year. The bulk of the potential O&M costs, however, are related to vegetation maintenance during the first 5 years to ensure that invasive species do not spread back and become dominant species and to ensure survival and growth of the native species planted. Thus, the actual outlay by the non-Federal sponsor is anticipated to be about $2500/acre each year for the first five years. This is considered a conservative estimate, to ensure that it included in the evaluation of the alternatives and to determine the non-Federal sponsor's capability to undertake the projects.

An initial run was done of the CE/ICA to get a sense of the top 15 ranked project sites and alternatives. Following this initial evaluation, the project sponsors set up meetings or conducted other outreach to both public and private landowners to determine the level of interest in continuing forward with each project site. Project C1F was determined to not be implementable due to the high number of landowners along the alignment of the project and lack of interest. Project Sites C3B and M2B do not have willing landowners. Lane County indicated that they would only be interested in restoration on one of their properties – C1B. The County has requested that Site C2B be removed from further consideration for this study. Oregon State Parks and the Middle Fork Willamette Watershed Council also determined that they

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[3] The discount rate used in economic analyses for USACE Civil Works projects is provided annually by USACE Economic Guidance Memoranda (EGM), for 2013 it is provided in EGM 13-01. The rate is set each fiscal year by the U.S. Department of the Treasury in accordance with Section 80 of Public Law 93-251. Treasury computes the rate as the average market yield from the previous year on interest-bearing marketable securities of the United States that have 15 or more years remaining to maturity. According to law the rate may not be raised or lowered by more than one quarter of one percentage point in any year.

would proceed to implement projects M5A and M5C on their own and this did not want these two project sites to be included in the final array of alternatives. The City of Cottage Grove also indicated that since work was already occurring on the R1C site, that they would prefer to move ahead and implement that project on their own. Thus, it was determined that Sites C1F, C2B, C3B, M2B, M5A, M5C, and R1C should be removed from the final array of restoration alternatives. The CE/ICA was then run again after deleting these projects from the list. In addition, due to the maximum of 26 alternatives that can be run using the IWR-Plan software, the site were further screened to eliminate all those projects that cost more than $50,000 per AAHU because these costly alternatives are likely to be well beyond the non-Federal sponsor's cost-sharing capabilities and thus do not warrant consideration with more cost effective alternatives.

Table 26 shows the input data for the final array of restoration alternatives for the CE/ICA runs once the previously mentioned sites were deleted. This then allows one CE/ICA run for the Coast Fork/Row River sites and one CE/ICA run for the Middle Fork sites. Then, for each separate run, all cost effective plans with a cost less than $15,000/output that result are then combined and run for an overall combined CE/ICA.

Table 26. Final Array of Restoration Alternatives with Identifier Codes, Costs and Outputs

Alternative	Scale	Scale Name	Net Present Value of Cost + O&M	Avg. Ann. Cost + O&M (rounded)	Net AAHUs
M1A	1	Min	$7,819,500	$348,550	29.71
M1A	2	Max	$9,309,180	$414,950	54.58
M1B	1	Min	$7,554,611	$336,740	21.19
M1B	2	Mod	$8,818,079	$393,060	43.56
M1B	3	Max	$9,238,056	$411,780	48.12
M1C	1	Min	$4,585,957	$204,420	1.71
M1C	2	Max	$5,990,593	$267,030	2.9
M1D	1	Min	$1,975,104	$88,040	5.78
M1D	2	Max	$3,291,840	$146,730	13.39
M2A	1	Min	$2,978,326	$132,760	14.15
M2A	2	Max	$4,098,476	$182,690	18.51
M2B	1	Min	$2,978,326	$132,760	3.33
M2B	2	Max	$4,098,476	$182,690	12.67
M2C	1	Min	$13,042,941	$581,380	8.6
M2C	2	Max	$14,692,814	$654,920	44.92
M2D	1	Min	$4,143,717	$184,700	4.93
M2D	2	Max	$4,918,123	$219,220	15.32
M2E	1	Min	$5,939,328	$264,740	6.64
M2E	2	Max	$6,816,106	$303,820	21.93
M2F	1	Max	$4,411,760	$196,650	1.15
M2G	1	Min	$1,316,736	$58,690	2.38
M2G	2	Max	$2,139,696	$95,380	5.99
M3A	1	Min	$2,096,242	$93,440	3.53
M3A	2	Max	$2,984,118	$133,010	5.35
M4A	1	Min	$5,041,522	$224,720	6.25
M4A	2	Max	$5,782,879	$257,770	13.43
M4B	1	Min	$554,350	$24,710	0.84
M4B	2	Max	$1,775,248	$79,130	1.67

Alternative	Scale	Scale Name	Net Present Value of Cost + O&M	Avg. Ann. Cost + O&M (rounded)	Net AAHUs
M4C	1	Min	$6,630,558	$295,550	9.04
M4C	2	Max	$7,604,424	$338,960	14.21
M4D	1	Min	$4,444,349	$198,100	6.82
M4D	2	Max	$4,892,641	$218,090	8.17
M4E	1	Min	$4,419,965	$197,020	5.93
M4E	2	Max	$5,463,814	$243,550	15.62
M4F	1	Max	$3,579,572	$159,560	2.87
M4G	1	Min	$1,316,736	$58,690	1.19
M4G	2	Max	$1,975,104	$88,040	1.97
M5B	1	Min	$6,642,240	$296,070	11.61
M5B	2	Max	$6,826,553	$304,290	13.57
M5D	1	Min	$183,360	$8,170	-0.02
M5D	2	Max	$422,717	$18,840	0.17
M5E	1	Min	$1,316,736	$58,690	-2.87
M5E	2	Max	$1,817,640	$81,020	5.0
C1A	1	Min	$2,778,709	$123,860	5.97
C1A	2	Max	$3,311,370	$147,600	11.63
C1B	1	Min	$3,947,272	$175,950	9.16
C1B	2	Max	$4,129,769	$184,080	26.13
C1C	1	Min	$6,441,518	$287,130	21.34
C1C	2	Max	$8,251,399	$367,800	39.31
C1D	1	Min	$4,238,576	$188,930	4.85
C1D	2	Max	$4,531,103	$201,970	16.20
C1E	1	Max	$8,006,124	$356,870	2.35
C1G	1	Min	$1,316,736	$58,690	4.63
C1G	2	Max	$1,975,104	$88,040	5.67
C2A	1	Min	$20,044,359	$893,460	30.69
C2A	2	Max	$22,853,041	$1,018,660	77.07
C2C	1	Min	$3,052,278	$136,050	6.64
C2C	2	Max	$6,587,491	$293,630	11.86
C2D	1	Min	$8,135,855	$362,650	20.72
C2D	2	Max	$17,111,882	$762,750	27.44
C2E	1	Min	$4,013,252	$178,890	8.43
C2E	2	Max	$5,298,481	$236,180	12.94
C3A	1	Min	$3,997,696	$178,190	6.89
C3A	2	Max	$4,737,344	$211,160	17.85
C3C	1	Min	$6,090,536	$271,480	10.89
C3C	2	Max	$7,992,349	$356,250	20.34
C3D	1	Min	$3,314,145	$147,730	4.72
C3D	2	Max	$3,807,921	$169,740	10.06
R1A	1	Min	$5,362,272	$239,020	10.85
R1A	2	Max	$6,167,260	$274,900	11.04
R1B	1	Min	$810,929	$36,150	1.97
R1B	2	Max	$1,239,259	$55,240	3.16

5.5.1 Cost-Effectiveness and Incremental Cost Analysis

The CE/ICA is conducted to evaluate the relative effectiveness and efficiency of alternative restoration measures at addressing environmental objectives of the project. The analyses provide a framework for comparing the differences in output across alternative measures and the associated changes in cost. The analysis was conducted in the following steps:

- Tabulate average annual cost and average annual environmental outputs of each restoration alternative
- Identify any measures whose implementation is dependent upon implementation of others
- Identify any measures that are not combinable with others
- Identify all potential combination of measures
- Calculate cost and output estimates for each alternative
- Identify any measures that provide the same output at greater cost than other combinations
- Identify any measures that provide less output at the same or greater cost as other combinations
- Evaluate changes in incremental costs for remaining combinations
- Identify most efficient set of remaining combinations ("best-buys")
- Display changes in incremental cost for best-buy combinations

5.5.2 Relationships

The analyses involve deriving all possible combinations of the alternatives and then comparing the cost and output levels associated with each combination. Any relationships of dependency or non-combinability need to be determined prior to combining measures. It was identified that the minimum and maximum alternatives at each site were not combinable because the maximum alternatives at each site included all features of the minimum plan. Each site was fully combinable with any other site. The analyses use the FY13 Federal discount rate of 3.75 percent and a period of analysis of 50 years for discounting and amortization of costs.

5.5.3 Cost-Effectiveness Analysis

Once all combinations were derived and their cost and output estimates calculated, cost-effectiveness analysis was performed in the following two steps:

- Identify any measures that provide the same output at greater cost than other combinations and screen from further analysis
- Identify any measures that provide less output at the same or greater cost as other combinations and screen from further analysis

This two-step screening was performed on the array of possible combinations for each of the subbasins. This cost-effectiveness screening resulted in identification of the array of combinations that are referred to as the "Cost-Effective Set." If considering only the cost and output estimates, there is no rational reason to implement a non-cost effective combination.

Because of the large number of alternatives, the Coast Fork and Middle Fork alternatives were first run separately. Tables 27 and 28 show the results for the initial Coast Fork and Middle Fork runs, respectively. Table 29 presents the best buy plan outputs from the combined Coast Fork and Middle Fork CE/ICA. Table 30 combines the Coast Fork and Middle Fork runs. Figures 28, 29, 30, and 31 graphically present the results from the Coast Fork run, Middle Fork run, then the combined Coast Fork and Middle Fork, in a graph and box plot format, respectively.

5.5.4 Incremental Cost Analysis

Following the identification of cost-effective combinations, an incremental cost analysis was conducted on the cost-effective set for each of the two subbasins. This incremental cost analysis compares the rate of increase in cost and the rate of increase in output between the cost effective plans providing the least output to all other cost effective plans producing more output. The larger plan that provides the greatest increase in output for the least increase in cost is identified as the "best buy." This best buy is then compared to all larger cost effective plans in a reiteration of the same analytical process to identify the "next best buy." This process is repeated until no larger plans remain. The result is an array of "best-buy" plans that are the most efficient production schedule for the desired environmental outputs.

5.5.5 Interest during Construction

Following the combined Coast and Middle Fork run, interest during construction (IDC) was included for the best buy plans to ensure that scheduling and phasing would not change the results of the analysis. To calculate IDC, the following assumptions were made: 1) assume 4 month work window to construct each site; 2) assume no more than two sites constructed in a year; 3) assume 2015 is the first year that construction begins; 4) assume mid-life full expenditure pattern (half of expenditure accrues IDC over whole construction period); and 5) assume when two sites are constructed in one year that two separate crews are working. Table 31 shows the IDC calculation results.

Table 27. Coast Fork CE/ICA Results

Names	Code	Scale	Names	Code	Scale
C1A MIN	A	1	C2D MIN	I	1
C1A MAX	A	2	C2D MAX	I	2
C1B MIN	B	1	C2E MIN	J	1
C1B MAX	B	2	C2E MAX	J	2
C1C MIN	C	1	C3A MIN	K	1
C1C MAX	C	2	C3A MAX	K	2
C1D MIN	D	1	C3C MIN	L	1
C1D MAX	D	2	C3C MAX	L	2
C1E MAX	E	1	C3D MIN	M	1
C1G MIN	F	1	C3D MAX	M	2
C1G MAX	F	2	R1A MIN	N	1
C2A MIN	G	1	R1A MAX	N	2
C2A MAX	G	2	R1B MIN	O	1
C2C MIN	H	1	R1B MAX	O	2
C2C MAX	H	2			

Codes for the Coast Fork CE/ICA runs. Below, all scales comprising plans with an incremental cost per output less than or equal to $15,000 are retained for the combined CE/ICA. Scales retained are C1B MAX, C1C MAX, C1G MIN, C3A MAX, C1D MAX, C1A MAX, C2A MAX. The codes are renumbered for the combined Coast and Middle Fork run.

Best Buy Plans

Plan #	Plan Code	Inc Cost	Inc Out	Inc Cost / Inc Out
1	No Action Plan	$0	0.0000	$0
2	B2	$184,080	26.1267	$7,046
3	B2C2	$367,800	39.3095	$9,357
4	B2C2K2	$211,160	17.8573	$11,825
5	B2C2D2K2	$201,970	16.2026	$12,465
6	B2C2D2F1K2	$58,690	4.6307	$12,674
7	A2B2C2D2F1K2	$147,600	11.6341	$12,687
8	A2B2C2D2F1G2K2	$1,018,660	77.0674	$13,218
9	A2B2C2D2F1G2K2M2	$169,740	10.0551	$16,881
10	A2B2C2D2F1G2K2M2O2	$55,240	3.1615	$17,473
11	A2B2C2D2F1G2I1K2M2O2	$362,650	20.7240	$17,499
12	A2B2C2D2F1G2I1K2L2M2O2	$356,250	20.3423	$17,513
13	A2B2C2D2F1G2I1J2K2L2M2O2	$236,180	12.9414	$18,250
14	A2B2C2D2F1G2H1I1J2K2L2M2O2	$136,050	6.6436	$20,478
15	A2B2C2D2F1G2H1I1J2K2L2M2N1O2	$239,020	10.8498	$22,030
16	A2B2C2D2F2G2H1I1J2K2L2M2N1O2	$29,350	1.0398	$28,227
17	A2B2C2D2F2G2H2I1J2K2L2M2N1O2	$157,580	5.2155	$30,214
18	A2B2C2D2F2G2H2I2J2K2L2M2N1O2	$400,100	6.7208	$59,532
19	A2B2C2D2E1F2G2H2I2J2K2L2M2N1O2	$356,870	2.3494	$151,898
20	A2B2C2D2E1F2G2H2I2J2K2L2M2N2O2	$35,880	0.1854	$193,528

Due to limitations of the IWR Planning Suite Software, and because of the large number of measures and scales formulated for the Middle Fork, all Middle Fork scales were sorted by average cost per unit habitat output. In doing so, it was identified that seven scales had an average cost per AAHU of over $50,000. At this cost, it could be inferred that these scales would be the least incrementally efficient additions to a restoration plan, and these scales were screened out of further analysis. Screened scales included M4F MAX, M2C MIN, M1C MAX, M5D MAX, M1C MIN, M2F MAX, and M5D MIN. The remainder of the measures and scales were carried forward to the CE/ICA as summarized below.

Table 28. Middle Fork CE/ICA Results

Names	Code	Scale	Names	Code	Scale
M1A MIN	A	1	M3A MIN	L	1
M1A MAX	A	2	M3A MAX	L	2
M1B MIN	B	1	M4A MIN	M	1
M1B MOD	B	2	M4A MAX	M	2
M1B MAX	B	3	M4B MIN	N	1
M1D MIN	C	1	M4B MAX	N	2
M1D MAX	C	2	M4C MIN	O	1
M2A MIN	E	1	M4C MAX	O	2
M2A MAX	E	2	M4D MIN	P	1
M2B MIN	F	1	M4D MAX	P	2
M2B MAX	F	2	M4E MIN	Q	1
M2C MAX	G	1	M4E MAX	Q	2
M2D MIN	H	1	M4G MIN	S	1
M2D MAX	H	2	M4G MAX	S	2
M2E MIN	I	1	M5B MIN	T	1
M2E MAX	I	2	M5B MAX	T	2
M2G MIN	K	1	M5E MIN	V	1
M2G MAX	K	2	M5E MAX	V	2

Codes for the Middle Fork CE/ICA runs. Below, all scales comprising plans with an incremental cost per output less than or equal to $15,000 are retained for the combined CE/ICA. Scales retained are M1A MAX, M1B MAX, M2A MIN, M2A MAX, M1D MAX, M2E MAX, M2D MAX, M2C MAX, M2B MAX. The codes are renumbered for the combined Coast and Middle Fork run.

Best Buy Plans

Plan #	Plan Code	Inc Cost	Inc Out	Inc Cost / Inc Out
1	No Action Plan	$0	0.0000	$0
2	A2	$414,950	54.5827	$7,602
3	A2B3	$411,780	48.1240	$8,557
4	A2B3E1	$132,760	14.1568	$9,378
5	A2B3C2E1	$146,730	13.3970	$10,952
6	A2B3C2E2	$49,930	4.3511	$11,475
7	A2B3C2E2I2	$303,820	21.9365	$13,850
8	A2B3C2E2H2I2	$219,220	15.3230	$14,307
9	A2B3C2E2F2H2I2	$182,690	12.6728	$14,416
10	A2B3C2E2F2G1H2I2	$654,920	44.9204	$14,580
11	A2B3C2E2F2G1H2I2Q2	$243,550	15.6209	$15,591
12	A2B3C2E2F2G1H2I2K2Q2	$95,380	5.9963	$15,906
13	A2B3C2E2F2G1H2I2K2Q2V1	$81,020	5.0000	$16,204
14	A2B3C2E2F2G1H2I2K2M2Q2V1	$257,770	13.4237	$19,203
15	A2B3C2E2F2G1H2I2K2M2Q2T2V1	$304,290	13.5748	$22,416
16	A2B3C2E2F2G1H2I2K2M2O2Q2T2V1	$338,960	14.2082	$23,857
17	A2B3C2E2F2G1H2I2K2L2M2O2Q2T2V1	$133,010	5.3516	$24,854
18	A2B3C2E2F2G1H2I2K2L2M2O2P2Q2T2V1	$218,090	8.1712	$26,690
19	A2B3C2E2F2G1H2I2K2L2M2N1O2P2Q2T2V1	$24,710	0.8453	$29,232
20	A2B3C2E2F2G1H2I2K2L2M2N1O2P2Q2S2T2V1	$88,040	1.9740	$44,600
21	A2B3C2E2F2G1H2I2K2L2M2N2O2P2Q2S2T2V1	$54,420	0.8283	$65,701

To help understand how the alternatives were coded for each run and the resulting alternatives that were selected for the combined run, Table 29 below shows the alternatives and codes for each.

Table 29. Coding of Alternatives through CE/ICA Runs

Coast Fork Alternatives	Code	Middle Fork Alternatives	Code	Combined Run	Code
C1A Minimum	A1	M1A Minimum	A1	C1A Maximum	A1
C1A Maximum	A2	M1A Maximum	A2	C1B Maximum	B1
C1B Minimum	B1	M1B Minimum	B1	C1C Maximum	C1
C1B Maximum	B2	M1B MODERATE	B2	C1D Maximum	D1
C1C Minimum	C1	M1B Maximum	B3	C1G Maximum	E1
C1C Maximum	C2	M1D Minimum	C1	C2A Maximum	F1
C1D Minimum	D1	M1D Maximum	C2	C3A Maximum	G1
C1D Maximum	D2	M2A Minimum	E1	M1A Maximum	H1
C1E Maximum	E1	M2A Maximum	E2	M1B Maximum	I1
C1G Minimum	F1	M2B Minimum	F1	M1D Maximum	J1
C1G Maximum	F2	M2B Maximum	F2	M2A Minimum	K1
C2A Minimum	G1	M2C Maximum	G1	M2A Maximum	K2
C2A Maximum	G2	M2D Minimum	H1	M2B Maximum	L1
C2C Minimum	H1	M2D Maximum	H2	M2C Maximum	M1
C2C Maximum	H2	M2E Minimum	I1	M2D Maximum	N1
C2D Minimum	I1	M2E Maximum	I2	M2E Maximum	O1
C2D Maximum	I2	M2G Minimum	K1		
C2E Minimum	J1	M2G Maximum	K2		
C2E Maximum	J2	M3A Minimum	L1		
C3A Minimum	K1	M3A Maximum	L2		
C3A Maximum	K2	M4A Minimum	M1		
C3C Minimum	L1	M4A Maximum	M2		
C3C Maximum	L2	M4B Minimum	N1		
C3D Minimum	M1	M4B Maximum	N2		
C3D Maximum	M2	M4C Minimum	O1		
R1A Minimum	N1	M4C Maximum	O2		
R1A Maximum	N2	M4D Minimum	P1		
R1B Minimum	O1	M4D Maximum	P2		
R1B Maximum	O2	M4E Minimum	Q1		
		M4E Maximum	Q2		
		M4G Minimum	S1		
		M4G Maximum	S2		
		M5B Minimum	T1		
		M5B Maximum	T2		
		M5E Minimum	V1		
		M5E Maximum	V2		

Note: Highlighted alternatives were carried forward to the combined run.

Table 30. Combined Coast and Middle Fork CE/ICA Results

Names	Code	Scale
C1A MAX	A	1
C1B MAX	B	1
C1C MAX	C	1
C1D MAX	D	1
C1G MIN	E	1
C2A MAX	F	1
C3A MAX	G	1
M1A MAX	H	1
M1B MAX	I	1
M1D MAX	J	1
M2A MIN	K	1
M2A MAX	K	2
M2B MAX	L	1
M2C MAX	M	1
M2D MAX	N	1
M2E MAX	O	1

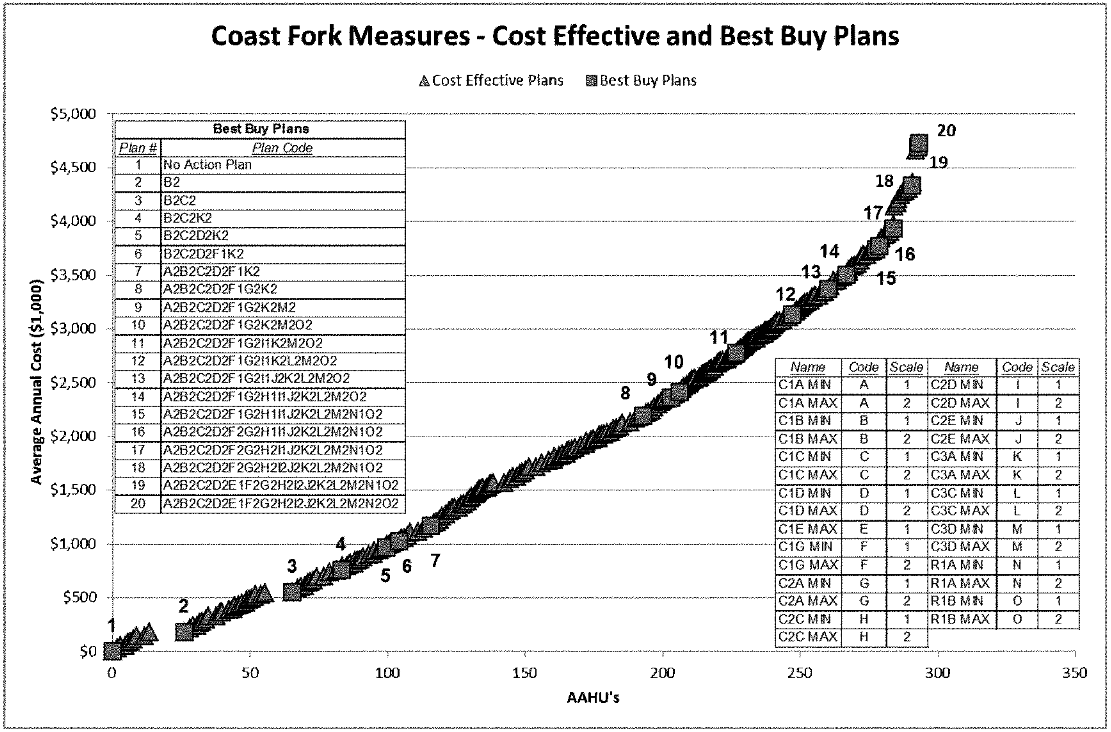
Codes for the combined Coast and Middle Fork CE/ICA run. All scales from each previous run with an incremental cost per output less than or equal to $15,000 are retained for the combined CE/CIA.

Best Buy Plans

Plan #	Plan Code	AACost	AAOutput	Inc Cost	Inc Out	Inc Cost / Inc Out
1	No Action Plan	$0	0.00	$0	0.00	$0
2	**B1**	$184,080	26.13	$184,080	26.13	$7,046
3	B1**H1**	$599,030	80.71	$414,950	54.58	$7,602
4	B1H1**I1**	$1,010,810	128.83	$411,780	48.12	$8,557
5	B1**C1**H1I1	$1,378,610	168.14	$367,800	39.31	$9,357
6	B1C1H1I1**K1**	$1,511,370	182.3	$132,760	14.16	$9,378
7	B1C1H1I1**J1**K1	$1,658,100	195.7	$146,730	13.4	$10,952
8	B1C1H1I1J1**K2**	$1,708,030	200.05	$49,930	4.35	$11,475
9	B1C1**G1**H1I1J1K2	$1,919,190	217.91	$211,160	17.86	$11,825
10	B1C1**D1**G1H1I1J1K2	$2,121,160	234.11	$201,970	16.20	$12,465
11	B1C1D1**E1**G1H1I1J1K2	$2,179,850	238.74	$58,690	4.63	$12,674
12	**A1**B1C1D1E1G1H1I1J1K2	$2,327,450	250.37	$147,600	11.63	$12,687
13	A1B1C1D1E1**F1**G1H1I1J1K2	$3,346,110	327.44	$1,018,660	77.07	$13,218
14	A1B1C1D1E1F1G1H1I1J1K2**O1**	$3,649,930	349.38	$303,820	21.94	$13,850
15	A1B1C1D1E1F1G1H1I1J1K2**N1**O1	$3,869,150	364.7	$219,220	15.32	$14,307
16	A1B1C1D1E1F1G1H1I1J1K2**L1**N1O1	$4,051,840	377.37	$182,690	12.67	$14,416
17	A1B1C1D1E1F1G1H1I1J1K2L1**M1**N1O1	$4,706,760	422.29	$654,920	44.92	$14,580

Table 31. Interest during Construction Calculation for Combined Run Best Buy Plans

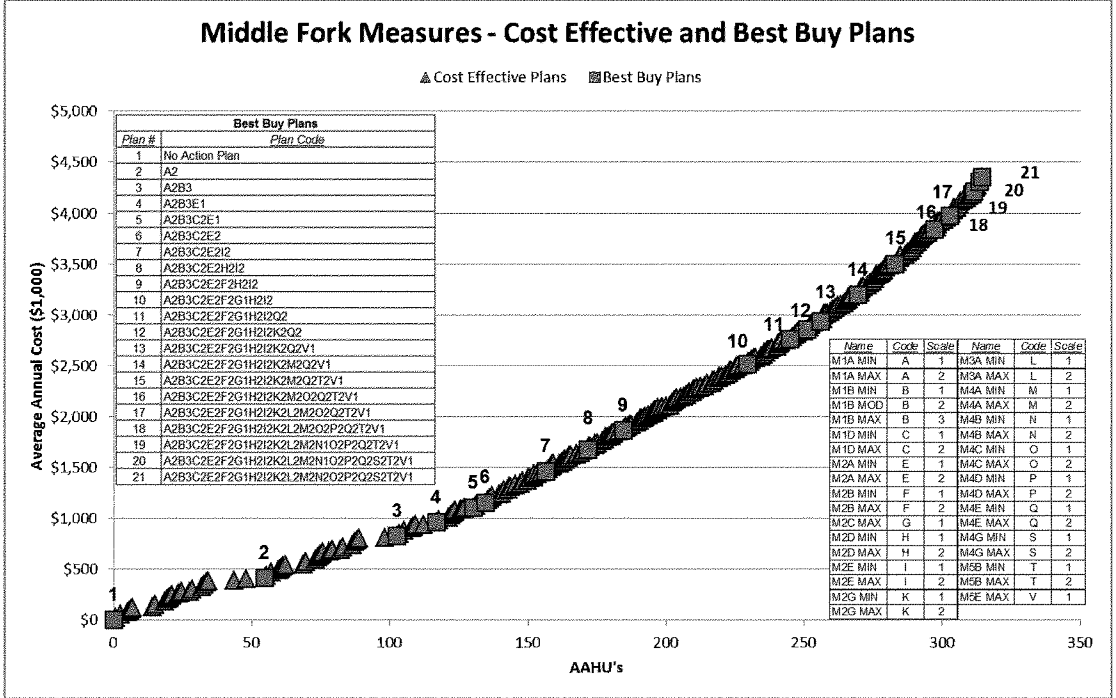
Best Buy Plan	IDC ($)	Annual IDC	Final Alt Cost (Annualized)	Final NPV
2	$25,495	$1,136	$185,216	$4,155,236
3	$82,965	$3,698	$602,728	$13,521,899
4	$139,996	$6,240	$1,017,050	$22,817,006
5	$190,936	$8,511	$1,387,121	$31,119,352
6	$209,323	$9,330	$1,520,700	$34,116,143
7	$209,323	$9,330	$1,667,430	$37,407,956
8	$236,560	$10,544	$1,718,574	$38,555,347
9	$265,805	$11,848	$1,931,038	$43,321,860
10	$293,778	$13,095	$2,134,255	$47,880,927
11	$301,906	$13,457	$2,193,307	$49,205,736
12	$322,349	$14,368	$2,341,818	$52,537,510
13	$463,432	$20,657	$3,366,767	$75,531,714
14	$505,510	$22,533	$3,672,463	$82,389,840
15	$535,872	$23,886	$3,893,036	$87,338,291
16	$561,174	$25,014	$4,076,854	$91,462,151
17	$651,880	$29,057	$4,735,817	$106,245,655



Best Buy Plans	
Plan #	*Plan Code*
1	No Action Plan
2	B2
3	B2C2
4	B2C2K2
5	B2C2D2K2
6	B2C2D2F1K2
7	A2B2C2D2F1K2
8	A2B2C2D2F1G2K2
9	A2B2C2D2F1G2K2M2
10	A2B2C2D2F1G2K2M2O2
11	A2B2C2D2F1G2I1K2M2O2
12	A2B2C2D2F1G2I1K2L2M2O2
13	A2B2C2D2F1G2I1J2K2L2M2O2
14	A2B2C2D2F1G2H1I1J2K2L2M2O2
15	A2B2C2D2F1G2H1I1J2K2L2M2N1O2
16	A2B2C2D2F2G2H1I1J2K2L2M2N1O2
17	A2B2C2D2F2G2H2I1J2K2L2M2N1O2
18	A2B2C2D2F2G2H2I2J2K2L2M2N1O2
19	A2B2C2D2E1F2G2H2I2J2K2L2M2N1O2
20	A2B2C2D2E1F2G2H2I2J2K2L2M2N2O2

Name	*Code*	*Scale*	*Name*	*Code*	*Scale*
C1A MIN	A	1	C2D MIN	I	1
C1A MAX	A	2	C2D MAX	I	2
C1B MIN	B	1	C2E MIN	J	1
C1B MAX	B	2	C2E MAX	J	2
C1C MIN	C	1	C3A MIN	K	1
C1C MAX	C	2	C3A MAX	K	2
C1D MIN	D	1	C3C MIN	L	1
C1D MAX	D	2	C3C MAX	L	2
C1E MAX	E	1	C3D MIN	M	1
C1G MIN	F	1	C3D MAX	M	2
C1G MAX	F	2	R1A MIN	N	1
C2A MIN	G	1	R1A MAX	N	2
C2A MAX	G	2	R1B MIN	O	1
C2C MIN	H	1	R1B MAX	O	2
C2C MAX	H	2			

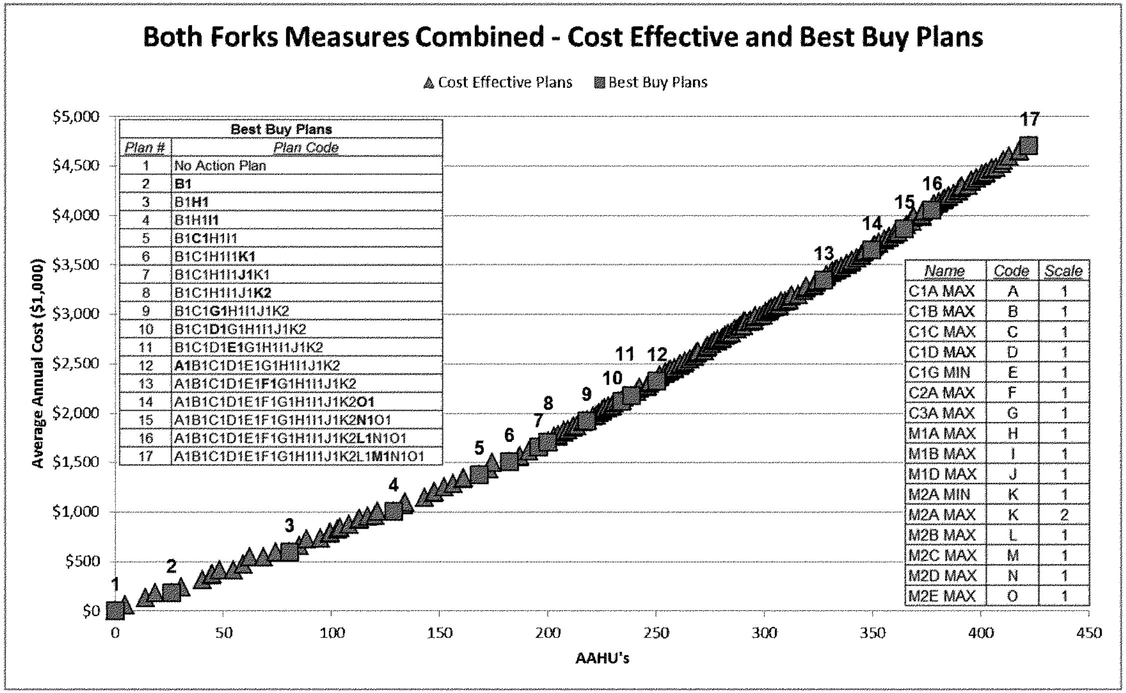
Figure 28. Cost Effective and Best Buy Plans Graph for Coast Fork Cost Effectiveness and Incremental Analysis



Best Buy Plans	
Plan #	*Plan Code*
1	No Action Plan
2	A2
3	A2B3
4	A2B3E1
5	A2B3C2E1
6	A2B3C2E2
7	A2B3C2E2I2
8	A2B3C2E2H2I2
9	A2B3C2E2F2H2I2
10	A2B3C2E2F2G1H2I2
11	A2B3C2E2F2G1H2I2Q2
12	A2B3C2E2F2G1H2I2K2Q2
13	A2B3C2E2F2G1H2I2K2Q2V1
14	A2B3C2E2F2G1H2I2K2M2Q2V1
15	A2B3C2E2F2G1H2I2K2M2Q2T2V1
16	A2B3C2E2F2G1H2I2K2M2O2Q2T2V1
17	A2B3C2E2F2G1H2I2K2L2M2O2Q2T2V1
18	A2B3C2E2F2G1H2I2K2L2M2O2P2Q2T2V1
19	A2B3C2E2F2G1H2I2K2L2M2N1O2P2Q2T2V1
20	A2B3C2E2F2G1H2I2K2L2M2N1O2P2Q2S2T2V1
21	A2B3C2E2F2G1H2I2K2L2M2N2O2P2Q2S2T2V1

Name	*Code*	*Scale*	*Name*	*Code*	*Scale*
M1A MIN	A	1	M3A MIN	L	1
M1A MAX	A	2	M3A MAX	L	2
M1B MIN	B	1	M4A MIN	M	1
M1B MOD	B	2	M4A MAX	M	2
M1B MAX	B	3	M4B MIN	N	1
M1D MIN	C	1	M4B MAX	N	2
M1D MAX	C	2	M4C MIN	O	1
M2A MIN	E	1	M4C MAX	O	2
M2A MAX	E	2	M4D MIN	P	1
M2B MIN	F	1	M4D MAX	P	2
M2B MAX	F	2	M4E MIN	Q	1
M2C MAX	G	1	M4E MAX	Q	2
M2D MIN	H	1	M4G MIN	S	1
M2D MAX	H	2	M4G MAX	S	2
M2E MIN	I	1	M5B MIN	T	1
M2E MAX	I	2	M5B MAX	T	2
M2G MIN	K	1	M5E MAX	V	1
M2G MAX	K	2			

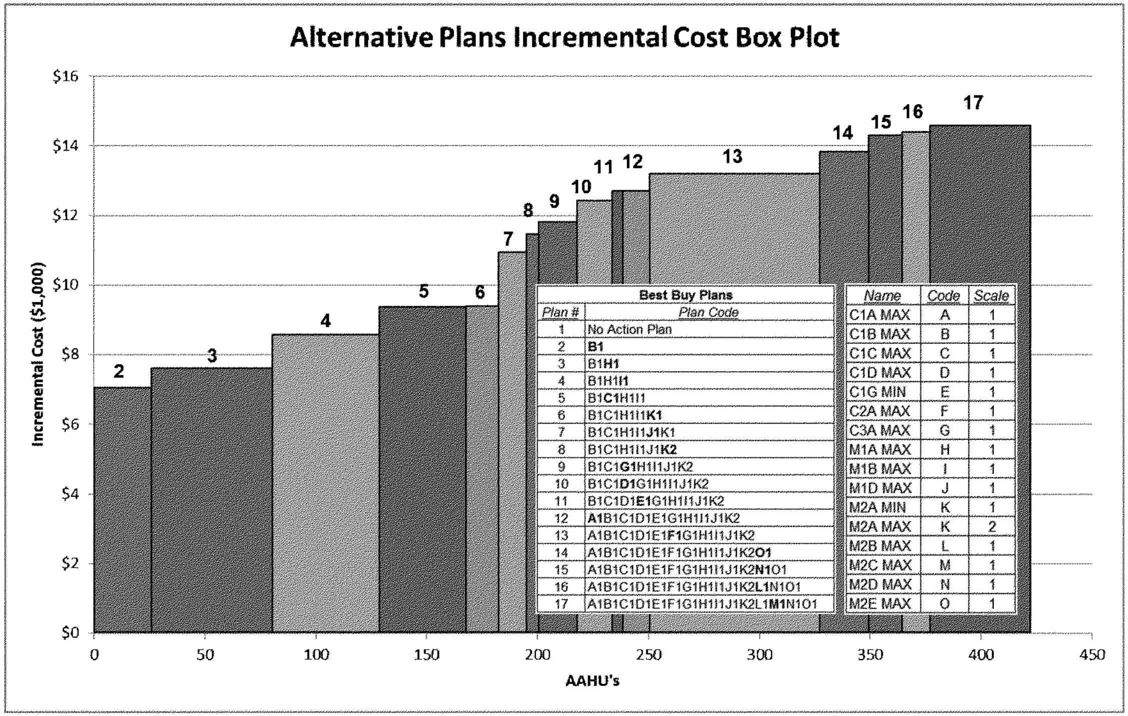
Figure 29. Cost Effective and Best Buy Plans for Middle Fork Cost Effectiveness Analysis



Best Buy Plans	
Plan #	*Plan Code*
1	No Action Plan
2	**B1**
3	B1**H1**
4	B1H1**I1**
5	B1**C1**H1I1
6	B1C1H1I1**K1**
7	B1C1H1I1**J1**K1
8	B1C1H1I1J1**K2**
9	B1C1**G1**H1I1J1K2
10	B1C1**D1**G1H1I1J1K2
11	B1C1D1**E1**G1H1I1J1K2
12	**A1**B1C1D1E1G1H1I1J1K2
13	A1B1C1D1E1**F1**G1H1I1J1K2
14	A1B1C1D1E1F1G1H1I1J1K2**O1**
15	A1B1C1D1E1F1G1H1I1J1K2**N1**O1
16	A1B1C1D1E1F1G1H1I1J1K2**L1**N1O1
17	A1B1C1D1E1F1G1H1I1J1K2L1**M1**N1O1

Name	*Code*	*Scale*
C1A MAX	A	1
C1B MAX	B	1
C1C MAX	C	1
C1D MAX	D	1
C1G MIN	E	1
C2A MAX	F	1
C3A MAX	G	1
M1A MAX	H	1
M1B MAX	I	1
M1D MAX	J	1
M2A MIN	K	1
M2A MAX	K	2
M2B MAX	L	1
M2C MAX	M	1
M2D MAX	N	1
M2E MAX	O	1

Figure 30. Combined Coast and Middle Fork Cost Effectiveness Analysis Graph



Best Buy Plans	
Plan #	*Plan Code*
1	No Action Plan
2	**B1**
3	B1**H1**
4	B1H1**I1**
5	B1**C1**H1I1
6	B1C1H1I1**K1**
7	B1C1H1I1**J1**K1
8	B1C1H1I1J1**K2**
9	B1C1**G1**H1I1J1K2
10	B1C1**D1**G1H1I1J1K2
11	B1C1D1**E1**G1H1I1J1K2
12	**A1**B1C1D1E1G1H1I1J1K2
13	A1B1C1D1E1**F1**G1H1I1J1K2
14	A1B1C1D1E1F1G1H1I1J1K2**O1**
15	A1B1C1D1E1F1G1H1I1J1K2**N1**O1
16	A1B1C1D1E1F1G1H1I1J1K2**L1**N1O1
17	A1B1C1D1E1F1G1H1I1J1K2L1**M1**N1O1

Name	*Code*	*Scale*
C1A MAX	A	1
C1B MAX	B	1
C1C MAX	C	1
C1D MAX	D	1
C1G MIN	E	1
C2A MAX	F	1
C3A MAX	G	1
M1A MAX	H	1
M1B MAX	I	1
M1D MAX	J	1
M2A MIN	K	1
M2A MAX	K	2
M2B MAX	L	1
M2C MAX	M	1
M2D MAX	N	1
M2E MAX	O	1

Figure 31. Combined Coast and Middle Fork Incremental Analysis Box Plot

5.5.6 Guide to Interpreting Results

As discussed in Section 5.5, an initial run was done of the CE/ICA to get a sense of the top 15 ranked project sites and alternatives. Following this initial evaluation, a number of sites were screened in coordination with the project team and local stakeholders and landowners. In addition, due to the maximum of 26 alternatives that can be run using the IWR-Plan software, the sites were further screened to eliminate all those projects that cost more than $50,000 per AAHU[4]. This screening of sites based on cost per unit does not affect plan formulation or selection because these costly alternatives would have been included only in those alternatives far to the right on each graph, and well beyond the local sponsor's cost share capability constraints. Thus, these sites were pre-screened to make the software analysis more expedient. The following discusses the final CE/ICA results presented in Figure 31.

The data points on the graph in Figure 31 are sequential per the plan number shown in the corresponding best buy code table. For example, in Figure 31, the third best buy point is Plan 4; the corresponding combination includes C1B Maximum, M1A Maximum, and M1B Maximum.

The selection of the recommended plan should be based on an evaluation of what benefits are worth what cost? There is no precise selection criterion that identifies the optimal restoration plan. Instead the project team must consider the results of the CE/ICA, comparing the successive levels of output and their cost and determining which levels are worth their added cost. Flatter sloped portions of the incremental cost curves indicate more increase in output and lower increase in cost than more steeply sloped potions of the curves. As the slope gets steeper and higher, increased scrutiny of, and justification for such a recommendation is in order. Because the non-Federal sponsor cannot cost-share beyond a total cost of $40-50 million (not including O&M), this criterion will be used in selecting the recommended plan.

Moving sequentially from the first plan, Plan 2, this plan provides an average annual output of 26.1 AAHUs at an incremental cost per output of $7,046. Plan 3 provides substantially more output (80.7 cumulative AAHUs) at an incremental cost per output of $7,602. Plan 4 also provides substantially more output (128.8 cumulative AAHUs) at an incremental cost per output of $8,557. Plan 3 is the first obvious break point with a net present value cost of $13,439,000. As this is below the non-Federal sponsor's cost-sharing limit, they are interested in considering more expensive plans. Plan 4 is the second obvious break point and also provides a substantial increase in output with a net present value cost of $22,677,000. Moving on to Plan 5 provides a moderate increase in output (168.1 cumulative AAHUs) at a moderate increase in incremental cost of $9,357. Plan 6 is the third obvious break point that provides more output (182.3 cumulative AAHUs) at virtually no increase in incremental cost per output at $9,378 and with a net present value cost of $33,907,000.

Moving to more costly plans than Plan 6 provide fairly small increases in output for both small and moderate increases in incremental cost per out up until Plan 13, which is the fourth obvious break

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[4] The projects not included that cost more than $50,000 per AAHU include M1C Minimum and Maximum, M2C Minimum, M2F Maximum, and M4F Maximum. If cost were no object, the maximum scale projects would likely have been included as cost effective at the end of the graph after all other cost effective measures were cumulatively added. Site M1C was the installation of multiple ELJs in Reach M1, which could have provided substantial benefits to salmonids, but was of lesser benefit to other species for the cost. Site M2F included excavation/reconnection of a long side channel in Reach M2, but the substantial excavation costs outweighed the potential benefits. Site M4F included excavation of a side-channel between the Middle Fork and Fall Creek, and had similar high excavation and also real estate costs that outweighed the potential benefits.

point, where there is a substantial increase in output (327.4 cumulative AAHUs) for an incremental cost per output of $13,218 and with a net present value cost of $75,068,000. Beyond Plan 13, the final break point is the most costly best buy plan, Plan 17, with an incremental cost per output of $14,580 and a net present value cost of $105,594,000. The NER plan was determined to be Plan 13, which would include restoration at 11 sites and in addition to the restoration of gravel mined floodplains would also include the removal of two Corps' revetments, installation of more ELJs, and reconnections to several side-channels to meet the project objectives of restoring channel complexity and diversity, increasing connection between the rivers and floodplains, and restoring native floodplain habitats. However, due to the cost-sharing limitations of the non-Federal sponsor and the potential difficulties of de-authorizing Corps revetments, Plan 6 is selected as the locally preferred plan and the recommended plan. The recommended plan is a reduction in scope, is cost effective, and meets all the objectives of the study.

After identifying the tentatively recommended plan, further discussions were conducted with the stakeholders. Plan 6 that includes 5 projects was agreed to as a reasonable plan based on the total cost and number of projects distributed fairly equally in both the Coast and Middle Forks and focused on the confluence area that is considered the highest priority for restoration by numerous stakeholders. The project team has conducted outreach with all of the affected landowners to ensure that these projects could be implemented. The project alternatives were developed with consideration to potential floodplain and habitat benefit as the primary consideration, and not whether the site was "available." This was done because the objectives of this study are to restore floodplain functions to these watersheds. Developing project alternatives only based on what is currently "available" does not tend to adequately provide for the restoration of natural processes, and tends to provide only small areas of fragmented habitat that is less beneficial on a watershed scale.

Table 32, below, shows the project sites included in the recommended plan, Plan 6. Selection of this plan was made with the non-Federal sponsor based on their ability to cost-share the total project cost and because these projects provided substantial restoration benefits in the highest priority reaches (C1, M1, and M2) and on the largest undeveloped sites that would reconnect substantial areas of off-channel and floodplain aquatic habitats. More expensive plans could not be cost-shared by the non-Federal sponsor. All of the sites in the recommended plan have been subjected to some level of mineral extraction (gravel mining) in the past and while they are currently highly degraded, they also provide the best opportunities for substantial restoration of floodplain habitats. Average preliminary costs per acre for the recommended restoration plan are approximately $60,000 per acre (including net present value of O&M in preliminary costs). Average annual cost per habitat unit is approximately $8,000 (including net present value of O&M).

Table 32. Alternatives Included in the Recommended Plan (Plan 6)

ICA Code	Project ID	Landownership	Acres	Cumulative AAHUs
B1	C1B	Lane County/ OR State Parks	86	26.1
H1	M1A	The Nature Conservancy	147	80.7
I1	M1B	The Nature Conservancy	170	128.8
C1	C1C	The Nature Conservancy	114	168.1
K1	M2A	The Nature Conservancy	68	182.3

5.6 RECOMMENDED RESTORATION PLAN

The sites included in Plan 6 are selected as the recommended plan and are carried forward for feasibility level designs. The recommended restoration plan will result in a plan with a total increase of 182.3 habitat units and restoration of 574 acres of floodplain[5]. The primary measures proposed at each site are identified below. More details on the effects of the recommended plan are provided in Sections 6 and 7.

Site C1B. This site is currently owned by Lane County and Oregon State Parks. The restoration plan at this site will be to restore and connect the gravel mined ponds to the Coast Fork. Pond banks will be regraded to smooth out and flatten the slopes, additional fill material piled on site will be regraded into the ponds to provide more shallow water, invasive species will be removed/controlled, native riparian and wetland species will be planted throughout the site, large wood will be placed in the floodplain and ponds, channels will be excavated to connect the ponds to each other and then to the Coast Fork and one ELJ will be installed on an island/bar in the channel to promote split channel flows. Connector channels will include culvert crossings to maintain existing access.

Site M1A. This site is owned primarily by The Nature Conservancy. The restoration plan at this site will be to restore and connect the gravel mined ponds to the Middle Fork. Pond banks will be regraded to smooth out and flatten the slopes, debris will be removed from the site, additional fill material piled on site will be regraded into the ponds to provide more shallow water, invasive species such as blackberries will be removed/controlled, native riparian and wetland species will be planted throughout the site, large wood will be placed in the floodplain and ponds, and channels will be excavated to connect the ponds to each other and then to the Middle Fork.

Site M1B. This site is owned primarily by The Nature Conservancy. The restoration plan at this site will be to restore and connect the large gravel mined ponds to the Middle Fork. Pond banks will be regraded to smooth out and flatten the slopes, debris will be removed from the site, additional fill material piled on site will be regraded into the ponds to provide more shallow water, invasive species such as blackberries will be removed/controlled, native riparian and wetland species will be planted throughout the site, large wood will be placed in the floodplain and ponds, and overflow

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[5] Area of recommended restoration plan was revised during 35 percent design to eliminate small areas of private parcels, thus total acreage slightly decreased from 585 to 574 acres.

channels will be excavated to connect the ponds to each other and to both the Coast (high flows only) and Middle Fork.

Site C1C. This site is owned primarily by The Nature Conservancy. The restoration plan at this site will be to restore and connect the gravel mined ponds to the Coast Fork. Pond banks will be regraded to smooth out and flatten the slopes, debris will be removed from the site, additional fill material piled on site will be regraded into the ponds to provide more shallow water, invasive species such as blackberries will be removed/controlled, native riparian and wetland species will be planted throughout the site, large wood will be placed in the floodplain and ponds, channels will be excavated to connect the ponds at both the upstream and downstream ends to the Coast Fork, and two ELJS will be installed to promote channel migration onto the site.

Site M2A. This site is owned by The Nature Conservancy. The restoration plan at this site will be to remove and control invasive species such as blackberries and aquatic weeds, native riparian and wetland species will be planted to enhance the riparian and floodplain habitats, and large wood will be placed in the floodplain.

5.7 SIGNIFICANCE OF THE RECOMMENDED PLAN

The recommended plan will provide 574 acres of restored and reconnected floodplain in the Coast and Middle Forks subbasins. This will provide essential rearing and refuge habitats for multiple listed fish and wildlife species and species of concern that occur in the subbasins and contribute towards their recovery. Of primary focus are the species included in the HEP analysis: salmonid species including the listed Upper Willamette Chinook and steelhead, cutthroat trout, Oregon chub, Western pond turtle, riparian dependent wildlife such as beaver and wood duck, Neotropical migratory song birds such as yellow warbler, native amphibians, and raptors. Specifically, the types of improvements that this project will make to their habitats include provision of fish access to off-channel habitats, improvements in quality to the off-channel habitats including provision of more suitable off-channel water depths that vary naturally with the seasons (deeper depths in winter, shallower water in summer), improvements in cover and shading, increases in large wood and small woody debris, removal of invasive species and revegetation with native species, and interspersion of habitat types. This project will also contribute to the restoration of natural riverine processes including channel migration and the recruitment of large woody debris over time as the riparian vegetation grows and matures. At the confluence of the Coast and Middle Forks this project will stimulate the formation of natural habitats along nearly 3 miles of river (1 mile on the Coast Fork and 2 miles on the Middle Fork), such as pools, riffles, alcoves and side channels.

The large stakeholder group that has been participating in this study (Table 1) has supported the goals and objectives of the study throughout the feasibility phase. Key agencies, including the National Oceanic and Atmospheric Administration (NOAA), USFWS, EPA, BPA, ODFW, and others are looking to this project to provide a substantial amount of floodplain habitat and process restoration. This project, as proposed, would provide one of the largest floodplain restoration projects in the State of Oregon and contribute towards the recovery of sensitive species.

5.7.1 Institutional Significance

Institutional recognition is based on the significance of resources acknowledged in laws, adopted plans and policy statements by agencies both public and private. The formal recognition of the

Willamette River by multiple agencies illustrates the significance of the resources. The plans and programs listed in Section 2 demonstrate the significance of the resources to multiple agencies. Of particular importance is the *Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead* (ODFW 2011) that lays out strategies for the recovery of listed Upper Willamette River Chinook salmon and steelhead trout. Reconnection of floodplain habitats is one of the primary methods to assist in recovery.

This project will restore and reconnect off-channel and floodplain habitats for several species listed under the ESA, including Upper Willamette River Chinook salmon (threatened), bull trout (threatened), Oregon chub (threatened), and Oregon spotted frog (candidate). The project will improve habitat designated as critical habitat for these species and contribute towards their recovery. In addition, this project will restore suitable floodplain and riparian habitats for species of concern identified by the USFWS, including Western pond turtle, Northern red legged frog, and Pacific lamprey. This project will also contribute towards meeting key objectives of the Willamette Subbasin Plan (NPCC 2004) developed as part of Phase 1 of this study, but involving multiple federal, state, regional, and local agencies to set priorities for fish and wildlife conservation throughout the basin. Key aquatic habitat strategies that this project will address include: 1) increase interaction of rivers and floodplains; 2) increase supply and recruitment of large wood by improving riparian composition and extent and providing for flows to capture wood; and 3) control the most damaging terrestrial and aquatic invasive species (NPCC 2004a).

5.7.2 Public Significance

Public recognition means that some segment of the public either individually or as a group recognizes the importance of an environmental resource. The Willamette River valley hosts 70 percent of the state of Oregon's population and has strong citizen involvement in the uses and activities of the river. The Willamette River is one of ten rivers included in the Sustainable Rivers Project between the Corps and The Nature Conservancy.

Collaboration with the public through the watershed councils and other public outreach organizations, such as The Friends of Buford Park, has been conducted throughout the feasibility study. This project is supported by those organizations and their members. This feasibility study provided technical documentation to The Nature Conservancy on the potentially significant restoration need and value at the confluence of the Coast and Middle Forks and was a key driver for their fundraising and purchase of the confluence property supported by their large public membership.

5.7.3 Technical Significance

Technical recognition is determined through review of relevant published and non-published literature and documents. Numerous scientific analyses and long-term studies through Oregon State University and the University of Oregon have documented the significance of the resources in the Willamette River Basin, of which the *Willamette Basin Planning Atlas* demonstrates the resources that have been lost, while laying out scenarios to guide future development while restoring natural resources.

The recommended plan will restore connectivity between both the Coast and Middle Forks and their floodplain habitats which is a key component of natural floodplain processes that have been significantly altered by the presence and operation of upstream dams, revetments, land use and infrastructure. The recommended plan will restore a large contiguous block of floodplain habitat in a critical river confluence area that was historically highly dynamic with numerous side channels, overflow channels, and a diversity of plant communities. This plan will allow this dynamism to be restored as possible within the context of existing dams and flows, and will restore the diversity of habitats and plant communities appropriate for the site and allow natural formation of habitats to continue over the long-term.

5.8 PLANNING GUIDANCE CRITERIA

Per ER 1105-2-100, recommended plans should be evaluated for completeness, effectiveness, efficiency, and acceptability. The recommended plan can be implemented as a stand-alone restoration project and is not dependent on actions by other agencies or stakeholders. It will function in perpetuity and allow the natural formation of riverine, riparian, and floodplain habitats. The recommended plan includes restoration measures that have been successfully implemented in multiple locations throughout the Pacific Northwest for salmon restoration and have been demonstrated to be effective. Restoration and connections of gravel mined ponds has been conducted in several locations such as along the mainstem Willamette River (Eugene Delta Ponds, Harrisburg, etc.) and on the Washougal and Lewis Rivers in Washington. When gravel mined ponds are less than 25 feet in depth (as all are sites in this recommended plan), it is feasible to regrade and reshape the shorelines to provide shallow water habitat, fringing wetlands, and riparian areas and also reduce the potential for river "capture." That is the intent for this project and has been shown to be effective elsewhere.

5.8.1 Acceptability

An ecosystem restoration plan should be acceptable to State and Federal resource agencies, local governments and stakeholders in the area. There should be evidence of broad based public consensus and support for the plan. A recommended plan must be acceptable to the non-Federal cost-sharing partner. However, this does not mean that the recommended plan must be the locally preferred plan. The recommended plan meets all of the project objectives, including: 1) restores channel complexity and diversity; 2) restores the connectivity of the river to floodplain and off-channel habitats; 3) restores and enhances the floodplain habitats (including riparian and wetland habitats); 4) reduces invasive non-native species, primarily plant species such as reed canary grass and blackberries; 5) contribute to a reduction in water temperatures to meet native species needs by providing more effective connections to the river, shading, and groundwater recharge; and 6) contribute to a reduction in bacteria and nutrient loading by providing improved riparian buffers and provide more frequent connections to floodplain habitats that provide nutrient and sediment deposition opportunities during storm events. The recommended plan meets these objectives, while simultaneously does not cause adverse effects to existing wetland habitats and is constructible. The numerous stakeholders listed in Table 1 have expressed support for the recommended plan.

5.8.2 Completeness

A plan must provide and account for all necessary investments or other actions needed to ensure the realization of the planned restoration outputs. This may require relating the plan to other types of public or private plans if these plans are crucial to the outcome of the restoration objective. Real estate, O&M, monitoring, and sponsorship factors must be considered. Where there is uncertainty concerning the functioning of certain restoration features and an adaptive management plan has been proposed it must be accounted for in the plan. The recommended plan will realize the predicted habitat outputs by providing the complete mix of measures that ensures that hydrologic, fish passage, wildlife, and vegetation objectives are met. O&M will be required, but is primarily focused on the first 5 years after implementation and conducting invasive species removal/control efforts and replanting as appropriate. This is to ensure that invasive non-native species are controlled for the long-term and do not reoccupy the majority of the floodplain as they currently do. Experience by many entities in the basin has indicated that maintenance efforts for up to 5 years is appropriate to ensure such invasive species are adequately controlled. Once the native vegetation can become established and start to provide shading of the understory, invasive species become reduced in vigor and spread. Temporary controls such as mowing and spot application of herbicide to the invasives are necessary, however, for native species to become fully established. Also, it is typical in most revegetation efforts that some replanting is necessary as not all planted stock survives. Once a plant has survived 1-2 years, it can typically then persist and grow suitably over time. It is not intended that the ELJs or other large wood will be replaced or maintained as it is being installed to provide up to 25 years of cover and habitat formation until the riparian zone can begin to mature and start naturally recruiting large and small wood to the river system. Channel openings will be monitored, but are expected to be sustainable because they are primarily backwater connections. Geomorphic conditions are described further in Section 7.

5.8.3 Efficiency

An ecosystem restoration plan must represent a cost effective means of addressing the restoration problem or opportunity. It must be determined that the plan's restoration outputs cannot be produced more cost effectively by another agency or institution. The recommended plan will provide substantial benefits at a reasonable cost. These benefits cannot be realized more effectively by the local sponsor or other stakeholders because they do not have the funds to construct the primary elements of the project that restore floodplain connections and promote in-channel diversity, namely the grading and channel features and ELJs. Also, while small-scale riparian revegetation has been occurring by many entities, providing nearly 600 acres of revegetation on the highly disturbed sites in the recommended plan is well beyond local entities financial capabilities.

5.8.4 Effectiveness

An ecosystem restoration plan must make a significant contribution to addressing the specified restoration problems or opportunities. As identified above under acceptability, the recommended plan will contribute substantially towards the six primary objectives of the study. The types of restoration measures proposed have been used in many locations and shown to be effective, including providing access to off-channel habitats, installation of ELJs, and riparian restoration.

5.9 OTHER EVALUATION ACCOUNTS

The Planning Guidance Manual requires evaluation of alternatives according to several evaluation accounts including the National Economic Development (NED), Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE). Ecosystem restoration projects are also evaluated for National Ecosystem Restoration (NER) benefits. The plans formulated and evaluated for this project were all developed to provide ecosystem restoration benefits. There is no evaluation for a NED or RED plan as benefits are not monetized and no measurable economic benefits would accrue. Table 33, below compares the economic costs and benefits from the NER plan and LPP and then also provides the final recommended plan economic costs.

Table 33. NER and LPP Costs and Benefits Comparison.

Criteria	No Action	NER Plan (Plan 13) Preliminary Costs	LPP (Plan 6) Preliminary Costs	Updated Recommended Plan (LPP) Costs[1]
National Ecosystem Restoration (NER) Assessment				
Total Cost	$0	$75,531,714	$34,116,143	$42,155,000
Annual Cost	$0	$3,346,110	$1,511,370	$1,879,000
Annualized O&M Cost	$0	$299,000	$150,000	$150,000
Real Estate Percentage of Cost	0	25%	30%	1%
Net Gain in AAHUs	0	327.4	182.3	182.3
Incremental Cost/AAHU	0	$13,218	$9,378	N/A
% Increase in AAHU vs. No Action	0	57%	77%	77%

[1] – Updated costs use final costs from Chapter 6 as compared to the preliminary costs used in the CE/ICA and comparison of alternatives.

Environmental quality is described as favorable or unfavorable changes in the ecological, aesthetic, and cultural attributes of the study area natural and cultural resources. The potential environmental effects of the alternatives are described in Chapter 7. The effects of the LPP Plan and the NER Plan are substantially similar, just larger for the NER Plan.

Other social effects describes the potential effects of project alternatives in other areas not explicitly in the other accounts. This would include effects on the community, health and safety, displacement, energy conservation, environmental justice, and other non-monetary effects. The LPP and the NER plans would have substantially similar effects. Other social effects are summarized briefly by a variety of categories, below, but generally result in no measureable changes to other social considerations.

- Displacement/Impacts to Residences – There would be no displacement effects on residences as none of the alternatives considered would require removing any residences from the floodplain. In locations where new side channels are considered, culvert crossings would be provided to maintain access to any residences.
- Displacement/Impacts to Minority or Low Income Populations – There would be no displacement effects on minority or low income populations as none of the alternatives considered would remove existing structures or residences. There are some homeless people that periodically camp on Site C1B without permission from the landowners. Under both the No Action and restoration alternatives, the landowners intend to reduce this use, thus all alternatives would likely reduce homeless use of Site C1B.
- Public Health and Safety – There would be very minor benefits to public health and safety under both the LPP and NER plans as a result of removal of debris and trash from the sites. The No Action alternative would maintain the existing condition with debris and trash on some sites. The installation of engineered log jams in the river will be designed to avoid

effects to public health and safety (i.e. by positioning to allow boaters to get around the feature and not leaving sweeper logs, branches, etc. that could snag boaters).

- Displacement/Impacts to Businesses – There would be no displacement or other effects on businesses as none of the alternatives considered would be located on parcels with businesses and the project is designed to not increase the flood water surface elevations of the rivers.
- Displacement/Impacts to Recreation – Recreational use occurs on some of the sites considered. Under the No Action alternative, some changes in recreational use are likely to occur, particularly at Site C1B, where the landowners will be reducing uncontrolled use and planning for more controlled passive public uses of the site. With any of the restoration alternatives considered, the project would not change any recreational uses, but maintain existing compatible recreational uses per landowner request.
- Community Growth – There would be continued community growth under the No Action and restoration alternatives, but this growth is not related to any action. The restoration of floodplain habitats would have incremental benefits to the community and future development by maintaining floodplain areas for flood storage and attenuation.
- Community Well Being – The No Action alternative would not change community well-being. The restoration alternatives would provide restored floodplain habitats, some of which would be publicly accessible, that could provide improved educational opportunities and also fishing opportunities.
- Aesthetics – The No Action alternative would not change existing aesthetics, including unrestored gravel mined ponds, debris, and invasive species. The restoration alternatives would restore and reclaim the gravel mined ponds to more natural looking riparian and wetland habitats.

5.10 SENSITIVITY OF FEDERAL DISCOUNT RATE

As discussed previously, the discount rate for amortization of costs in ecosystem restoration projects is dictated each year by USACE guidance. The following sensitivity analysis shows that plan selection is not substantially affected by change in the discount rate. Public Law 93-251 dictates that the discount rate published for use may not change by more than 0.25% per fiscal year. Thus, the most the discount rate could change over a five year period would be plus or minus 1.25%. A change in discount rate would affect O&M amortization over the period of analysis, as well as the calculation of interest during construction. In general, a higher discount rate would result in a lower present value total cost (because O&M and IDC are discounted more heavily), and a lower discount rate would result in a higher present value total cost (because O&M and IDC in the future is discounted less).

The present value cost of the recommended plan was $33,907,000 at the FY13 discount rate of 3.75%. Assuming an increase of 1.25% in the rate to 5%, the present value cost of the recommended plan would increase by about 1.7% or $576,419. The study team judged the recommended plan to be a worthwhile investment at $33,907,000, and it judged that the plan would still be worthwhile if decreased by 1.7%. Assuming a decrease of 1.25% in rate to 2.5%, the present value cost of the recommended plan would decrease by about 2.4% or $813,768. The study team judged the recommended plan to be worthwhile at $33,907,000, and it judges that the plan would still be worthwhile if cheaper by 2.4%.

Because the O&M schedules and construction schedule assumptions are relatively similar across alternatives, the effects of a different discount rate are not sufficient to cause a change in the selected plan.

6. RECOMMENDED RESTORATION PLAN

6.1 DESIGN FEATURES

The overall project includes the development of several design features that are included in the five proposed restoration sites. Each restoration site includes a unique combination of design features and quantities. The design elements are detailed below, and the 35 percent design drawings are provided in Appendix F.

6.1.1 Clearing

Clearing includes the removal of large rocks, boulders and debris from land for access and in advance of vegetative restoration. This item does not include removal of invasive vegetation (see Section 6.1.2).

Clearing will be accomplished by hydraulic excavators, dozers, front end loaders, and dump trucks. Unusable rocks and debris will be removed to an off-site landfill or reuse site.

6.1.2 Removal of Invasive Vegetation

The plan for removing and controlling invasive species is that they will be reduced and controlled sufficiently too allow planted native vegetation to compete to establish a dominant community in subsequent growing seasons (see Section 6.1.13). They key invasive plant species present include blackberries (*Rubus* sp.), Scotch broom (*Cytisus scoparius*), knotweed (*Polygonum* sp.), reed canary grass (*Phalaris arundinaceae*), purple loosestrife (*Lythrum salicaria*), Eurasian and Brazilian milfoil (*Myriophyllum* sp.), Brazilian elodea (*Egeria densa*), and the potential for future invasion by Ludwigia (*Ludwigia hexapetala*) that is present in high concentrations in other locations of Eugene. Key invasive fish species include carp, brown bullhead, largemouth bass, western mosquito fish, and other warmwater species. Key invasive herptiles include bullfrog and snapping turtle (only one has been observed). Invasive invertebrates are not confirmed, as yet.

Hand labor and small equipment will be used to cut and/or pull to remove invasive vegetation. Spot application of herbicide is appropriate after cutting to kill or reduce the vigor of the invasive plant stems, while also minimizing any potential for spills or over-application. The removed vegetation will be disposed of off-site, such as at a compost facility, or chipped and composted on-site. It is expected that this would occur prior to planting, and then maintenance to continue to cut and/or apply herbicide to the invasive species would be conducted for three to five years following construction.

6.1.3 Excavation

Excavation is the removal of earth for the development of side channels and pond connections and/or to regrade bank slopes or disturbed floodplain areas to provide a better planting surface (see 6.1.4: Construction of side channels and pond re-connections). Excavation limits are determined by the design details at each restoration site. Two sites – M1A and M1B – include excavation and regrading or reuse of previously-placed piles of fill or debris in the floodplain (these piles include windrows of top soil removed prior to gravel mining operations as well as piles of cobbles and other material excavated during the gravel mining operations).

Excavation will be accomplished by hydraulic excavators, dozers, front end loaders and dump trucks. Excavated materials will be placed at both on-site and off-site disposal locations. Care and diversion of water will be needed for excavations that are in or adjacent to water. This will be accomplished by placement and maintenance of temporary coffer dams and pumps. Best management practices for erosion control will be placed and maintained to avoid excessive turbidity in adjacent waterways. Work will generally be accomplished isolated from the rivers, with final connections made during the allowed in-water work windows (coordination with ODFW will be required to determine site-specific in-water work windows).

6.1.4 Construction of Side Channels and Gravel Pond Connections

Side channel construction involves the placement of one or more of the following: channel bed material, bank stabilization measures, streambank vegetation restoration, and riparian vegetation restoration. Bed material is typically a well graded mix of fine material and gravel and cobbles either imported from off-site sources or from suitable material on-site. Channel invert grades are designed to provide a backwater connection during the typical winter/spring flows (November to June) at the channel outlets, so grade control measures are unnecessary. Bank stabilization is accomplished using vegetation, large woody debris and root wads, and fabric as necessary. Bank and riparian restoration will include the planting of local, native vegetation species.

Connecting previously mined gravel ponds to the Coast or Middle Forks is a relatively new restoration design concept. Some stakeholders are concerned about the potential for the ponds to "capture" the river if the ponds are very deep (i.e., 50 feet and greater). Gravel mined ponds further upstream on the Middle Fork did capture the river in the 1996 flood event, but now provide a highly braided channel system and a few deep pools to the river. None of the ponds proposed in this project are deeper than 25 feet, and are typically 6-15 feet in depth.

Pond connections include the elements of side channel construction, but are typically shorter because they will be designed to achieve a backwater connection or connections between ponds using existing topographic features (following overflow channels or other existing channels), and may not typically include riparian restoration features if an existing overflow channel is simply widened and/or deepened. No frequent flow-through channels are included; some high-flow connection channels will be excavated to allow connections above a 2-year event. These channels will include roughness features to slow velocities and minimize the potential for river capture. All of the proposed pond connections will connect ponds that are within the 100-year floodplain to their respective rivers. These sites were all inundated during the 1996 flood event, but did not experience avulsions. Some sites already have partial connections below the 2-year flow, including C1C and M2A. The existing connections at site C1C will be enhanced for frequent accessibility by fish.

Construction of the side channel and pond connection habitat elements will be staged to follow clearing and excavation. Bed material will be placed with excavators, front end loaders, and dump trucks. Large woody debris, root wads, and native rock materials will be placed by using a combination of machines and hand labor. Streambank and riparian vegetative plantings will be accomplished using hand labor during the fall after other construction activities are complete.

6.1.5 Concrete and Debris Removal

In its existing state, Site M1B includes a berm that is protected on its river-side by a privately installed revetment of miscellaneous debris and rock. This berm was created to separate a large gravel mined pond from the river during the mining operations. The M1B design includes partial removal of this private (non-Corps) revetment and replacement with wood and rock, as appropriate. Debris present on M1A and M1B would be removed as appropriate.

The existing concrete and debris will be removed using excavators, dump trucks, small equipment and hand labor. The debris will be disposed of or recycled off-site.

6.1.6 Engineered Log Jam Construction

Engineered log jams are large wood structures designed to withstand 100-year flows and provide fairly long-term (i.e., 25 years or more) stable elements of habitat in otherwise more uniform channels. Their presence will trap and store additional wood that drifts down the rivers. The construction of engineered log jams requires excavation to install key pieces and driving of wooden piles to support the structures. Chains may be used to temporarily anchor the wood to the piles until sufficient sediment or additional wood has racked up on the ELJs to stabilize the structure. Cables will not be used. Ballast of river cobbles/gravel or large rock may also be used as necessary.

Large wood would be installed during low flows (within in-water work windows) using excavators, cranes, helicopters, and hand labor, as appropriate. The work sites would be isolated as much as feasible using coffer dams and/or silt curtains and dewatered if feasible to facilitate construction. Access to islands would be provided by temporary bridges or dewatering of side channels via coffer dams and pumping.

6.1.7 Placement of Large Wood in Floodplains and Ponds

Much of the riparian area, floodplain and the formerly gravel mined ponds in the project area are lacking in large woody debris. Large wood will be placed in vegetated floodplain areas to provide habitat diversity and cover for amphibians, reptiles, and other wildlife species. This wood will not be anchored, but will be installed in well vegetated areas, particularly floodplain forested areas where it is unlikely that the wood could be floated back into the river during a flood event. It is expected that this material will move somewhat around the floodplain over time, but will not cause a navigation hazard. Wood placed in restored ponds will be anchored with large rock or keyed into banks. This wood will provide cover for fish species as well as perching or basking habitat for wildlife.

Rootwads and large woody debris, cut to specified dimensions, will be obtained from a local source. The rootwads will be placed using an excavator, dump truck, small equipment, and hand labor. Large woody debris will be placed using small equipment and hand labor.

6.1.8 Riprap Installation

Riprap may be used, only as necessary, to protect culvert footings, as part of a bioengineered bank with installed wood and vegetation to protect the toe of the existing berm at site M1B and the flow-through notches from hydraulic scour and potential avulsions. It will only be used as necessary, particularly on the M1B site where erosive forces could be high and where there could be the potential for the large gravel pits to "capture" the river. All connection channels to gravel mined ponds are designed to either function as backwater connections with low velocities, or to connect above the 2-year flow event when water spreads out on many floodplain areas and velocities are reduced in the roughened floodplain. Riprap will only be used following the guidelines in the NMFS Standard Local Operating Procedures for Endangered Species (SLOPES) IV Roads, Culverts, and Bridges Biological Opinion (NMFS 2008b). Riprap will be placed using a hydraulic excavator.

6.1.9 Culvert Installation

In some locations, new side channels and pond connections cross existing roads or trails that will be preserved. In these cases, the channels will be passed under the road in three-sided culverts that, in addition to providing hydraulic capacity, provide a natural bottom and room for the channel to meander slightly. The culvert size will be determined with hydraulic design calculations and will meet the State of Oregon's requirements for fish passage.

Culvert construction will be staged after the construction of the affected side channels or pond connections. Culvert installation will be conducted with mechanized equipment, and when necessary will include the pouring of concrete footings below the soil surface.

6.1.10 Reshaping Pond Banks

The ponds that currently exist in the floodplain of the project sites are mostly remnants of historical gravel mining activities, and thus have typically steep banks. The steep banks provide little habitat for fish, insects, aquatic and riparian plants, and primary production. Regrading and reshaping the pond banks to a much gentler slope will create shallow water habitat, wetland areas, and a much larger and more extensive riparian zone. It will also allow reptiles and other species better access to and from the ponds.

Pond bank reshaping consists of excavating the upper portion of the bank back to a 5:1 (H:V) slope or gentler and then pushing that bank material and other regraded material into the ponds to create shallow water and wetland habitats. High ground above the pond will be graded to a design slope by excavation using a front end loader or an excavator. The excavated material will be deposited below the water line inside the pond banks to create the shallow water habitat. The disturbed areas will be restored with bank and riparian vegetative plantings using a combination of machines and hand labor.

6.1.11 Gravel Road Obliteration

Site C1C features the removal of a small, little-used gravel road that parallels the Coast Fork Willamette River bank. In order to maximize the efficacy of a restored riparian corridor, the road will be excavated down to remove compacted rock and the soil will be ripped to facilitate planting of native vegetation in its place. A nearby road will be preserved to allow access to this area of the site.

The gravel road will be obliterated by excavating the surface material and subgrade using front end loaders and dump trucks. The material will be disposed of off-site. The road bed will be replaced with topsoil using dump trucks and front end loaders, and will be revegetated per section 6.1.13.

6.1.12 Vegetative Plantings

Native vegetation species will be planted at all sites. The primary plant community that will be planted will be the riparian community, dominated by black cottonwood, red alder, Oregon ash, incense cedar, Douglas fir, and a variety of shrub species. At sites with extensive tree cover, currently, the invasive understory will be removed as described in section 6.1.2. and then replanted with appropriate riparian underplantings of shrub and conifer species. At sites with gravel pits, the shallow water and wetland zones will be planted with emergent wetland vegetation.

Currently, the cost estimates reflect paid contract labor for all plantings.

6.2 COST ESTIMATE

A detailed cost estimate was developed for the recommended restoration plan. The project first cost estimate is $42,155,000, including design, construction, engineering during construction, construction management, monitoring, adaptive management, acquisition of all real estate, and contingency. The details are presented in Appendix C. Table 34 provides a summary of the main cost elements by account. The cost estimate was developed using the Corps Micro Computer Aided Cost Estimating Software (MCACES), Version 2 (M2).

Table 34. Cost Summary

Construction Item	**Cost ($1,000)**
Lands and Damages	428
Elements	
Fish & Wildlife Facilities	22,696
Roads, Railroads and Bridges	2,397
Channels and Canals	1,097
Levees and Floodwalls	7,686
Cultural Resources	341
Subtotal	**34,218**
Preconstruction Engineering and Design (PED)	3,581
Construction Management (S&A)	3,928
Project First Cost	**42,155**

The estimated Federal cost share is $27,401,000and an estimated local sponsor cost share of $14,754,000 ($428,000 of the non-Federal sponsor cost share would be credit for lands, easements, rights-of-way, relocations, and excavated or dredged material disposal areas [LERRDs]). Table 35 shows the cost-sharing breakdown for the project.

Table 35. Cost Apportionment

Item	Federal	Sponsor	Total
ECOSYSTEM RESTORATION (in $1000s)			
Design & Construction	27,401	14,326	
LERRDs*	0	428	428
Total Cost-Shared Implementation Costs	**27,401**	**14,754**	**42,155**
Percentage of Total Cost-Shared Amount – Ecosystem Restoration (Per Section 210 of WRDA 1996, the non-Federal cost for ecosystem restoration projects is 35 percent of all construction costs, including LERRD, and 100 percent of OMRR&R**	65%	35%	100%
Average Annual OMRR&R**		**150**	

*LERRDs = lands, easements, rights-of-way, relocation, and disposal sites
**OMRR&R = operation, maintenance, repair, replacement, and rehabilitation

6.3 REAL ESTATE

The value of the real estate required for the project from the gross appraisal is $428,000. This includes a valuation of lands already owned by the non-Federal sponsor (The Nature Conservancy), acquisition of lands not owned by the non-Federal sponsor, and with a contingency applied. More details are provided in the Real Estate Plan in Appendix G.

6.4 CONSTRUCTION ISSUES

For the most part, the construction elements proposed for the recommended plan are straight forward including grading, excavation of channels, removal of invasive species, and plantings of native species. Also, the majority of the work can be constructed "isolated" from the rivers (i.e., work in the gravel ponds that are not connected to the river) until the final connections are made and are thus not subject to the in-water work window restrictions. The only more complicated construction element anticipated for this project is construction of the Engineered Log Jams at island or bar locations that do not have direct access for vehicles. In these cases, access could be provided by a temporary bridge, dewatering of side channels via a coffer dam and pumping to allow vehicles to drive across, or by using a helicopter to deliver wood and other materials, or a combination of these techniques. Temporary bridging was used as the basis for cost estimating and it will be necessary to construct a temporary work pad and temporary bridge abutments on the adjacent bank. All of the ELJ work would need to be done during the designated in-water work windows (or with an approved extension by ODFW). Disturbed bar or island areas would require seeding and planting work following the completion of grading and other work by heavy equipment.

6.5 ELEMENTS FOR DETAILED DESIGN

Several design elements need to be developed in more detail in order to advance the project from feasibility to final design. These elements include but are not limited to the following.

- Cultural resource shovel testing
- Value engineering study
- Supplemental bathymetric and topographic surveying
- Detailed reach-scale hydraulic analysis for:
    - Engineered Log Jam design (size, placement, scour depths)
    - Sizing of side channels and pond connections (refine widths and depths)
    - Sizing of culverts to meet fish passage requirements
- Refinement of cut-fill line for pond bank reshaping
- Geotechnical borings at culvert locations
- Detailed dewatering and erosion control plans
- Riprap revetment sizing
- Detailed planting plans
- Baseline sampling of fish assemblages in ponds proposed for connections in order to determine fish salvage/removal needs

6.6 NON-FEDERAL SPONSOR SUPPORT

The non-Federal sponsor during the feasibility study has been the Mid-Willamette Council of Governments, with their partner The Nature Conservancy. A number of entities have provided grants and other funding to these partners throughout the feasibility study and there is high level of interest by many stakeholders in the implementation of this study. However, the Mid-Willamette Council of Governments will not be the sponsor for implementation because they will not be able to provide the lands or operation and maintenance required for implementation. The Nature Conservancy will be the non-Federal sponsor for implementation and owns four of the five sites included in the recommended plan. They would be able to provide all LERRDs for the project as well as to provide continued operation and maintenance for the project.

6.7 SCHEDULE

The following preliminary schedule has been prepared for the project (Figure 32). A more detailed schedule is provided in Appendix C. The Chief's Report is anticipated in December 2013.

Milestone	2011	2012	2013	2014	2015	2016	2017	2018
AFB		▨						
Public Draft Feasibility Report/EA			▨					
Final Feasibility Report/EA			▨					
Project Approval			▨					
PPA Signed			▨					
Design			▨	▨	▨			
Construction Phase 1				▨	▨			
Construction Phase 2					▨	▨		
Construction Phase 3						▨	▨	
Construction Phase 4							▨	▨
Monitoring (2015-2027)					▨	▨	▨	▨

Figure 32. Preliminary Schedule

6.8 RISK AND UNCERTAINTY

A detailed formal Cost and Schedule Risk Analysis was conducted for this project and is provided in Appendix C. This analysis formed the basis for the contingency factor applied to the implementation costs. A summary of those key risks as well as additional design/technical and construction risks and potential mitigation of those risks associated with this project are shown below in Table 36. Discussion regarding project sustainability is included in Section 6.12. Additional discussion on hydrologic/hydraulic and geomorphic trajectory and risks is described in Section 7.

Table 36. Risk and Mitigation

Potential Risks	Mitigation for the Risks
Potential that proposed fish and wildlife benefits will not be realized.	All restoration measures proposed in the recommended plan have been implemented in multiple sites in the Pacific Northwest. In particular, at the Eugene Delta Ponds project located within a few miles of the confluence, reconnection of a gravel-mined floodplain to the mainstem Willamette River saw immediate use by salmonid species. During design, incorporate information from Delta Ponds monitoring into design and develop detailed monitoring and adaptive management plan to document primary success metrics and take corrective adaptive management actions, if necessary.
Potential to raise flood water surface elevations	Modeling conducted for feasibility indicates no rise. Conduct detailed reach-scale modeling during design at each site and balance any potential rise with excavation to ensure no-rise.
Potential erosion or avulsion risk to adjacent landowners	Conduct detailed reach-scaled modeling during design at each site and design the placement location and orientation of features to minimize risk.
Project competing nationally for funding may delay implementation and thus raise costs	District will coordinate frequently with Division and HQ staff on status and needed funding. This project is a high priority for the District and stakeholders in the basin.
Plan for separate contracts for each site; potential cost implications.	Recommended plan has 5 separate restoration sites that will be phased over 3 years. Separate contracts make sense so that delay at one site will not affect any other site. Some economies of scale could be realized at sites at confluence and will be investigated during PED on the best approach.
Restricted in-water work windows could delay construction or completion of construction.	Consider qualifications of contractors during bidding/selection process to ensure they are capable and experienced with in-water work to expedite construction.
Potential changed climatic conditions that lead to changed hydrologic conditions.	Include range of native plant species that can withstand drought and flood conditions so communities can adapt to changed hydrologic and climatic conditions. Restoration of the floodplain, in and of itself, will help mediate potential increased flood flows by providing increased area for flows and storage.
Potential for adverse effects on species or water quality conditions during construction.	Develop erosion control and fish/wildlife protection plans during the final design to be implemented during construction.
Potential that restoration measure(s) could not work as designed.	All restoration measures proposed in the recommended plan have been designed and implemented in multiple sites in the Pacific Northwest. This risk is low and will be further mitigated by detailed modeling and engineering during the design phase to ensure features such as ELJs are designed to withstand appropriate flows and velocities.

Because habitat restoration is a relatively new science, there are always uncertainties associated with how long features will persist over time or if the desired benefits will be achieved. The recommended plan includes both passive and engineered measures to bracket this uncertainty. Large wood and ELJs installed with the project will decay and break down over time (generally within 25 years). However, by including a major component of riparian and floodplain plantings, it is intended that large wood will be recruited naturally into the river and floodplain over time as the trees mature and die on natural cycles or are eroded or washed into the river during flood events. Similarly, connection channels from the river to off-channel habitats may experience periodic sediment deposition or erosion conditions that could change the frequency or location of connections. However, the design of primarily backwater channels is intended to reduce the risk of deposition by creating them in locations of low energy and velocity where sediment transport of coarse material is limited. Additionally, by installing ELJs, it is intended to promote natural channel formation processes that will reform new channel connections, thus maintaining a dynamic equilibrium of habitats, rather than relying on the measures to remain static in perpetuity.

6.9 AREAS OF CONTROVERSY

There are no known areas of controversy with this study. Comments received during the public review of the draft document indicated strong interest for maintaining public access to Site C1B that had been temporarily restricted due to Lane County actions separate from this study. During the design phase, specific details on maintaining public access will be determined with the landowners. The current design does not eliminate public access or use. During the design phase more detailed bathymetric surveying and hydraulic analysis will be conducted for each site to ensure that connections to ponds in the floodplain do not increase the risk for river "capture."

6.10 IMPLEMENTATION REQUIREMENTS

6.10.1 Federal

Cost-sharing for ecosystem restoration is 65 percent Federal and 35 percent non-Federal. The Federal Government will provide 65 percent of the first costs of the Recommended Plan; the Federal portion of this project is estimated at $27,401,000 (additional funds required, not including feasibility study already cost-shared). The Corps is responsible for project management and coordination with Federal and State agencies. The Portland District will submit the Feasibility Report for approval, prepare plans and specifications, execute a Project Partnership Agreement (PPA) with the sponsor, advertise and award construction contract(s), and perform construction contract supervision and administration. A summary of cost sharing is shown in Table 37.

There are alternate authorities that could be used to fund and implement the site-specific projects included in the recommended restoration plan once it is authorized, such as Section 3138 Upper Willamette River Watershed Ecosystem Restoration, Oregon and Section 4073 Ecosystem Restoration and Fish Passage Improvements, Oregon from WRDA 2007 (Public Law 110-114). Project cost-sharing under these authorities would be the same as for the authorized project. Only fish passage components can qualify for implementation under Section 4073.

6.10.2 Non Federal

The Nature Conservancy is the non-Federal sponsor for this project, and is responsible for 35 percent of the project costs, estimated to be $14,754,000 (additional funds required, not including feasibility study already cost-shared). The non-Federal sponsor would like to conduct work-in-kind as a large portion of their cost-sharing responsibilities. Operation and maintenance of those projects is also a non-Federal responsibility. This section describes the primary non-Federal Sponsor responsibilities in conjunction with the Federal Government to implement the Recommended Plan.

A model PPA has been reviewed by the non-Federal Sponsor and its legal representative. The non-Federal Sponsor is aware of its responsibilities. The PPA will be modified to include work-in-kind for the non-Federal sponsor following Corps guidance and process. This deviated PPA will be reviewed and approved through the Corps' chain of command as required and executed prior to implementation.

The feasibility study and plans and specifications costs shall be included as part of the total project costs to be shared 65 percent Federal and 35 percent non-Federal. The non-Federal Sponsor shall:

- Provide 35 percent of total project costs as cash or in-kind services, as further specified below:
    - Provide the required non-Federal share of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;
    - Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs;
    - Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the project.
    - Provide, during construction, any additional funds necessary to make its total contributions equal to 35 percent of total project costs.
- The Nature Conservancy will provide work-in-kind during final design and construction as well as providing the post-construction monitoring. The value of the LERRDs needed for the project will be credited against the non-Federal sponsor's cost-sharing requirement. Work-in-kind tasks and estimated costs that match the cost estimate in Appendix C are provided below. This is used for cost estimating purposes only and a detailed accounting between LERRD value, cash contributions, and in-kind work will be decided during PED. The sponsor anticipates contributing the balance of funds from grant funding that will not include funds from Federal agencies.

    For cost estimating purposes, the MCACES cost estimate included the following breakdown of work provided by the non-federal sponsor. This list could change in the future depending upon circumstances, construction site prioritization, and funding availability from the federal government as well as the non-federal sponsor.

    - Design of Sites M2A and C1C. This could include additional technical analyses and hydraulic modeling, environmental compliance and preparation of 60%, 90%, 100%, and final designs and specifications to meet Corps requirements. The Corps would provide review of all design products prepared under this task. The estimated cost to prepare the complete design packages for these two sites is $270,000. The design work would be conducted according to the schedule outlined in Appendix C, in 2014.
    - Environmental Compliance (permitting). This could include preparation and submittal of state and local permit applications and documentation and coordination

  with agencies to receive permits for the additional 3 sites. The estimated cost for the planning and environmental compliance work is $341,000. This would be conducted following the 60% design for each site according to the schedule outlined in Appendix C.
  - Project Coordination Team. This could include participation on the Project Coordination Team throughout design, construction, and post-construction monitoring. The estimated cost to conduct this work is $250,000. This work would be conducted throughout the design and construction period at each site generally according to the schedule outlined in Appendix C.
  - Removal of Invasives and Plantings All Sites. This could include removal of invasives, purchase of plants and other materials, and on-site planting according to the designs at all sites. The estimated cost to provide these construction elements is $11,400,000. The Corps will inspect this work to approve that it meets the design requirements. This work would be conducted generally according to the schedule outlined in Appendix C.
  - LERRDs - $428,000
  - Monitoring All Sites. This work is outlined in Section 10. The estimated cost to conduct the monitoring over 10 years following construction is $429,000.
  - Cash Contribution - $1,636,000
- Shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized;
- Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project's proper function;
- Shall not use the project or lands, easements, and rights-of-way required for the project as a wetlands bank or mitigation credit for any other project;
- Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. §§ 4601-4655), and the Uniform Regulations contained in 49 C.F.R. part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;
- For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;
- Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;
- Hold and save the United States free from all damages arising from construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;
- Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the

accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management;

- Comply with all applicable Federal and State laws and regulations, including but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. § 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. §§ 3141-3148 and 40 U.S.C. §§ 3701-3708;
- Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. §§ 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;
- Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project;
- Agree, as between the Federal Government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and,
- Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. § 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. § 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

6.11 OPERATION, MAINTENANCE, REPAIR, REPLACEMENT AND REHABILITATION

The non-Federal sponsor is required to operate, maintain, repair, replace, and rehabilitate (OMRR&R) the project in perpetuity following construction (outside of any adaptive management measures that may be cost-shared). The average annual cost of OMRR&R has been estimated to be $150,000. The majority of the cost and effort would occur in the first five years associated with vegetation maintenance. The key elements identified as likely OMRR&R activities include:

- Vegetation maintenance during first five years. This effort is estimated at $2,500 per acre per year to remove/cut/apply herbicide to invasive species and/or provide occasional supplemental plantings or supplemental watering. This applies to all floodplain acres planted for each site.

- Culvert maintenance that may be required following a large flood event. This is estimated at $10,000 per culvert location and is estimated to occur in Years 25 and 50 following construction. This activity would include debris removal and minor repairs.
- Channel maintenance. This applies to all connector channels on each site for maintenance that may be required following a large flood event. This is estimated at $10,000 per channel and is estimated to occur in Years 25 and 50 following construction. This activity would include debris removal and excavation.

6.12 PROJECT SUSTAINABILITY

The purpose of the recommended restoration plan is to restore natural floodplain functions along the Lower Coast and Middle Forks of the Willamette River. However, this study has been conducted within the context of existing development and management of the system and other actions being conducted by a variety of other stakeholders. The project team and stakeholders recognized early in the plan formulation process that this study could not address all problems and limiting factors in the subbasins and that the types of floodplain restoration measures would not be entirely self-sustaining over the long term. Plan formulation focused specifically on the three objectives of the study to: 1) increase channel complexity and diversity; 2) restore connectivity of the rivers to floodplain habitats; and 3) restore native floodplain habitats (cottonwood gallery forests, riparian areas, wet prairie habitats).

Two key elements relate to the overall project sustainability: a) the long-term management of the vegetation communities to promote native vegetation and natural succession and reduce and control the dominance of invasive species; and b) the long-term recruitment of large wood and sediment to the study area to provide the key elements for natural habitat formation within the river channels and in the floodplain.

Specific to the sustainability of native vegetation communities, the recommended plan includes several sites partly or wholly owned by the non-federal sponsor (Nature Conservancy) as the Willamette Confluence site (project sites C1C, M1A, M1B, and M2A). The Nature Conservancy has developed a draft management plan (TNC 2011) that included an inventory of invasive species present on the sites in 2011 and a preliminary invasive species management program that prioritizes management for each species based on the level of impact to native habitats/species and the relative feasibility of management. Species were then categorized into "high priority," "early detection rapid response," "containment," and "project-specific" categories. Species in the high priority category have a high level of impact and are easy to moderate to control. Species in the early detection and rapid response category have the potential to cause significant impacts if left untreated, but are in localized areas or low populations and could potentially be eradicated from the sites. Species in the containment category are widespread with moderate level of impact and are difficult to control. These species will be contained to reduce in localized areas and prevent further spread, but cannot be eradicated. Species in the project-specific categories are present in areas where future projects such as the recommended restoration plan sites and grading and other substantial work will be occurring and the goal will be to remove the species in graded areas and treat in other locations (i.e. ponds) to remove as much as possible. This type of strategy will be implemented on the other project site (C1B) as well in conjunction with management by Lane County and the Friends of Buford Park. The Corps will additionally enter into an operations and maintenance agreement with the Nature Conservancy for the lifetime of the restoration project that will outline expected short-term and long-term actions to manage invasive species within the project footprint. It is not anticipated that all invasive species will be eradicated from any of the sites, but will be managed to not diminish the expected habitat functions of the sites.

The majority of the project sites will include two primary types of habitat where invasive species are currently dominant or could require management in the future: 1) cottonwood riparian gallery forest; and 2) gravel mined ponds that will be converted to more wetland/riverine side channel habitats. The primary invasive species of concern in the cottonwood riparian gallery forest areas are blackberry species (*Rubus* sp.) and knotweed species (*Polygonum* sp.). Both of these species are widespread throughout the Pacific Northwest and there is a long history of treatment and control. The primary invasive species of concern in and surrounding the gravel mined ponds include Eurasian water milfoil (*Myriophyllum spicatum*), purple loosestrife (*Lythrum salicaria*), yellow flag iris (*Iris pseudacorus*) and reed canary grass (*Phalaris arundinaceae*). These species are also very widespread throughout the Pacific Northwest but control has been more difficult due to their presence in aquatic habitats and rapidly spreading nature. These species will be managed to reduce their populations and promote hydrologic changes that will discourage their survival – by promoting seasonal flow-through and then drying down over the summer/fall, these species will have less suitable habitat and other measures such as shading with riparian vegetation (i.e. willows), spot cutting/herbicide applications, project-specific grading, and other methods will also be used to reduce their populations and diminish their effects on habitat and native species.

Invasive fish and wildlife species are also of concern such as bullfrogs, snapping turtles, warmwater fish species, etc. These will also be removed as feasible (only one snapping turtle has been observed and will be trapped; fish species may be netted from individual ponds) and the introduction of a more natural hydrologic regime with seasonal flow-through and then summer/fall dry down will also reduce habitat for these warmwater species that thrive in the isolated and warm gravel ponds currently.

The proposed large wood and engineered log jams included as restoration measures in the recommended restoration plan are intended to provide medium-term habitat function (i.e. 25-50 years) to provide a deposition site for other large wood in the system, promote formation of in-channel habitats (pools, riffles, side channels), provide in-channel cover, and provide floodplain cover and habitat for wildlife species and may also be recruited into the channel during high flow events. In conjunction with these medium-term benefits, the restored riparian zone that will extend for two miles along the Middle Fork and 1 mile along the Coast Fork will be growing and maturing for eventual contributions of wood into the rivers. In addition, other stakeholders are undertaking riparian revegetation in many locations upstream of the project sites on both the Middle Fork and Coast Fork that will also contribute to future recruitment of large wood into the rivers. The wood is not expected to create a static habitat situation over the life of the project, but promote formation of habitats in multiple locations and work in concert with environmental flows and other actions undertaken separate from this project.

The overall sediment supply and transport regime in both the Coast and Middle Forks has been substantially affected by the construction of multiple dams upstream. If no separate projects were to occur that provided sediment transport past the dams or placed gravel downstream of the dams, then over a 50-100 year period, channel bed coarsening and incision could occur adjacent to the project sites that could reduce the frequency of connections between the rivers and the floodplains. However, as sediment transport is already being conducted experimentally at Fall Creek Dam and plans for further such projects are being considered, it is likely that sediment nourishment or gravel transport will occur and provide benefits to this recommended plan.

Additionally, the Nature Conservancy and the Corps, along with numerous other stakeholders, have been implementing the first phase of the Sustainable Rivers Project (SRP) that seeks to modify dam operations throughout the Willamette basin to provide environmental and habitat benefits. Some of the actions to date have included providing environmental flows on the Middle Fork Willamette River during rainfall or other runoff events to mimic more naturally occurring peaks, while still meeting flood risk management requirements. Environmental flows have been conducted and monitored from 2008-2012 to identify if these flows can initiate geomorphic changes in the river and stimulate the formation of habitat features. Preliminary results indicate that there have been increases in bar deposition and localized bank erosion that can contribute both sediment and wood into the system (McDowell, draft 2012, in progress). Continuation of this program will also provide benefits to this recommended plan and ensure sustainability of this and other projects currently underway in the subbasins.

Table 37. Cost-Sharing Summary

			Federal Funding Requirements			
	Federal	**Non-Federal**	**FY13**	**FY14**	**FY15+**	**Totals**
PED	$2,970,000	$270,000	$0	$1,000,000	$1,970,000	$3,240,000
Env. Compliance	$0	$341,000	$0	$0	$0	$341,000
Construction	$20,647,000	$13,036,000	$0	$2,000,000	$18,647,000	$33,683,000
Construction Mgmt	$3,249,000	$250,000		$150,000	$3,099,000	$3,499,000
Monitoring	$0	$429,000	$0	$0	$0	$429,000
Adaptive Mgmt	$535,000				$535,000	$535,000
LERRD	$0	$428,000	$0	$0	$0	$428,000
Totals	$27,401,000	$14,754,000	$0	$3,150,000	$24,251,000	$42,155,000

7. EFFECTS OF THE RECOMMENDED PLAN

Sections 1500.1(c) and 1508.9(a) (1) of the National Environmental Policy Act of 1969 (as amended) require Federal agencies to "provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact" on actions authorized, funded, or carried out by the Federal government to insure such actions adequately address "environmental consequences, and take actions that protect, restore, and enhance the environment". This section identifies the expected environmental effects of the No Action alternative and the recommended plan. The effects of alternative sites that were not included in the recommended plan are substantially similar to those of the recommended plan and are thus not discussed. The effects of the recommended plan are primarily beneficial in the long-term, although there will be short-term adverse effects during construction.

7.1 HYDROLOGY/HYDRAULICS

7.1.1 No Action

The No Action alternative would not include any action to reconnect or restore floodplains. Hydrology in the basins is likely to change as a result of climate change even without any Federal action (see Section 7.14) as warming temperatures will likely lead to a reduced snow-pack and more intense storms that could both increase flood peaks and frequencies and also reduce low-flows in summer. The Corps will likely modify their operations of the dams of the Coast and Middle Forks basins to better meet the needs of aquatic species including mimicking more closely rainfall-runoff timing and peaking (within their flood management rule curves) and improving temperature conditions by constructing facilities at the dams to allow selective withdrawal from differing reservoir elevations. The Corps will continue to implement actions particularly related to the dams to comply with the requirements of the Biological Opinions for the Willamette Projects (NMFS 2008a; USFWS 2008). These actions will lead to improvements in habitat conditions for listed fish species, although without maintaining essential floodplain areas for flood storage and attenuation, changes in hydrology as a result of climate change could exceed the capabilities of the Corps to manage flood peaks/duration within the existing size of the reservoirs and dams and lead to more frequent flooding of downstream reaches.

Also, the Cities of Cottage Grove and Creswell are developing plans to withdraw surface water from the Row River and the Coast Fork, respectively, to accommodate future growth and provide cleaner water to their customers. It is likely that water withdrawals for municipal and industrial use will increase over time as the population increases, although agricultural usage may decline somewhat and reduce the overall increase of withdrawals. However, even with increased demand for municipal and industrial water supply, minimum flows will still be required from both the State of Oregon and per the Biological Opinions (NMFS 2008a; USFWS 2008), although due to climate change effects, maintaining those minimum flows will likely become more difficult even if water users are required to reduce withdrawals during low flows.

Overall, with the No Action alternative, hydrology in the basin is likely to have increased potential for flooding and lower summer flows. While the Corps and other agencies will be taking actions to ameliorate this scenario, it will not likely be sufficient to prevent future changes.

7.1.2 Recommended Plan

A primary purpose of this restoration plan is to restore more natural and frequent hydrologic connections between the rivers and their floodplains in the Coast and Middle Fork subbasins. The key features included at most sites that influence hydrology and hydraulics are connections to restored gravel pits and side channels via either backwater or high flow connections and the removal of some areas of bank armoring, fill and debris on the sites. The proposed restoration plan will not change the overall hydrologic regime in either the Coast or Middle Forks subbasins because this project does not include changes in dam operations. However, by allowing regular connections and inundation of the floodplain on the project sites, the plan would incrementally restore a more natural flooding regime to approximately 574 acres; approximately 200 acres in the Coast Fork and 374 acres in the Middle Fork. This restoration plan does not rely on changes being made to the operations of the upstream dams, but can operate within the potential changes that are being currently implemented and/or envisioned for the future. These projects are intended to promote natural habitat formation to occur within the variable hydrologic regime. The balanced approach of including both passive and engineered features on each site allows for initial connections to the floodplain with the long-term revegetation and wood structures to promote natural formation of habitats and does not rely on the provision and maintenance of static features in the floodplain. This project will not affect water supply or instream flows, except for the potential for incidental benefits to minimum flows as a result of groundwater discharge into the river that may result from additional floodplain connections and groundwater recharge.

The potential effects of the recommended plan were evaluated with a hydraulic analysis. One of the primary objectives of the with-project hydraulic analysis was to determine the potential for the implemented projects to increase the 1 percent (100-year) water surface elevation. Evaluation of with project conditions for the 100-year flood event is necessary to illustrate that there will be a "no-rise" effect due to the implementation of the restoration projects. All five restoration sites are located within a Federal Emergency Management Agency (FEMA) regulated floodway, meaning a detailed hydraulic study must be completed prior to construction to confirm that implementation of the projects will not increase flood heights for the 100-year return period flood event. Figures 15 through 18 in Appendix E show the footprints of the five restoration sites overlaid on the FEMA floodplain.

However, given the current limitations of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" as a bankfull condition hydraulic model, the traditional no-rise evaluation could not be conducted with the "Updated Middle-Coast Fork Willamette River HEC-RAS Model". The HEC-2 model that was developed for the Lane County Flood Insurance Study (FEMA 1999) is a flood model that is appropriate for modeling flood events in excess of bankfull conditions; however, the cross section spacing and the resolution of the model is too coarse to be used to model the with-project conditions for the proposed restoration sites.

At the feasibility level, the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" was used to evaluate the with-project conditions for a bankfull flow rate, which was assumed to be approximated by the 2-year return period flood event. Modeling of this flood event was used to show that implementation of the five restoration projects will not increase flood heights for the bankfull condition, or would at most increase them by a nominally small magnitude. In the design phase, site specific hydraulic modeling will be conducted, in which case, the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" would be revised to include more detail and flexibility in modeling not only the bankfull flows but also 100-year return period flows. See Appendix E for more discussion of future recommended actions for the hydraulic analysis.

7.1.3 With Project Hydraulic Connection to Restoration Features

With the implementation of the recommended plan, floodplain features at each restoration site will be hydraulically connected to the main stem river much more frequently than under the without project conditions. Refer to the design drawings in Appendix F for references to the site specific restoration features and their associated design elevations included in the discussion below.

Site C1B. Pond 1 would be hydraulically connected to the Coast Fork starting at approximately the 90 percent exceedance flow rate for the winter/spring period (386 cfs). All of the other gravel mined ponds at the site would be hydraulically connected to the Coast Fork starting at approximately the 75 percent exceedance flow rate for the winter/spring period (632 cfs).

Site C1C. The proposed high flow channel at the upstream end of the site would allow for a hydraulic connection between the Middle Fork and the large gravel mined pond starting at approximately the 25 percent exceedance flow rate for the winter/spring period (2,920 cfs). The proposed backwater channel further downstream would allow connection between the Middle Fork and the gravel mined pond starting at approximately the 95 percent exceedance flow rate for the winter/spring period (274 cfs).

Site M1A. The proposed high flow connection channel between the Coast Fork and the smaller of the two gravel mined ponds would be hydraulically connected to the river starting at approximately the 5 percent exceedance flow rate for the winter/spring period (7,686 cfs). Starting at approximately the 2-year flood event (15,800 cfs), the entire channel and the smaller of the two gravel mined ponds would then be connected to the Coast Fork. The larger of the two gravel minded ponds would be hydraulically connected to the Middle Fork starting at approximately the 75 percent exceedance flow rate for the winter/spring period (1,530 cfs).

Site M1B. The two notches that are proposed to be cut in the existing berm would allow for a hydraulic connection between the Middle Fork and the gravel mined ponds starting at approximately the 90 percent exceedance flow rate for the winter/spring period (1,530 cfs). At this flow rate, the water surface elevation at the upstream end of the site will be sufficient to allow for a hydraulic connection between the river and all of the ponds on the site.

Site M2A. The proposed work will not involve any grading of connector channels. At the 2-year flood event (20,000 cfs), all ponds on the site would be connected to the Middle Fork.

7.1.4 No-Rise Analysis and Results

The no-rise analysis for the with-project analysis was conducted for the 2-year return period flood event. The objective was to illustrate that implementation of the seven restoration projects would not increase flood heights for this bankfull flood event, or would at most increase them by no more than a nominal magnitude of 0.3 feet. Based on the results of this 2-year with project analysis, it is reasonable to assume that during the design phase when the 100-year flood is analyzed with a reach-scale hydraulic model more suitable to analyzing out of bank flow conditions, the modeling would show a no-rise situation for the with-project condition. A hydraulic model more suitable to analyzing out of bank flow conditions would account for the hydraulic conveyance afforded by the extensive floodplains and relic floodplain channels adjacent to the Coast and Middle Fork Willamette River when flows are out of bank. The current watershed-scale "Updated Middle-Coast Fork Willamette River HEC-RAS Model" does not have this capability.

At each of the five recommended restoration sites, the cross section geometry of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" was modified to represent the implementation of the restoration features. Specific restoration features, such as main-channel ELJs and main channel levee/berm modifications, were easily represented in the one-dimensional hydraulic model and were therefore included in the with-project conditions analysis. The main-channel ELJ's were represented in the model as individual blocked obstructions in the closest model cross section to each ELJ site.

Other restoration features, such as floodplain side channels, gravel pit bank-modifications and connector channels between gravel pits were more difficult to represent in the one-dimensional hydraulic model as it is currently configured. As was described in Appendix E, the ineffective flow area option in HEC-RAS was used throughout the "Updated Middle-Coast Fork Willamette River HEC-RAS Model to limit effective conveyance to within the banks of the main channel and to exclude the floodplain and features in the floodplain such as side channels and gravel pits. The floodplain side channels, gravel pit bank-modifications and connector channels between gravel pits that were proposed at the restoration sites were therefore included in the with-project hydraulic model by editing the ineffective flow areas at the project sites. Where a restoration feature such as a flow through side channel was proposed, the ineffective flow areas that were originally defined in the HEC-RAS model were revised to allow for a width of effective flow in the floodplain, commensurate with the expected active flow width attributed to the side channel.

Finally, implementation features such as backwater channels would have no effect on main-channel water surface elevations due to the fact that they would not be effective flow conveyance features. Therefore, they were not included in the with-project hydraulic analysis.

Figures 33 through 35 present the comparison of with project and without project water surface elevations for the 2-year flood event. To provide a point of reference, these figures also include the without project water surface profiles for the 90 percent winter/spring exceedance flow.

Tables 22 and 23 in Appendix E present the comparison of with project and without project hydraulic modeling for the 2-year flood event for the Coast Fork Willamette River in a detailed tabular format.

The hydraulic modeling of the with-project conditions shows both small increases and decreases in water surface elevation relative to the without project condition. Decreases in water surface elevation are generally attributed to the increased conveyance provided by flow through side channel features; the primary example of which is the 0.6 foot reduction in water surface elevation in the vicinity of Restoration Site C1C. Increases in water surface elevation are generally attributed to loss of main channel conveyance from placement of ELJ features, although typically less than 0.2 feet. At most of the restoration sites, the net decrease or increase in the water surface elevations is the result of the combined effect of those restoration features that decrease main channel conveyance and those restoration features that increase off channel or floodplain conveyance.

It is noted that this analysis is based on the bankfull flow conditions that are approximated by the 2-year return period flood event. Those minor increases in water surface elevation would not be expected when the reach-scale hydraulic analysis of the 100-year flood event is conducted during the design phase with a hydraulic model that is capable of accurately modeling large out-of-bank flood events. When the entire floodplain is inundated, localized minor increases are easily dwarfed by the overall flood event.

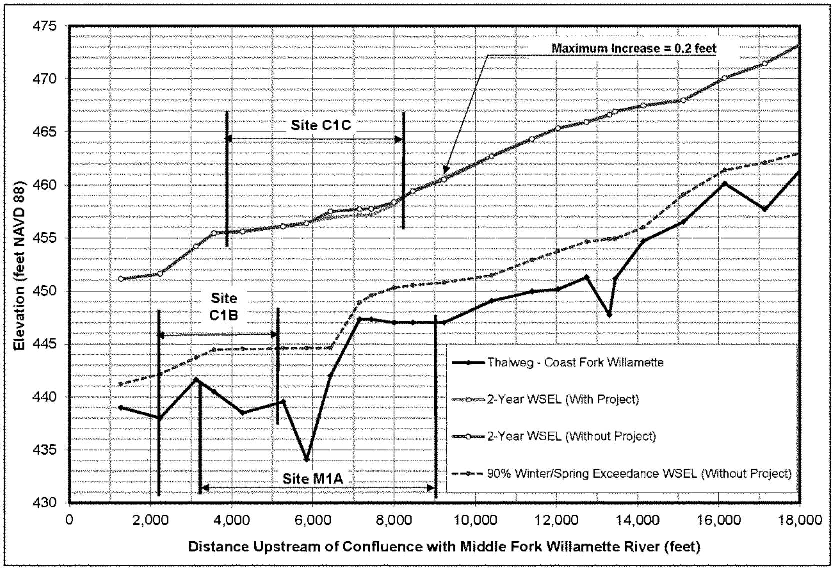

Figure 33. Coast Fork Willamette River without Project versus With Project Water Surface Profiles for 2-Year Return Period Flood for Sites C1B, C1C and M1A

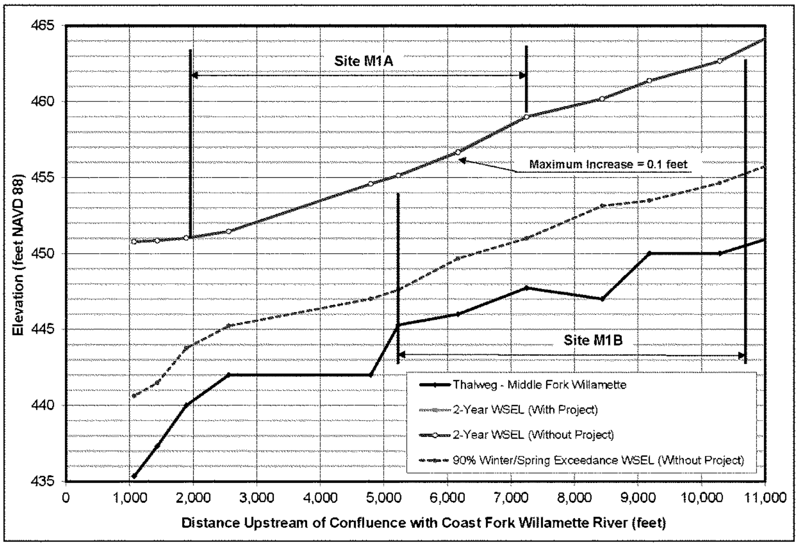

Figure 34. Middle Fork Willamette River without Project versus With Project Water Surface Profiles for 2-Year Return Period Flood for Sites M1A and M1B

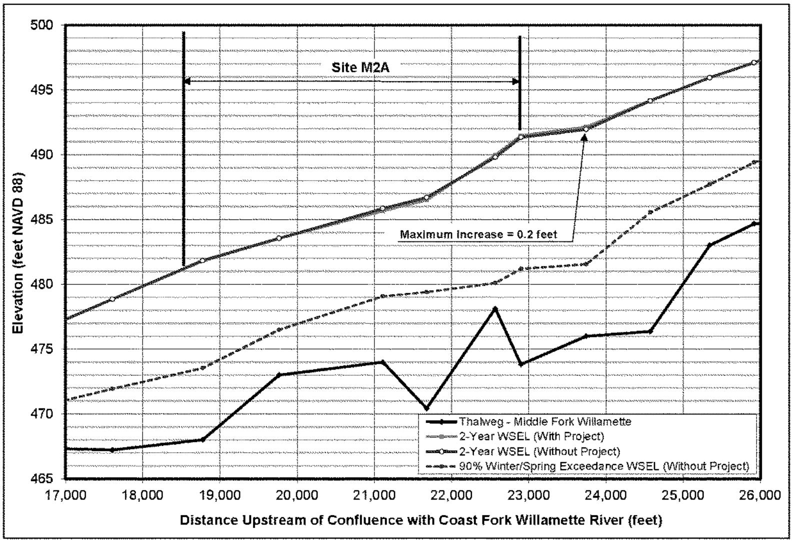

Figure 35. Middle Fork Willamette River without Project versus With Project Water Surface Profiles for 2-Year Return Period Flood for Site M2A[6]

Additional hydraulic analyses of the recommended plan will be conducted for each site and final designs will be refined, if necessary, to ensure no-rise of water surface elevations as a result of any site or the combined effects of all sites.

7.2 GEOMORPHOLOGY

7.2.1 No Action

Under the No Action alternative, it is likely that the river channels would continue to become more predominantly single-thread channels due to a reduced supply of sediment from the upstream watershed, vegetation growing on existing bars and islands that reduces the ability of the rivers to erode the bars, continued management to reduce peak flows/floods that tends to reduce the potential for avulsion and channel migration, and bank armoring that also prevents channel migration. Several former gravel pits have been captured within recent decades and more could naturally be captured during flood flows in the future. While this would naturally reconnect floodplains it is difficult to predict when or how this would occur and could lead to both improvements in the natural habitats and geomorphology of the rivers as well as having adverse effects if uncontrolled capture of a deeper pit occurred that could cause destabilization in the main channel and headcutting.

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[6] The ELJs proposed at Site M2A have been removed from the recommended plan, thus the potential increase in water surface elevation shown here is unlikely to occur. During the design phase, more detailed modeling will occur to ensure no rise.

The Corps and BPA would likely undertake restoration and protection activities as required by the Biological Opinions (NMFS 2008a; USFWS 2008); however, these actions would be directed at the key fish populations (McKenzie River, Santiam River) and may not include this level of restoration in the study area.

Without Federal action, it would be very difficult for stakeholders in the subbasins to undertake large-scale floodplain restoration that would affect the rivers on a geomorphic scale. While numerous additional projects would likely be undertaken by the Watershed Councils, The Nature Conservancy, and others (especially riparian revegetation and control of invasive species), the stakeholders in the subbasins do not have the funds or means to provide this scale of restoration. The geomorphic condition of the study area will likely continue to worsen, by continuing toward single-thread channels with limited off-channel and in-channel diversity.

7.2.2 Recommended Plan

A primary purpose of this restoration plan is to incrementally restore natural geomorphic processes that form fish and wildlife habitats in the Coast and Middle Fork subbasins. The key features included on all sites that influence geomorphic processes include removal of fill and debris in the floodplains and in some locations, portions of private revetment on the banks to allow some channel migration into the sites, placement of ELJs and wood in the floodplain to promote scour of pools and side-channel openings as well as promoting split channel flows in key locations adjacent to these sites where existing bars and islands can be enhanced and further formed over time, revegetation of the riparian and floodplain habitats that will promote large wood recruitment to the river over time, and channel connections to restored gravel pits and side channels via backwater or high-flow connections. In general, at the sites in the recommended restoration plan, there are no structures or existing land uses or infrastructure that requires protection and the landowners would like to promote natural geomorphic floodplain processes. Particularly at the confluence of the Coast and Middle Forks, The Nature Conservancy has purchased over 1200 acres between the forks with the purpose of protecting and restoring the natural deltaic processes.

Each of the project reaches and the potential effects on geomorphology are described below.

Reach C1 – RM 0 to RM 6.4

Two of the restoration sites included in the recommended plan, C1B and C1C are located in this reach. The sites are contiguous on the left (south) bank of the Coast Fork in an area that has several gravel pits that have been protected via bank protection on the Coast Fork as well as some gravel pits that have already been captured and incorporated into the floodplain and side channel features of the Coast Fork.

A major portion of the restoration effort in Reach C1 is centered on the gravel mined areas. At C1B, the downstream site, five ponds would be connected via a culvert inlet to Pond 1. The other four ponds will be connected by a series of channels between them. There is no direct upstream connection proposed to the Coast Fork; however flows sufficient to overtop the existing bank would flow through a culvert outlet at the downstream end of the site that will connect a sixth gravel pond with the mainstem. Based on a review of the LiDAR topography for the site, the ground elevations surrounding the ponds are on the order of elevation 448 to 450 feet. This compares to the proposed downstream culvert invert of approximately 443 feet. The adjacent river thalweg is at an elevation of approximately 440 feet. Considering the limited topographic differences, there is little chance the gravel pits could capture the main channel.

At C1C, the main restoration features is connection of a large gravel pit to the Coast Fork by a 1,400 foot long channel at the upstream end and a 400 foot long, outlet channel with a culvert at the downstream end. The proposed controlling invert of the downstream connection culvert is 443 feet compared to the adjacent thalweg of approximately 440 feet. The inlet channel connects to the Coast Fork at an elevation of approximately 450 feet at a location where the adjacent channel thalweg is approximately 446 feet. The ponds at this site were recently surveyed for The Nature Conservancy (Tetra Tech 2012). Results show the bottom of the large pond being at an elevation between 440 and 445 feet which is approximately at or up to 6 feet below the adjacent channel thalweg. Considering the downstream culvert control, the length of the connecting channel and the relatively shallow nature of the gravel pit, the likelihood of the proposed restoration effort at Site C1C resulting in capture of the Coast Fork is also small.

Two additional small gravel pits are proposed to be connected by backwater notches to the Coast Fork on the west end of site C1C. These ponds have minimum elevation of about 439 feet compared to the adjacent thalweg of the Coast Fork at elevation 440 feet. The plan also proposes lowering of a roadway berm separating the river from these ponds to an elevation of approximately 453 feet to 449 feet. Considering the limited differences in topography as well as the small footprint of these two ponds, the proposed actions pose no threat to capture of the Coast Fork. During high flows in January 2012, these ponds were connected to the Coast Fork via flows that overtopped the roadway.

The portion of site C1C located upstream of the Wildish bridge and adjacent to the Coast Fork is an abandoned gravel pit that was connected to the Coast Fork in the 1960s. Over time it has evolved into the floodplain and side channel system that currently exists. This is the area that the 1,400 foot channel will be cut across to connect the large pond as a flow-through system. In addition, two ELJs will be installed at side channel inlets to promote scour, create habitat and increase the channel dynamics. This site is currently a good example of how shallow gravel pits may evolve in the Coast Fork and Middle Fork of the Willamette River. Over the five decades that the area has been evolving, the main channel has stayed in the same location, including a bridge crossing at the downstream end of the former pits. This suggests that there is the potential to provide even more main channel connection with the gravel pits to develop complex floodplain and side channel systems similar to what has evolved at the upper end of site C1C. In the next level of design, it is recommended that further investigation be performed to refine the restoration efforts. This analysis should look at the localized hydraulic and sediment transport impacts of the connections, and also consider the system-wide impact. For example, it might make more sense to sequentially connect the ponds over a few years in order to avoid any cumulative impact on sediment transport in the reach that might create an overall sediment deficit that might cause adverse channel impacts such as downcutting and coarsening of the bed material. Similarly, the impacts on infrastructure such as bridges, bank protection and utility crossings would need to be investigated to refine the design.

Reach M1 RM 187 to RM 191

Two of the sites in the recommended plan are located in this reach. Site M1A is located on the left bank of the Middle Fork from RM 187.4 to RM 188.4 and extends across the floodplain to the right bank of the Coast Fork. It occupies the finger of floodplain that separates the Middle and Coast Forks. Site M1B overlaps with M1A and extends along the left bank of the Middle Fork from RM 188.0 to RM 189.2. M1B does not extend all the way across the floodplain to the right bank of the Coast Fork. Both sites involve similar actions including reshaping of the gravel pit banks and reconnection of several gravel pits to the main channel. Site M1A includes placement of ELJs at the reconnection channels, whereas Site M1B does not.

The recent bathymetry data (Tetra Tech 2012) at M1A indicates a minimum pond elevation for the large pond at the center of the site of about 439 feet with the majority of the main pond between elevations 440 to 445 feet or higher. The adjacent Middle Fork thalweg elevation at the connection point is approximately 446 feet. The small pond adjacent to the Coast Fork has a minimum elevation of about 440 with the adjacent thalweg of the Coast Fork at an elevation of 446 feet. Considering the small elevation difference between the main channels and the pond bottoms (similar in scale to in-channel pool depths), the likelihood of stream capture is small. In the design phase, a more detailed reach-scale hydraulic analysis of the connection between the Middle Fork and the Coast Fork should be performed to confirm the likely range of head differentials between the two systems in order to refine the connector channel elevations to minimize any adverse effects on the rivers.

The Middle Fork thalweg ranges from elevation 445 to 449 along the M1B site while the bottom of the largest pond is predominantly at an elevation of between 440 and 445 with the deepest locations at about 440. For the downstream third of the pond, the bottom of the pond is at or slightly below the river thalweg. For the middle third, the thalweg and pond bottom are at about the same elevation. It is only the upper third of the pond where the pond bottom is substantially lower, 5 feet or more, than the adjacent river thalweg. In the design phase, refinements to the downstream connection channel to allow the river channel to readily migrate into the lower third of the pond should be investigated because the pond and river are at the same elevation. This would include a detailed reach-scale hydraulic and sediment transport analysis to determine potential impacts on the mainstem as well as the evolution of the pond.

In addition to the connection to the river, the proposed plan at Site M1B calls for removal of the existing riverward revetment at the two notches (15-foot bottom width) and as part of the regrading that brings the top of bank to OHW. This limited removal of revetment as developed in the current design is not likely to cause the channel to migrate into the ponds for many decades, if ever, based on the performance of the current revetment that has been in place for many years. During the design phase, the extent of removal of the revetment in the lower and middle third of the pond, where the potential for stream capture appears small should be refined. Complete removal of the revetment could be performed separately over several decades by the owner to allow the river to slowly fully migrate into the new area that is opened up without adverse effects on the river.

Reach M2 RM 191 to RM 194

One site in the recommended plan, M2A is located at RM191 within reach M2 on the left bank of the Middle Fork. The bathymetry of the gravel pits at this location was recently surveyed for The Nature Conservancy (Tetra Tech 2012). At the time of survey in January 2012, the two downstream ponds were connected to the Middle Fork during a flood event. Additionally, Pudding Creek flows through the downstream-most pond due to its culvert being blocked and damaged and when river levels are high; this is an existing backwater connection (i.e., Chinook and Oregon chub have been captured in the ponds). The two downstream ponds have minimum bottom elevations of 465 feet or higher. The upstream pond is shallower, with much of its bottom at an elevation of 470 feet or higher. The Middle Fork thalweg adjacent to the downstream pond ranges from about 468 feet to 473 feet. At the upstream pond, the elevation of the thalweg ranges from about 473 feet to 477 feet. Based on this information, the ponds are up to 7 feet deep. This represents a fairly small difference in elevation (similar to typical pool depths in the river) and it does not appear that capture of the river is likely, particularly as the recommended plan will focus primarily on invasive species removal and revegetation and not include connector channels. There appears to be little risk of damage to adjacent infrastructure if the ponds were to eventually capture a substantial portion of the mainstem flow, although one concern could be the potential to dewater the Springfield Millrace inlet across the river. A reach-scale hydraulic and sediment transport analysis will be conducted to refine the design to ensure no adverse effects across the river.

This restoration plan does not rely on changes being made to the operations of the upstream dams, but can operate within the potential changes that are being currently implemented and/or envisioned for the future as well as likely hydrologic changes due to climate change. The primary purpose of these projects is to allow natural habitat formation to occur within a variable hydrologic regime. The balanced approach of including both passive and engineered features on each site allows for initial connections to the floodplain with the long-term revegetation and wood structures to promote natural formation of habitats and does not rely on the provision and maintenance of static features in the floodplain. While the gravel pit restoration will be designed to reduce overall depths of the existing gravel pits to minimize risks to the river systems from pit capture, over time it is expected that the gravel pits will slowly fill with organic material derived from the floodplain and fine sediments transported by the rivers and that the rivers will form a variety of channel, pond, and oxbow habitats through the sites.

At 4 of the 5 sites, restoration efforts involve connecting the gravel pits to the rivers (either the Coast Fork or the Middle Fork). In general, the gravel pits are relatively shallow with the deepest portions of the pits being at a similar elevation to the adjacent mainstem thalweg up to about 5 to 7 feet below the thalweg. For the current designs with limited size of the connections to the mainstem, there is very little risk of capture of a substantial portion of the mainstem channel as a result of the gravel pond connections. At the majority of the sites, there does not appear to be the potential for damage to adjacent infrastructure if the pits did capture a major portion of the flow as the site footprints include the floodplain area that could be affected. A very conservative approach to connecting the pits to the main channel has been followed in this proposed design with relatively small openings and channels. In addition, the openings are armored with cobbles and boulders to prevent down-cutting and widening.

In the design phase, more detailed hydraulic and sediment transport investigations will be undertaken to refine the depths and widths of connections at each site. The primary question to answer for increased connection frequency would be whether this would result in negative impacts to the overall sediment balance that could induce unwanted changes in the overall river morphology including down-cutting and coarsening of substrate. Another option that should be investigated in the next level of design is allowing the river to migrate freely through some of the narrow berms that are separating the pits from the mainstem. Again, this would need to be investigated with a reach-scale hydraulic and sediment analysis. Either of these two approaches to increased mainstem connectivity could be pursued in a long term, adaptive manner.

The incorporation of the pulsed flows (Sustainable Rivers Program) in the dam releases may accelerate filling of the pits. It was observed that after recent high flows on both the Middle Fork and Coast Fork in January 2012 that large gravels and small cobbles had been mobilized and new bars and increased deposition areas were observed. The disadvantage of the higher level of mobilized bed material is a somewhat increased potential for gravels to deposit in the connection channel inlets and reduce their frequency of connection over time. This potential exists without the pulsed flows but is a somewhat higher risk if gravels are mobilized more frequently and to a greater extent. If the inlets do become plugged over time, they can either be maintained or the connections could be allowed to revert to a backwater connection, only open at the downstream end. The proposed design assumes that some periodic maintenance may be required to remove sediment at the inlet channels.

Because of the conservative approach taken to reconnecting the ponds with relatively small sized inlets and outlets and protection of the hydraulic controls that are elevated above the channel thalweg, very little bed load is likely to be delivered to the gravel pits. The primary sediment to enter the reconnection channels will be suspended load. Because of this and the fact that much of the suspended sediment load is trapped in upstream reservoirs, the rate of pit infilling is expected to be slow. The wash load (silts and clays) in the suspended load will not be totally trapped in the pits as some will remain in suspension, particularly the clays. Sand load entering would be expected to be trapped, but it is unknown as to the quantity of sand that is present in the Middle and Coast Forks. In the next phase of design, this issue will be investigated to develop estimates of the sand to be trapped in the pits based on estimates of the volume of water passing thought the pits and the typical suspended sand load concentration in the Middle and Coast Forks.

There are no existing Corps revetments on any of the sites, with the exception of Site M1A, where the Evans revetment is located immediately adjacent to the private bridge crossing of the Coast Fork that provides access to Site M1A. The restoration plan will not remove or modify this revetment. The Nature Conservancy may, at some point in the future, request that this revetment be deauthorized or modified, but will work separately with the Corps in that case.

Geological conditions would not be affected by the recommended plan. Soils and sediments may be removed or regraded/relocated during construction, however the impacts would not be significant. It is likely that each of the restoration activities would cause some amount of upland or stream bank erosion during construction as a result of ground disturbance from vegetation clearing and the use of heavy equipment. These impacts are expected to be minimal and temporary. Measures will be implemented to control erosion both during and after construction. These measures will be described in a Stormwater Pollution Prevention Plan (SWPPP) and will be in compliance with the Oregon Department of Environmental Quality Construction Stormwater General Permit (NPDES permit). Once construction is complete, the restored areas would provide habitat improvements, and would restore natural soil and sediment transport and deposition processes.

Permanent alteration of soils may come from removal during the construction of the projects. Final designs will balance the amount of cut and fill at the project site through the reuse of excavated materials on site. Debris or other unsuitable materials will be removed from the project site and disposed of at a proper disposal facility.

7.3 WATER QUALITY

7.3.1 No Action

Under the No Action alternative, the stakeholders in the subbasins would still be required to develop plans and projects to comply with the TMDLs for temperature in both subbasins and ammonia, nutrients, and mercury in the Coast Fork subbasin, along with other water quality requirements to meet state standards; thus generally improving water quality. The Corps is also likely to construct selective withdrawal facilities at dams in the subbasins to more effectively mimic pre-dam conditions. However, this would tend to increase summer and fall water temperatures, thus potentially working against the TMDL requirements. Climate change will also work against the TMDLs by increasing air and likely water temperatures both as a result of direct heating as well as reduced low flows induced by a reduced snowpack and reduced summer/fall precipitation. Riparian protection and restoration projects will likely be implemented as one component to reduce direct heating of the streams/rivers; additional measures could include further treatment of point-source discharges (such as infiltration basins for wastewater treatment discharges).

To implement the mercury, ammonia, and nutrients TMDLs, ODEQ will require stakeholders to begin reducing the quantities of mercury, ammonia, and nutrients released into the Coast Fork. This could require clean-up of soils and additional treatment of point-source discharges. These pollutants are likely to be much easier to reduce than temperatures, so water quality will likely improve from the pollutant standpoint.

Overall, temperatures are likely to change in the future in both positive and negative directions, with perhaps the net result of slight improvements.

7.3.2 Recommended Plan

While water quality improvements are not a project purpose, there may be some incidental water quality improvements that occur as a long-term result of the restoration plan. The increased floodplain connections and inundation may result in increased groundwater recharge and subsequent discharge that could provide cooler water to the rivers during low flows. At this time, this benefit is not considered to be measurable. Additionally, as a result of flow-through or backwater connections to the restored gravel pits, water quality conditions in the pits would be improved. It is likely that temperatures would become more similar to river temperature conditions and the increased flushing of the pits could provide improved dissolved oxygen conditions. However, these effects are expected to be relatively minor.

The overall temperature regimes in the rivers that are highly affected by dam operations will not be significantly changed as a result of the recommended restoration plan. However, it is likely that the Corps will modify its operations of the dams and also install structural features on the dams to help return outflow temperatures to a more natural regime. This restoration plan would be further enhanced by modifications to Corps outflow temperatures, but is not dependent on those actions occurring.

There could be temporary impacts to water quality, mainly turbidity, during construction of the project. These impacts will be minimized by isolating construction activities from adjacent receiving waters by primarily working on the sites prior to making connections to the rivers and implementation of construction stormwater best management practices (BMPs) to the maximum extent practicable. These BMPs will likely include surface stabilization (i.e., mulches), silt fence and other sediment barriers, and by maintaining booms, silt curtains, and absorbent pads on site and implementing source-control program to prevent the generation or release of potential pollutants. Water quality monitoring will take place to meet permit requirements. If the standards are exceeded then construction will be halted until additional BMPs can be installed to ensure standards are met.

Construction equipment may release small amounts of pollutants into the water, including oils and grease or other contaminants, as a result of spills and leakages or the existence of contaminants on machinery that is used within the water column. Contained staging areas and the pollution prevention plans will be used to identify methods and procedures to control contaminants from entering the water through leaks or spills. Machinery and materials used for restoration would be clean from approved sources. During the design phase, detailed erosion and pollution control plans will be developed for each site.

7.4 FISH AND AQUATIC HABITAT

7.4.1 No Action

Under the No Action alternative, it is likely that a variety of stakeholders in the subbasins will undertake habitat restoration and preservation activities. However, the rate and scale at which these actions occur will be dependent upon state, local, and private funding, none of which are certain. The Corps will also be required to implement restoration actions associated with compliance with the Biological Opinions (NMFS 2008a; USFWS 2008), although no specific restoration projects have yet been identified or implemented. The Services will also undertake species recovery efforts in cooperation with a variety of other agencies and landowners. Key Corps actions in the near-term are associated with temperature modifications and fish passage at the dams. Watershed councils will play a key role in establishing restoration priorities in the Coast and Middle Fork subbasins. The Oregon Watershed Enhancement Board will continue to provide funding and technical assistance for watershed and stream restoration projects, although overall state funding is limited and primarily focused on habitat protection and riparian revegetation or invasive species control projects. The Oregon CREP will provide incentives to landowners for shorter term riparian and wetland restoration, mainly through the use of vegetated filter strips and riparian buffers; but the CREP program does not provide funding for more costly engineering or large-scale restoration. The Nature Conservancy will undertake restoration actions on their property, but would not likely obtain sufficient funding for the large-scale actions proposed in this plan.

In addition, other factors will continue to degrade aquatic habitats, such as continued population growth and development in the subbasins, likely continued bank armoring to protect residences and infrastructure, and climate change effects such as increased flooding/scour and increased temperatures. Without the recommended plan, large-scale floodplain restoration is unlikely to occur. On balance, it is likely that aquatic habitats will be restored in localized areas, but not likely to the level required to recover fish and wildlife species. The Willamette River Basin Planning Atlas (Hulse et al. 2002) scenarios predict that aquatic habitat quality and quantity will stay about the same, or improvement somewhat depending on whether a development oriented or conservation oriented future scenario occurs.

Existing trees and native shrubs in the riparian zones and floodplains will continue to mature, but non-native invasive species such as blackberries, Japanese knotweed, and reed canary grass will also continue to expand their range, density, and size. Large wood recruitment to the river will continue to be limited due to further land clearing and development, and the inability of native trees to recruit into areas dominated by non-native species. In areas where localized restoration occurs, these areas will contribute large wood to the rivers within the 50-year period of analysis, but this is expected to be much less than would occur with more extensive floodplain restoration. Temperatures are likely to remain similar to existing conditions or slightly increase due to the combined effects of more natural temperature releases from the dams and climate change effects.

7.4.2 Recommended Plan

A primary purpose of this restoration plan is to restore and enhance fish and aquatic habitats including floodplains, off-channel, and wetland habitats. Approximately 574 acres of floodplain and in-channel habitats will be restored on both the Coast and Middle Forks. All of the sites included in the restoration plan have had former gravel mining activities occur on sites, so there are gravel pits/ponds that will be restored and enhanced via grading of the shorelines and placement of fill to provide shallow water habitats. Many of these gravel pits/ponds will be reconnected to the rivers via backwater or flow-through channels or high flow connections. Additionally, riparian and wetland habitats will be restored via the removal of non-native invasive species and plantings of native vegetation. In-channel habitats will be restored and enhanced via the installation of large wood and ELJs to promote scour of pools, deposition of gravels in bars or riffles, and formation and maintenance of side-channels. It is intended that the restoration plan will promote the natural formation of a variety of habitats over time rather than relying on the engineering and construction of static habitat features. It is desirable for the river channels to migrate on these sites and promote bar, island, and side channel formation. The revegetation of riparian and floodplain habitats with native tree species will contribute to the long-term recruitment of large wood into the rivers to further promote and maintain channel processes.

Specifically in regards to the focal fish species in this study; Chinook, steelhead, cutthroat and Oregon chub, this plan will restore habitats that are limiting for all of these species such as off-channel ponds, oxbows, channels, pools, shallow water, overhanging vegetation, and cover. As recommended in the EDT analysis conducted for the Middle Fork, restoration is focused in Reaches M1 and M2 where water temperatures are not limiting for the use of salmonids. Focusing on the confluence of the Coast and Middle Forks provides a very large area of contiguous complex habitat for fish species. Particularly on the lower Middle Fork, this restoration plan will work in synergy with the nearly continuous public ownership present on the right bank of the Middle Fork to provide nearly two miles of high quality fish habitat.

During construction, most work will be phased to isolate the construction area from adjacent receiving waters in order to protect aquatic species and fish (i.e., avoid connections to the rivers until other work is complete). In addition, construction stormwater BMPs will be implemented to the maximum extent practicable in order to preserve local water quality, especially with respect to turbidity effects. These BMPs will include surface stabilization (i.e., mulching), silt fence and other sediment barriers, and a source-control program to prevent the generation or release of potential pollutants.

All work below the ordinary high water line will take place only during the in water work windows, designated by the ODFW, to minimize possible harm to fish species. Fish salvage and removal will occur as necessary, such as within the gravel pits/ponds or isolated portions of the rivers to install ELJs.

Overall, adverse impacts to fish during construction are expected to be minor and temporary. Although fish may be temporarily excluded from habitats, the areas of exclusion would be minimal and passage up- and down-stream would not be compromised. Overall, there should be long-term benefits to fish and aquatic habitats from the restoration plan.

7.5 TERRESTRIAL SPECIES AND HABITAT

7.5.1 No Action

Under the No Action alternative, stakeholders in the subbasins will likely undertake terrestrial habitat restoration and protection activities, particularly on public lands further upstream (i.e., U.S. Forest Service lands). Additionally, areas of native trees and shrubs will continue to mature and become higher quality in some locations where invasive species are not dominant. The Corps, state and local parks, and other landowners are conducting restoration activities, particularly to restore western pond turtle habitats as well as prairie habitats for listed terrestrial species. However, with continued population growth and development, it is likely that many existing habitats will be converted to residential or other land uses and wildlife habitats on agricultural lands will also be reduced. The Willamette River Basin Planning Atlas (Hulse et al. 2002) scenarios identify a potential benefit to terrestrial species and habitats if a conservation scenario is undertaken. Particularly, coniferous forest habitats and amphibian/reptile habitats will likely improve. If the development scenario occurs, then terrestrial habitats and species will likely remain similar to existing conditions or be somewhat further degraded.

7.5.2 Recommended Plan

A primary purpose of this restoration plan is to restore floodplain habitats and processes that will benefit a variety of fish and wildlife species. Approximately 574 acres of floodplain and riparian habitats will be restored on both the Coast and Middle Forks. All of the sites included in the restoration plan have had former gravel mining activities occur on sites and substantial disturbance has occurred leaving many of the sites dominated by invasive species. These floodplain, riparian and wetland habitats will be restored via the removal of non-native invasive species and plantings of native vegetation. It is intended that the restoration plan will promote the natural formation of a variety of habitats over time rather than relying on the engineering and construction of static habitat features. It is desirable for the river channels to migrate on these sites and promote bar, island, and side channel formation. The revegetation of riparian and floodplain habitats with native tree species will contribute to the long-term recruitment of large wood into the rivers to further promote and maintain channel processes.

Specifically in regards to the focal wildlife species in this study including native amphibians, pond turtles, raptors and migratory bird species, this plan will restore habitats that are limiting for all of these species such as floodplain forest, wetlands, riparian habitats, cover and large wood. Focusing on the confluence of the Coast and Middle Forks will provide a very large area of complex habitat for wildlife species. Particularly on the lower Middle Fork, this restoration plan will work in synergy with the nearly continuous public ownership present on the right bank of the Middle Fork to provide nearly two miles of high quality wildlife habitat as well as being located immediately adjacent to Mt. Pisgah.

During construction, terrestrial wildlife may be affected by the action alternatives primarily by disturbance. Construction equipment, human presence, and increased noise may disturb resident wildlife or discourage migrating wildlife from utilizing the surrounding habitats. Wildlife may also be affected if their habitats are altered during the construction process. Vegetation clearing, earthwork, and debris removal may directly impact foraging or nesting grounds for amphibians, reptiles, birds, and small mammals.

Vegetation clearing may reduce the availability of foraging, resting, or nesting habitat. Any clearing conducted for the purposed of access would be carefully planned, leaving important trees or communities intact, whenever possible. In cases where large areas of vegetation are cleared, that vegetation would be non-native, and it is not expected to support a diverse or abundant assemblage of wildlife. Construction activities may require wildlife exclusion or protection during the establishment period.

During the design phase, wildlife protection plans will be developed for each site for the removal and/or protection of individuals and habitats. In this way, disturbance to species present in the area proposed for restoration can be avoided or reduced. Wildlife would have many available habitats to disperse to temporarily and would return once construction is complete.

Under the recommended plan, all mature trees will be protected to the extent possible. Any trees that would be taken down due to construction would be used to create an in-stream or terrestrial habitat structure. Sensitive habitats and species that must be protected, including trees, would be clearly marked. Additional native riparian trees and shrubs will be planted in floodplain, riparian, and wetland habitats. Invasive species will be removed from the project area. Only site specific chemical application would be allowed to cut stems of invasive species and no widespread spraying would be conducted. Staging areas would be located in areas of non-native vegetation or where little or no native vegetation would have to be cleared.

Overall, although there may be minimal displacement of resident wildlife and temporary exclusion of wildlife during construction, there are not expected to be significant adverse impacts. The riparian plantings would increase the habitat value of the site by creating additional opportunities for foraging, nesting, cover, and refuge for a wide variety of species.

7.6 WETLANDS

7.6.1 No Action

Under the No Action alternative, it is likely that The Nature Conservancy would undertake invasive species removal and revegetation efforts on its properties, including wetland areas, however, they are not likely to undertake larger engineered efforts to increase wetland area in the ponds. Similarly, wetlands located on the other properties in the recommended plan may have small-scale efforts at removing invasive species, but additional efforts are not likely and the wetlands would continue to exist in much the same condition as they do now.

7.6.2 Recommended Plan

There are wetlands or waterbodies present on all of the sites, primarily associated with the existing gravel mined ponds (narrow fringing wetlands around the ponds) and in floodplain overflow channels. Estimated wetland areas and types are detailed in Table 38, below, as identified from National Wetland Inventory (NWI) mapping and wetland delineations conducted by The Nature Conservancy for their properties. The proposed project will enhance and enlarge these wetlands by providing additional shallow water habitats associated with the ponds and increase the frequency of connection of the channels and floodplain areas. During construction, some wetlands will be disturbed by equipment, removal and fill of material, removal of invasive species, placement of large wood, and native plantings. The removal and fill actions may change the water depths inundating the wetlands, and thus the plant communities may change, but the project will both create and enhance more area of wetland than currently exists and provide an overall benefit to the floodplain/riparian system by allowing natural hydrologic connections that may form additional natural aquatic and wetland habitats over time. The small area of conversion of wetland to seasonal channel will be substantially offset by the increased area of wetlands and overall enhancement of existing wetlands.

Table 38. Wetland Areas Affected by the Recommended Plan

Site	Pond/Fringing Wetland Acreage Existing	Riparian/Floodplain Wetland Acreage Existing	Wetland Area to be Changed/ Created
C1B	14 acres pond; 4 acres fringing emergent wetland	30 acres palustrine scrub/shrub and emergent wetland	Reduce pond acres to 8; increase fringing emergent wetland acres to 10; enhance 29 acres of palustrine scrub/shrub and emergent wetlands by removing invasives and providing native plants; convert 1 acre of palustrine scrub/shrub to seasonal channel
C1C	15 acres pond; 1 acre fringing emergent wetland	12 acres palustrine scrub/shrub and forested wetland	Reduce pond acres to 11; increase fringing emergent wetland acres to 5; enhance 11 acres of palustrine scrub/shrub and forested wetlands by removing invasives and providing native plants; convert 1 acre of palustrine scrub/shrub or forested wetland to seasonal channel
M1A	24 acres pond; 1 acre fringing emergent wetland	2 acres palustrine scrub/shrub and forested wetland	Reduce pond acres to 20; increase fringing emergent wetland acres to 5; enhance 2 acres of palustrine scrub/shrub and forested wetlands by removing invasives and providing native plants; create 1 acre of seasonal channel through uplands
M1B	79 acres pond; 1 acre fringing emergent wetland	4 acres palustrine forested	Reduce pond acres to 67 acres; increase fringing emergent wetland acres to 13; enhance 4 acres of palustrine forested wetlands by removing invasives and providing native plants; create 1 acre of seasonal channel through uplands
M2A	22 acres pond; 2 acres fringing emergent wetland	4 acres palustrine scrub/shrub and forested wetland	Enhance 2 acres of fringing emergent wetland and 4 acres of palustrine scrub/shrub and forested wetland by removing invasives and providing native plants

7.7 THREATENED AND ENDANGERED SPECIES

7.7.1 No Action

Under the No Action alternative, the Corps would continue to implement projects, primarily at the dams to comply with the requirements of the Biological Opinions (NMFS 2008a; USFWS 2008) and may implement some restoration projects directed at ensuring "no jeopardy" to the species from the dams. However, these actions alone are unlikely to substantially contribute to recovery of the listed species and actions by a variety of other stakeholders would be required, which will be limited by funding availability at the federal, state, and local level. It is likely that the species currently listed would continue to be listed during the 50-year period of analysis and additional species may become listed, such as the sensitive amphibian and reptile species considered in this study.

7.7.2 Recommended Plan

The Corps has conducted consultation with USFWS and NOAA under Section 7 of the ESA. The recommended plan may adversely affect Chinook salmon, and Oregon chub as a result of the temporary effects from construction; and may affect, but is not likely to adversely affect bull trout as their presence in the confluence area is very limited. The recommended plan would have no effects on the other listed species, because they are unlikely to be present in the project area. The recommended plan may also affect, but is not likely to adversely affect critical habitat for Chinook salmon and bull trout. In general, the proposed restoration plan is intended to help restore habitats and natural processes that form habitats for listed and proposed species, especially the listed fish species and will help contribute to the recovery of these species. The NMFS and USFWS are charged with recovery of these species and this plan is not intended to be the primary element of that recovery, but will contribute.

The proposed project will restore a more natural hydrologic connection between the Coast and Middle Forks of the Willamette River and their floodplains and is expected to provide long-term benefits to the species. The project will provide a substantially increased area of freshwater off-channel and floodplain rearing and refuge habitat. The project will allow greater dispersal of Oregon chub populations to off-channel habitats and also likely minimize the populations of non-native fish species in the ponds by providing more frequent connections and water exchange. The pond restoration actions will create more shallow water and wetland habitats that Oregon chub utilize.

During construction there will likely be short-term adverse effects such as temporary increases in turbidity, fish salvage and handling, pile driving for ELJ installation, and general disturbance. BMPs will be implemented during construction to avoid and minimize potential effects, such as work area isolation by the use of coffer dams and/or silt curtains, requiring that fish salvage be conducted in accordance with an approved fish salvage plan and Scientific Collection Permit by experienced fish biologists, conducting pile driving out of water or isolated from the river, installation of erosion and pollution control measures, and compliance with all permit requirements.

A summary of the determination of findings is provided in Table 39 below.

Table 39. Threatened and Endangered Species Impacts Summary

Common Name	Scientific Name	ESA Status	Preliminary Determination of Effect
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	No effect
Northern spotted owl	*Strix occidentalis caurina*	Threatened	No effect
Upper Willamette River Chinook salmon	*Oncorhynchus tshawytscha*	Threatened	May affect, likely to adversely affect
Oregon chub	*Oregonichthys crameri*	Threatened	May affect, likely to adversely affect
Bull trout	*Salvelinus confluentus*	Threatened	May affect, not likely to adversely affect
Fender's blue butterfly	*Icaricia icarioides fenderi*	Endangered	No effect
Willamette daisy	*Erigeron decumbens var. decumbens*	Endangered	No effect
Bradshaw's desert parsley	*Lomatium bradshawii*	Endangered	No effect
Kincaid's lupine	*Lupinus sulphureus spp. Kincaidii*	Threatened	No effect
Bald eagle	*Haliaeetus leucocephalus*	Protected	N/A

7.8 SOCIO-ECONOMIC CONDITIONS

7.8.1 No Action

The No Action alternative is unlikely to have any direct effects on socio-economic conditions. The small number of local construction jobs that could be generated by the recommended plan would not occur. With likely climate change scenarios, flood peaks and frequency could increase and cause future flood damages.

7.8.2 Recommended Plan

No significant effects on socio-economic conditions are expected as a result of the recommended restoration plan. The project will occur on lands that are either currently in recreation or open space designations or were historically, but not currently, used for sand and gravel extraction.

During construction, there may be a small number of local construction jobs that would be created or maintained associated with the various construction contracts, which may have direct and indirect effects on the local economy, but these effects are expected to be minor in the scale of overall construction employment in Lane County.

There also may be minor traffic effects to adjacent residences that may affect local businesses when trucks are importing or removing material. Impacts to traffic will be minimized to the maximum extent practicable by traffic control signage and flagging or other methods as necessary. It is not expected that significant adverse economic effects will occur to any businesses or commerce during construction.

7.9 RECREATION

7.9.1 No Action

The No Action alternative is unlikely to change any existing recreation uses on the sites recommended in the plan. Currently, Lane County and the State of Oregon own Site C1B and have taken temporary measures to restrict public access onto their sites due to concerns about illegal activities and safety. There has been extensive public interest in reopening these properties to public access, so it is likely that some form of future access to these properties will be developed. The Friends of Buford Park may purchase the Lane County properties and are interested in allowing future recreation that is compatible with natural habitats. The Nature Conservancy and other private landowners in the project footprint currently do not allow public access onto their properties. The Nature Conservancy may allow public access in the future, but has not developed a specific management plan for public access. Illegal access is likely to sporadically continue on all sites and may further degrade habitats and the recreational experience for legal users of the sites.

Other recreational amenities are being constructed in the subbasins including the Eugene to Pacific Crest Trail, the Middle Fork pedestrian/bicycle trail and improved amenities at Clearwater Park. Continued trail and interpretive resources are likely to be constructed over time at Buford Park as well as further upstream on the Coast Fork at North Regional Park and East Regional Park in Cottage Grove, along with additions to the Row River Trail. Additionally, continued trail development may also occur in Elijah Bristow State Park, if state funding is available. Future pedestrian/bike trail development is generally likely in Lane County. Recreational demands are likely to increase in the future with no action and while additional parks are not identified, properties may become available in the future that would be purchased and protected for public open space or access at the local level.

7.9.2 Recommended Plan

The recommended restoration plan does not include any recreational elements. Site C1B is currently owned by Lane County and the State of Oregon and passive recreation has been informally allowed; although Lane County recently fenced off street access. The project will include providing culverts under existing major trails and roadways to allow continued access at the discretion of the landowners, thus no direct effects on recreation are expected from the recommended plan. The other sites are privately owned and are not currently used by the public. It is expected that The Nature Conservancy may allow public access in the future on their property, but this project will not preclude future passive recreational uses that are compatible with the habitat restoration.

Overall, indirect/future passive recreational opportunities may be created by the recommended restoration plan including wildlife and bird watching and hunting and fishing as a result of improved habitat and potentially increased fish and wildlife populations.

7.10 CULTURAL RESOURCES

7.10.1 No Action

With the No Action alternative, no specific effects are likely to occur to cultural resources. Riparian restoration and invasive species control might occur on some of the project sites, but would largely affect areas already disturbed from former gravel mining.

7.10.2 Recommended Plan

Many locations included in the recommended restoration plan have been subjected to previous sand and gravel extraction activities and are likely disturbed to varying degrees. Cultural resources that are or may have been present in these locations were likely also disturbed by these activities. However, given the lack of previous archaeological assessments within the project area, the presence, nature and/or condition of cultural resources in both previously disturbed and undisturbed contexts have remained undetermined. Given these uncertainties, the potential for encountering cultural artifacts during the proposed construction and restoration work could not be ruled out. Therefore, a cultural resource assessment investigation was conducted within the proposed project area in November 2012 by Heritage Research Associates (2012). Information and findings from that investigation are summarized below.

A review of the records on file at the SHPO indicates that one prehistoric site (35LA95) was reported in the 1970s by a local landowner above the floodplain in the vicinity of parcel M2A. This site has been described as a thin scatter of materials, but its existence has not been confirmed by a professional archaeologist. The site area was visited during the Heritage Research Associates' 2012 cultural resources field inspections, but no artifacts were found. An earlier archaeological survey conducted in nearby locations identified no artifacts in the purported site area (Musil 2012). The closest, previously recorded archaeological sites (35LA1465; 35LA1470; 35LA1471; and 35LA179) are located north of the Middle Fork Willamette River, each outside and far removed from the proposed project area boundaries.

Historic settlement in this part of the Willamette Valley began in the late-1840s, as indicated by records of several donation land claims being made in the project area. However, no donation land claims were located within the individual project area parcels. From the late 1800s to the early-mid 1900s, the project area was primarily used for grazing and agriculture. The historic town of Seavey was reportedly located near parcel M2A and included stores, cabins, and a dance hall. However, very little evidence of the town's structures has been found. Three farmsteads were once located within the project area parcels, but all dwellings and structures were removed at an undetermined date. The only remnants of the original farmsteads include two old-growth Douglas fir trees standing near the former Compton house. Extensive gravel mining occurred in these areas from the 1950s through the 1980s.

A pedestrian survey conducted throughout the project area in November 2012 by Heritage Research Associates identified no prehistoric or historic artifacts. Most of the original landforms were found to have been heavily disturbed by gravel mining operations and many locations are now covered by piles of reconfigured topsoil or aggregate. In addition, dense vegetation (primarily blackberry brush) obscures the ground in many locations and greatly reduces surface visibility. A raised concrete foundation remnant, one metal storage tank, assorted pieces of farm equipment and a rectangular depression were observed near the historic Compton and Hilger farmsteads, but none of the items were determined to be historically significant. Areas that were found to have not been impacted by aggregate mining and/or were located within the floodplain showed signs of frequent inundation, scouring and/or sediment deposition. Such locations would not be expected to retain obvious evidence of past occupations.

This information was coordinated with the SHPO and appropriate Tribes and concurrence on the APE and further recommendations, below, was received.

The Corps is recommending that subsurface shovel testing occurring during the design phase in specific areas where the ground was obscured due to dense vegetation and where aggregate mining did not occur to further confirm the low likelihood of encountering cultural artifacts during construction. Following this additional work during the design phase, further consultation with SHPO and the appropriate Tribes will occur. The Corps is also recommending that a cultural monitor be present during construction at locations where excavation will occur.

In accordance with Oregon State Law (ORS 97.740 to 97.760, 358.905 to 358.955, and 390.235) if any artifacts are uncovered during construction or restoration work, work in the vicinity of the discoveries must be suspended immediately. SHPO and the appropriate tribes must be notified immediately and a qualified archaeologist shall be called in to evaluate the find(s) and recommend appropriate action in consultation with SHPO and the Tribes.

7.11 HAZARDOUS MATERIALS

7.11.1 No Action

The No Action alternative would have no direct effects on hazardous materials. An environmental database records search was conducted in July 2011 by EDR, Inc. as part of this study to evaluate the potential for the presence of hazardous materials and other contaminants in the study area. Additionally, The Nature Conservancy contracted with Hahn and Associates to conduct a Level 1 Environmental Assessment of their property prior to acquisition (Hahn and Assoc. 2010). There is no specific contamination that has been identified at any of the sites. A previous clean-up occurred on State of Oregon property on Site C1B in the early 1990s (clean-up of drums that had been disposed of on the site), and ODEQ provided a No Further Action letter after satisfactory clean-up. Anecdotal reports by informal users of the Lane County and State of Oregon properties indicates there still may be debris and other materials on the site, although no evidence exists that they may be contaminated. All of the proposed restoration sites are located within the 100-year floodplain or floodway and it is possible that hazardous materials or contaminants in floodwaters may have been deposited on the sites; however, based on site reconnaissance, this situation is unlikely. For the No Action alternative, no removal of debris or other materials is likely to occur and any unknown hazardous materials or contaminants on the sites would remain in place.

7.11.2 Recommended Plan

An environmental database records search was conducted in July 2011 by EDR, Inc. to evaluate the potential for the presence of hazardous materials and other contaminants in the study area. Additionally, The Nature Conservancy contracted with Hahn and Associates to conduct a Level 1 Environmental Assessment of the Wildish properties at the confluence of the Coast and Middle Forks prior to acquisition to evaluate the potential for the presence of hazardous materials and other contaminants (Hahn and Assoc. 2010). The results of these two evaluations of the likelihood of encountering hazardous materials during construction are summarized in this section. All of the proposed restoration sites are located within the 100-year floodplain and floodway. Thus, it is possible that hazardous materials or contaminants in floodwaters could have contaminated any one of these sites. However, there is no specific contamination that has been identified at any of the sites. Additional details are provided in Appendix F.

7.11.3 Coast Fork Willamette River

Site C1B. This site is owned by Lane County and the State of Oregon and has been used for gravel extraction in past decades. The Lane County property was leased in the past for recycling collection/separation. The site is undeveloped, but the public is allowed informal access on foot from Franklin Boulevard. Visual observation of the site indicated that trash is present, primarily adjacent to the road, but no hazardous materials, drums, or sheens/odors were observed. Two high voltage transmission lines are adjacent to this site, but not actually present on the site. The 2001 database search (EDR 2011) revealed eleven potential pollutant sources within one mile of the site. Virtually all of these potential pollutant sources are located along I-5 or Franklin Boulevard to the west of the site and generally separated by a railroad grade from the site. Four of the sites are Resource Conservation and Recovery Act (RCRA) conditionally exempt small quantity generators of hazardous materials such as small manufacturing and gas stations. Four of the sites have had leaking underground fuel storage tanks. A biofuel station within one mile was a former Brownfields site (former gas station) that was cleaned up and turned into a biofueling station that uses non-toxic fuels. A BPA substation within one mile has had several releases of various pollutants including oil, lead, ethanol, PCBs, and other materials. BPA has been working with the State of Oregon and other agencies to clean up and resolve all issues. The site will continue to store herbicides and fuels on the site for maintenance use. Lane Community College has some notices of non-compliance for handling of used oil, as well as documented releases of volatiles and disposal of paint waste into storm drains. They are registered to store and use pesticides and fuels and laboratory materials on site. The State of Oregon property was reported in the 1980s as having unknown drums dumped illegally on the site. The State Department of Transportation removed those drums in 1992 and received a No Further Action letter from ODEQ in 2001. While anecdotal comments received by informal users of the site have indicated there is still debris and other materials, there is currently no evidence that any of this material is contaminated. Overall, it is unlikely that any of these potential pollutant sources have released hazardous materials that could have reached Site C1B. Therefore, the likelihood of encountering hazardous materials or contaminants on the site is low. The recommended plan includes the removal of debris from ponds or other areas. If any hazardous materials are encountered during construction, they would be sampled and a plan for disposal would be developed and implemented. The costs of removal of hazardous materials would be borne by the non-Federal sponsor.

Site C1C. This site is owned by The Nature Conservancy and was recently purchased from Wildish. The site was used for gravel extraction in past decades and is generally undeveloped. One high voltage transmission line crosses this site (BPA). Visual observation of the site did not reveal the presence of any hazardous materials, drums, or sheens/odors. The Level 1 Environmental Assessment (Hahn and Assoc. 2010) indicated there were no potential pollutant sources to this site. The potential pollutant sources indicated for Site C1B are also within one mile of Site C1C, but similarly to Site C1B, it is unlikely that any of those potential pollutant sources have released hazardous materials that could have reached Site C1C. Therefore, the likelihood of encountering hazardous materials or other contaminants on the site is low. The recommended plan includes the removal of debris from ponds or other areas. If any hazardous materials are encountered during construction, they would be sampled and a plan for disposal would be developed and implemented. The costs of removal of hazardous materials would be borne by the non-Federal sponsor.

7.11.4 Middle Fork Willamette River

Site M1A. This site is owned by The Nature Conservancy and was recently purchased from Wildish. The site was used for gravel extraction in past decades and is generally undeveloped. One high voltage transmission line crosses this site (BPA). Visual observation of the site did not reveal the presence of any hazardous materials, drums, or sheens/odors. The Level 1 Environmental Assessment (Hahn and Assoc. 2010) indicated there was only one potential pollutant source to this site, which is the current hazelnut orchard on the western portion of the site, where pesticides and herbicides may have been used in the past. The 2011 database search (EDR 2011) revealed two potential pollutant sources within one mile of the site, but both sites are former leaking underground fuel storage tanks that have been decommissioned or cleaned up. The Springfield Utility Board drinking water well field is located between the potential pollutant sources and Site M1A and no reports of contaminants have occurred in that area; thus, it is unlikely that any discharges of hazardous materials or pollutants from the two potential sources could have reached Site M1A. Therefore, the likelihood of encountering hazardous materials or other contaminants on the site is low. The recommended plan includes the removal of debris from ponds or other areas. If any hazardous materials are encountered during construction, they would be sampled and a plan for disposal would be developed and implemented. The costs of removal of hazardous materials would be borne by the non-Federal sponsor.

Site M1B. This site is owned by The Nature Conservancy and was recently purchased from Wildish. The site was used for gravel extraction in past decades and is generally undeveloped. One high voltage transmission line crosses this site (BPA). Visual observation of the site did not reveal the presence of any hazardous materials, drums, or sheens/odors. The Level 1 Environmental Assessment (Hahn and Assoc. 2010) indicated there was only one potential pollutant source to this site, from the former agricultural use of the site prior to Wildish' s purchase and then an ongoing agricultural lease, where pesticides and herbicides may have been used. The 2011 database search (EDR 2011) revealed the same two potential pollutant sources as identified for Site M1A, which are both located across the river, with the Springfield Utility Board well field in between. It is unlikely that any discharges of hazardous materials or pollutants from the two potential sources could have reached Site M1B. Therefore, the likelihood of encountering hazardous materials or other contaminants on the site is low. The recommended plan includes the removal of debris from ponds or other areas. If any hazardous materials are encountered during construction, they would be sampled and a plan for disposal would be developed and implemented. The costs of removal of hazardous materials would be borne by the non-Federal sponsor.

Site M2A. This site is owned by The Nature Conservancy and was recently purchased from Wildish. The site was used for gravel extraction in past decades and is generally undeveloped. One high voltage transmission line is adjacent to this site (BPA; upstream). Visual observation of the site did not reveal the presence of any hazardous materials, drums, or sheens/odors. The Level 1 Environmental Assessment (Hahn and Assoc. 2010) indicated there were no potential pollutant sources to this site. The 2011 database search (EDR 2011) revealed three potential pollutant sources within one mile. These three potential sources are all across the river from the project site. One source is a manufacturing company that is a RCRA conditionally exempt small quantity generator that uses spent solvents and other materials. There is no record of spills or other releases. The Clearwater Landfill is located within one mile but there are no records of spills or other releases. Wentworth Buick has a leaking underground fuel storage tank, but it is unlikely that any hazardous materials or other contaminants would have reached Site M2A because Jasper Slough, that discharges into the Springfield Millrace is located between the potential source and the river and if any fuels discharged to ground or surface waters they would have likely been carried down the Millrace. An NPDES permitted stormwater outfall is located in Clearwater Park across the river from Site M2A, but it is not likely that any pollutants from the outfall have contaminated Site M2A. Therefore, the likelihood of encountering hazardous materials or contaminants on the site is low. The recommended plan generally does not involve excavation or grading. If any hazardous materials are encountered during construction, they would be sampled and a plan for disposal would be developed and implemented. The costs of removal of hazardous materials would be borne by the non-Federal sponsor.

7.12 AIR QUALITY

7.12.1 No Action

The No Action alternative would have no effects on air quality. No major construction would occur on the sites and no sources of emissions would be developed or used. Airborne dust could still be generated from gravel/dirt roadways and disturbed areas, but this is considered a very minor source.

7.12.2 Recommended Plan

The recommended restoration plan would have no long-term effects on air quality, other than the potential to reduce airborne dust as a result of revegetation sites that are currently disturbed due to sand and gravel extraction activities. The project will not construct any new sources of air pollution.

During construction, airborne contaminants, including dust and other particulate matter may be released into the air during clearing of project areas and use of heavy equipment that stirs up exposed soils. Measures would be taken to reduce dust in cleared areas, including the application of water to exposed soils or placement of mulches or other materials to reduce dust.

Construction vehicles may temporarily increase air emissions in the immediate project vicinity, through the release of carbon monoxide and other pollutants from fuel combustion. Air quality emissions should not exceed EPA's *de minimis* threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone) for non-attainment areas, however, the project is located in a maintenance area and there have been no standards set for greenhouse gas emissions (CO_2 in the case of this project) in the state of Oregon. Other emissions under consideration for non-road construction equipment are reactive organic gases (which are ozone precursors), nitrogen oxides, particulate matter, and sulfur oxides.

For every gallon of diesel fuel burned, 22 pounds of CO_2 are produced, and every gallon of gasoline burned produces 19.4 pounds of CO_2 (EPA 2008). The CO_2 emissions created by this project are likely to be insignificant compared to the emissions generated in Lane County annually. Nevertheless, diesel fuel consumption by heavy machinery required for construction, material delivery and haul-off, and gasoline consumption for travel to the sites are a part of world-wide cumulative contributions to change in climate by way of increases in greenhouse gas emission. However, the plantings at the site should aid in the absorption of CO_2 over time.

Overall, no significant adverse impacts are expected for air quality.

7.13 NOISE

7.13.1 No Action

The No Action alternative would have no effects on noise as no major construction activities would occur on the sites without Federal action.

7.13.2 Recommended Plan

Construction vehicles and equipment may temporarily increase noise in the immediate project vicinity. Construction will be restricted to normal working hours to minimize this disturbance (i.e., 7 a.m. to 7 p.m.), which is within the restricted limits outlined in the Lane County noise ordinance. Some example sources and magnitude of noise arising from construction is summarized in Table 40 (from the Federal Highway Administration Construction Noise Handbook).

Based on the preliminary project designs, construction may call for the use of excavators, bull dozers, front loaders, a wheel-mounted crane, and a pile driver. Based on the type and duration of construction activities proposed, temporarily elevated levels of noise are not expected to be an issue for the study area. The land uses adjacent to the construction zones are largely composed of rural residential land uses. No sensitive receptors have been identified adjacent to the project sites.

Table 40. Example Equipment Noise Levels

Equipment Description[1]	Impact Device?	Spec. 721.560 L_{max} at 50 feet (dBA, slow)
Chain Saw	No	85
Compactor (ground)	No	80
Compressor (air)	No	80
Concrete Pump Truck	No	82
Concrete Saw	No	90
Crane	No	85
Dozer	No	85
Dump Truck	No	84
Excavator	No	85
Flat Bed Truck	No	84
Front End Loader	No	80
Grader	No	85
Impact Pile Driver	Yes	95
Pickup Truck	No	55
Tractor	No	84

1 – List of equipment truncated for example purposes. Full list available at source below.

Source: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm

7.14 CLIMATE CHANGE

7.14.1 No Action

Under the No Action alternative, climate change is occurring and will continue to occur over the 50-year period of analysis. For the Upper Willamette River subbasin, potential climate change predictions have been summarized in *Preparing for Climate Change in the Upper Willamette River Basin of Western Oregon* (Doppelt et al. 2009). Key points from that assessment include:

- Average annual temperatures are likely to increase by 2 to 4F (1 to 2C) by 2040 and additional 6 to 8F (3 to 4C) by 2080. Average summer temperatures are likely to increase on the high end of that range and average winter temperatures are likely to increase on the low end of that range.
- Precipitation scenarios are more difficult to predict, but it is likely that there will be slightly reduced precipitation in spring, summer, and fall, and potentially increased precipitation in the winter months.
- Snowpack is likely to decline by up to 60 percent by 2040 and 80-90 percent by 2095. As snow melts earlier in the spring, runoff will peak earlier but at lower levels with reduced snowpack (see Figure 36).
- With increased temperatures and more moisture in the atmosphere, storm events will likely increase in intensity, resulting in increased levels or frequency of flooding.
- Changes in temperatures and hydrology of stream systems will likely be detrimental to many native aquatic species that rely on cool temperatures and more stable flows. Non-native species may increase in population as temperatures increase. Spring-fed systems will be buffered against some of these effects.
- Changes in temperature will likely be detrimental to terrestrial plant and wildlife species; similarly contributing to the spread of invasive species.

Recommendations for preparing natural systems to adapt to climate change include:

- Prioritizing protection of areas that provide ecosystem services such as flood control, water storage and carbon sequestration and/or areas that provide climate refuges.
- Increase efforts to identify, manage, and control invasive species.
- Base resource management efforts on the entire ecological system and maintain resiliency and flexibility.
- Protect key parts of the landscape that will be able to withstand or contribute towards helping the system withstand climate change stresses.

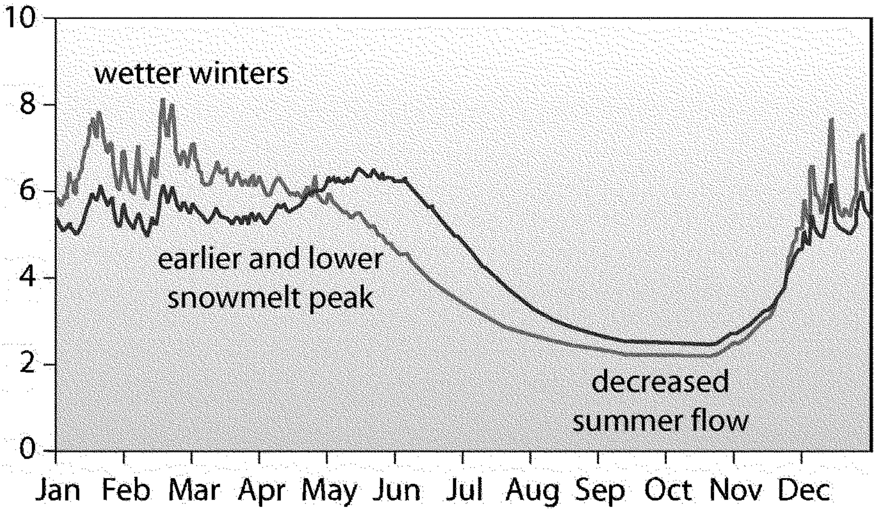

Figure 36. Future streamflow patterns (red) may differ from historical patterns (blue) in the High Cascade Mountains

Note: Streamflow, measured in mm/day, was modeled under a scenario of 1.5C warming (reproduced from Tague and Grant 2009).

7.14.2 Recommended Plan

The recommended plan is unlikely to cause measurable effects on climate either during construction or as a result of long term operation of the selected plan. As identified for the No Action alternative, climate change is continuing to occur regardless of whether this plan is implemented, or not. As climate change occurs, changes in conditions such as temperature and hydrology are expected. It is expected that climate change will cause reduced snowpack and may also lead to a more variable rainfall regime (higher peak rainfall events and lower summer season flows).

The restoration of floodplain habitats is an important way to maintain resilience in the ecological system that will help ameliorate effects to the ecosystem and human environment by maintaining flood storage capabilities and allowing sediment erosion and deposition, as well as providing off-channel refuge for aquatic species during high flows. Additionally, more frequent connections between the rivers and floodplains will promote groundwater recharge that can help sustain low flows.

Lower flows and more frequent droughts may alter the survivability of the current plant community. A drier, warmer summer may shift habitat conditions to favor more drought tolerant plant species. The type of species selected in the design phase will include a mix of both wet adapted and dry adapted native species to help bracket the range of conditions that may occur in the future. After construction, vegetation survival at the site will be monitored. Depending on monitoring results, the operation and maintenance activities (solely the responsibility of the non-Federal sponsor) would include replanting as necessary with a species list informed by the changing hydrology at the site.

7.15 ENVIRONMENTAL JUSTICE

7.15.1 No Action

The demographics of the project area include a 2010 population estimate for Lane County of 351,715, and populations of the adjacent zip codes 97405 and 97477 of 44,645 and 36,874, respectively. The median household income of Lane County is $42,621, with 17.4 percent of individuals below the poverty level; compared to the adjacent zip codes with median household incomes of $54,096 and $35,610 and individuals below the poverty level of 14.5 percent and 21.7 percent. The majority of the population is white (County 88.3 percent, zip codes 89.1 percent and 85.4 percent) with Hispanic or Latino and Asian races at 7.4 percent (4.7 percent and 12.3 percent) and 2.4 percent (3.3 percent and 1.5 percent) , respectively. This demographic analysis did not identify any predominantly ethnic minority, low-income, or subsistence populations in the project area.

The No Action alternative would not have any direct adverse effects on environmental justice communities, but would also not take any actions to improve the quality of natural floodplain habitats or potentially increase fish and wildlife populations.

7.15.2 Recommended Plan

Executive Order 12898 states "To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands."

EC 12898 requires the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The Federal government has this goal for all communities and persons across this nation. It would be achieved when everyone enjoys the same degree of protection from environmental and health hazards, equal access to the decision-making process, and the opportunity to have a healthy environment in which to live, learn, and work.

The project would temporarily and minorly affect noise, traffic, and air quality during construction, and would enhance aesthetics and habitat quality and fish and wildlife populations once construction is complete. The project will not affect human health as it will not involve the siting of a facility or creation of a scenario in which pollutants or contaminants would be discharged. This project will not have a disproportionately negative effect on any ethnic minority, low-income, or subsistence populations and may provide benefits via the contributions to recovery of fishable salmon populations. Therefore the proposed action is in compliance with this executive order.

7.16 SECONDARY (INDIRECT) IMPACTS

Secondary or indirect impacts of the project include the possible promotion of additional restoration projects in the Willamette Basin based on the project's success. Additional fishing and hunting opportunities may be provided due to an increase in the fish and wildlife population as a result of restoration actions. Future recreation and environmental education enhancements may be implemented within the project area at the landowner's discretion as an indirect result of successful habitat restoration.

7.17 CUMULATIVE IMPACTS

Cumulative effects are defined as the "impact on the environment which results from the incremental additional impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal of non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR 1508.7) In contrast to the potential direct and indirect effects of the actions, cumulative impacts result from the combination of multiple effects from various actions over time. In order to determine the cumulative effects for this project, the 50-year period of analysis was used as the future temporal limit of the analysis (approximately year 2065). The geographic boundary of the analysis was the lower Coast and Middle Fork subbasins (i.e. the study area).

The combined past and on-going human activities that have occurred since Euro-American settlement began in the early 1800s have caused the currently degraded environmental baseline and caused cumulative impacts to the ecosystems of the lower Coast and Middle Forks subbasins. These actions have included agricultural and urban development, timber harvesting, construction of dams and revetments/levees, water withdrawals, gravel mining within the rivers and floodplains, and removal of wood from the rivers. These effects have altered the hydrology and geomorphology of the rivers, disconnecting the rivers from their floodplains and caused the whole-scale removal or replacement of former terrestrial, floodplain, and aquatic habitats and conversion to other vegetation or non-vegetated communities (i.e. agricultural and ornamental communities or buildings, pavement and other disturbed/ruderal areas). As a result riparian and off-channel habitats have been greatly reduced resulting in adverse cumulative effects to multiple species and has also increased flooding risk to human communities and infrastructure due to their locations within floodplains.

Reasonably foreseeable future actions in the study area of the lower Coast and Middle Forks subbasins include the following:

- As yet unidentified, but likely continued residential development on privately owned lands within the floodplains of both the lower Coast and Middle Forks subbasins, including within and adjacent to the cities of Springfield, Eugene, Jasper, Creswell, and Cottage Grove, and also adjacent to the project sites in the Seavey Loop Road area;
- As yet unidentified, but likely implementation of water quality improvements associated with TMDL compliance, including riparian restoration along the mainstem rivers and their

tributaries, further treatment of wastewater and other point source discharges via tertiary treatment and the use of infiltration areas, wetlands, or direct injection into the ground;

- The implementation of fish passage, water quality (selective withdrawal), and restoration actions by the Corps for compliance with the Biological Opinions (NMFS 2008a; USFWS 2008). Specific actions required in the Biological Opinions for the lower Coast and Middle Fork subbasins include meeting minimum flow requirements for Fall Creek (50-200 cfs) and the Middle Fork Willamette River (1200 cfs), conduct instream flow studies on the Middle Fork Willamette River to identify the relationships between flow rates and habitat conditions for fish to then re-evaluate flow needs and carry out operational changes to flows as appropriate, maintain outflows from Fall Creek and Dexter dam below maximum levels as practicable to minimize effects on redds, reduce up and down ramping rates, carry out environmental/pulsed flows from all dams as feasible to create and maintain better fish habitat conditions, allocate and preserve stored water for fish enhancement purposes, capture and transport spring Chinook above Fall Creek and Middle Fork dams, develop Willamette Fish Operations Plan to avoid and minimize effects on adult salmon from dam releases and handling for transport, design/construct Dexter Ponds Fish Facility and Fall Creek Dam Trap to improve capture and handling of adults and minimize mortality, design/construct/operate interim and permanent downstream fish passage facilities on Fall Creek and Middle Fork dams, implement water quality improvement measures such as selective releases, improve genetic management of spring Chinook hatchery operations in Middle Fork subbasin, and implement habitat restoration projects (as yet unidentified).
- The installation of fish screens or other fish protection devices per NOAA standards on all dams/diversions/intakes associated with Bureau of Reclamation water contracts in the subbasins.
- Pulsed-flow hydrology (releases from the dams) under the Sustainable Rivers Program and for Biological Opinion compliance to include increased peaks to coincide with rainfall-runoff (within the flood risk management requirements);
- Other restoration actions undertaken by a variety of stakeholders in the subbasins, particularly the Middle Fork Willamette River Watershed Council, Coast Fork Willamette River Watershed Council, and the Friends of Buford Park. Projects on-going and likely in the future by the Middle Fork Watershed Council include floodplain and riparian revegetation at the confluence of Lost Creek and the Middle Fork, riparian revegetation and invasive species removal at multiple sites on Lost Creek and the Middle Fork, and habitat enhancements and side channel reconnections at Elijah Bristow State Park. Projects on-going and likely in the future by the Coast Fork Watershed Council include riparian and floodplain revegetation at Row River Nature Park, riparian and aquatic habitat enhancements at Garden Lake Park, and aquatic habitat enhancements in Mosby Creek. Side channel and formerly gravel mined pond restoration may occur at Row River Nature Park in the future. The Friends of Buford Park will continue to enhance various plant and aquatic communities in and adjacent to Buford Park.

Neither the No Action alternative nor the recommended plan is likely to have cumulative effects on socio-economic conditions, recreation, cultural resources, hazardous materials, air quality, or noise within the study area. Thus, these elements of the environment are not discussed further in the context of cumulative effects.

7.17.1 No Action Alternative

The No Action alternative will not include undertaking any actions, but there will be on-going and future cumulative effects from the reasonably foreseeable future actions and climate change on hydrology and hydraulics, geomorphology, water quality, fish and aquatic habitat, terrestrial species and habitats, wetlands, and threatened and endangered species. The direct effects are described previously in this chapter. Overall, while regulatory mandated actions and other restoration projects are intended to provide improvements in hydrologic conditions and stimulate some geomorphic change (within allowable flood risk management requirements) and will tend to improve the quality of both aquatic and floodplain/riparian habitats and contribute towards listed species recovery, continued population growth and development along with climate change effects will tend to counterbalance the overall effects at the study area scale with some additional degradation of habitats, water quality, and hydrology/hydraulics and geomorphic conditions.

Hydrology and Hydraulics. Under the No Action Alternative, the Sustainable Rivers Program and mandated compliance actions for the Corps, BPA, and the Bureau of Reclamation to undertake for the Willamette Biological Opinions (NOAA 2008; USFWS 2008) will result in pulsed flows (higher peak flows during rain storms and normal snow melt runoff) within allowable flood management limits. This will stimulate more frequent connections to existing side channel habitats that can be connected at flows less than bank-full. This will also tend to transport and deposit sediment and wood as available within the channel. However, the future effects of climate change will likely result in less snowpack and potentially less storage in upstream reservoirs that will reduce the capability of the dam operators to release flows. During flood events, the Corps will seek to manage flood risks and reduce flooding, however, more intense storms and rain-on-snow events will reduce their ability and there will likely be somewhat more frequent flooding caused by severe storms. This will reconnect floodplain areas, but without restoration, this could cause stranding of fish in floodplain areas or transport of pollutants and debris into the rivers.

Geomorphology. The results from the potential future changes to hydrology and hydraulics will contribute to the potential for at least limited geomorphic changes in the study area. More frequent floods will tend to cause localized channel migration from bank erosion and redistribution of sediment and wood in the channel and floodplain. This could cause some of the floodplain gravel mined ponds to become naturally reconnected; although this would occur in an uncontrolled fashion and could cause head-cutting or other changes within the channel. Over time, the on-going and future riparian revegetation efforts will contribute some increased large wood into the channel which will be transported or deposited within the channel or could be carried onto the floodplain during flood events. Overall, geomorphic changes under the No Action Alternative are likely to both create and destroy aquatic and floodplain habitats.

Water Quality. Under the no action alternative, the actions required by TMDLs in the study area will improve water quality conditions including reducing water temperatures, increasing dissolved oxygen, and reducing bacteria and mercury. However, climate change is likely to increase both air and water temperatures and reduce low flows due to reduced snowpack. Overall, water quality is likely to improve from the toxic pollutant stand-point, but water temperatures may remain close to existing or actually increase over time.

Fish and Aquatic Habitat. Under the no action alternative, the actions required by the Willamette Biological Opinions (NOAA 2008; USFWS 2008) will seek to increase fish populations (spring Chinook and steelhead) in the study area by providing transport and passage into the upper watersheds where habitats are more conducive to salmonid productivity and survival, and improve habitats in both the lower and upper watersheds. The Corps may also undertake actions to mimic more natural temperature and flow regimes through dam releases. However, with climate change, the reduced snowpack and potential increased intensity of rainstorms and rain-on-snow events will limit the capability of the Corps to conduct beneficial releases and water temperatures overall will likely increase, thus ultimately limiting the productivity of fish and potentially limiting the area and quality of aquatic habitats. Other restoration actions undertaken in the study area will improve localized habitats (particularly riparian areas) that will contribute more large wood into the system over time, but will not likely prevent future degradation to aquatic habitat from other development actions and climate change.

Terrestrial Species and Habitats. Under the no action alternative, other restoration actions undertaken by stakeholders in the study area will include removal of invasive species and riparian, floodplain, and upland revegetation. On-going population growth and development will tend to remove terrestrial vegetation communities and fragment these communities. It is likely that overall, conditions will remain somewhat similar to the existing condition.

Wetlands. Under the No Action Alternative, wetlands would continue to be regulated at the Federal, state and local levels; however, this would likely include continued fill or development in wetlands with associated mitigation. The gravel mined ponds in the floodplains would not likely be developed as it would be costly, although some ponds could be modified for use as recreational ponds/lakes that would likely remove aquatic vegetation. Such ponds that would remain in their generally existing condition would likely become more dominated by invasive species over time. During flood events, sediment and wood would likely be deposited slowly into these ponds and wetlands. Natural succession of wetlands might cause eventual natural filling. Shrub and forested wetlands would tend to mature over time, but invasive species would likely become more widespread (i.e. blackberries, knotweed).

Threatened and Endangered Species. Under the No Action Alternative, NOAA and the USFWS would still be responsible for recovery of threatened and endangered species and would require actions by various entities as well as undertaking actions themselves to promote recovery. Certain species, such as Oregon chub, have already been downlisted and are on a trajectory to being removed from the Endangered Species List. Other species, such as salmon, may continue to be listed during the period of analysis. Other restoration actions in the study area will be undertaken specifically for salmon habitat and population improvements, but it is unclear how effective these actions will be on a population level. Additional species are likely to be listed in the future, particularly terrestrial species as well as amphibians and reptiles. Overall, it is likely that listed species will continue to decline, particularly with the effects of climate change.

For the human elements of the environment, the No Action alternative will neither contribute to nor prevent cumulative effects such as increased population density, traffic, air emissions, noise, or creation or use of recreational amenities. It is likely that for most elements of the environment, the cumulative No Action condition will remain similar to the existing condition or slightly worsen with increased population density and resource use.

7.17.2 Recommended Plan

The recommended plan will have temporary adverse direct effects during construction on water quality, but it is unlikely that there will be other reasonably foreseeable future actions occurring in the immediate proximity or at the same time as the recommended plan so the temporary construction effects such as increased turbidity, disturbance, fish handling, etc. are not likely to cumulatively interact with other projects.

Hydrology and Hydraulics. In the long-term, the recommended plan will incrementally reverse some of the cumulative adverse effects that have occurred in the project area by restoring a more natural hydrologic connection between the rivers and their floodplains. While this project will not directly affect flows, it will allow flows and the future increasing flood frequency to naturally flood into floodplain habitats, thus incrementally helping the study area be more resilient in the face of climate change. Also, the reconnection of floodplain habitats tends to allow flows to come out of the main channel, thus reducing velocity and scour in the main channel by spreading out the total flow into the floodplain. The recommended plan will incrementally help ameliorate some of the cumulative adverse effects on hydrology and hydraulics in the study area.

Geomorphology. The recommended plan is intended to create some limited geomorphic responses to the placement of large wood and reconnection of floodplain areas and substantial riparian restoration that will contribute wood into the rivers over the long-term. This would stimulate sediment sorting and deposition and allow the limited creation of additional side channels. However, the recommended plan will not substantially restore natural geomorphic processes. The recommended plan will help ameliorate some of the cumulative adverse effects on geomorphology and help the study area to remain more resilient in the face of climate change by allowing sediment and wood processes to continue in the floodplain.

Water Quality. The recommended plan is intended to promote groundwater recharge as more frequent flows will connect to the floodplain. This may have minor overall cumulative benefits to water temperature by somewhat increasing groundwater flows back into the river. Other actions required for TMDL compliance by other stakeholders will likewise at least somewhat reduce temperatures and improve other water quality parameters. However, climate change will continue to increase air and water temperatures. The recommended plan will help the study area to remain more resilient in the face of climate change by incrementally promoting groundwater recharge and subsequent discharge to the rivers.

Fish and Aquatic Habitat. The recommended plan is intended to restore large areas of aquatic and floodplain habitat for fish refugia and rearing. This will help to ameliorate some of the cumulative adverse effects on fish and aquatic habitat that have already occurred and provide important refuge areas in the face of climate change. Overall, the recommended plan will also work in concert with other restoration actions in the study area to help to reverse cumulative effects.

Terrestrial Species and Habitats. The recommended plan will restore riparian habitats that are important for migratory birds, mammals, and other terrestrial species. This will incrementally help to ameliorate some of the adverse cumulative effects that have occurred to terrestrial species and habitats over time. The recommended plan will also work in concert with other restoration actions in the study area, particularly at Buford Park and adjacent upland areas to help to provide better linkages both along the rivers and from aquatic to upland habitats.

Wetlands. The recommended plan will enhance wetland habitats on the project sites by removal of invasive species and increasing the area of shallow water habitat to be revegetated with native species. In the scale of the study area, this may help to maintain wetland habitats in critical areas for species that use wetlands and promote linkages between the rivers and uplands. However, wetland habitats, while they will continue to be regulated in the future, are likely to become more fragmented over time, even with future restoration actions.

Threatened and Endangered Species. The recommended plan will enhance habitats for several listed species, particularly salmonids. While the recommended plan is only one component of the recovery requirements, it will incrementally help in the recovery of these species. Other restoration actions in the study area are also directed at recovery of listed species and will incrementally contribute towards their recovery. However, it is unclear, even with the reasonable foreseeable future actions if species will be recovered within the period of analysis.

For the human elements of the environment, the recommended plan will have no cumulative effects as the temporary induced increases in traffic, air emissions, and construction equipment noise would be minor and comply with all County codes. The recommended plan may have slight cumulative beneficial effects on recreation if the landowners elect to improve and/or provide public access to the sites as a result of the successful restoration of the sites and improved safety conditions associated with restoring the gravel mined ponds and removal of debris.

7.18 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The temporary use of construction equipment and materials during construction will generally be minor in the scale of energy use, air quality and noise effects, compared to the long-term restoration of floodplain processes and habitats. Also, the project sites are currently generally fallow, but subject to some recreational uses. By restoring these habitats, the sites will become more useful for conservation and recreational uses, but restrict their use for further gravel mining and development. In the long-term this will reduce the use of energy and further air quality and noise effects within the floodplain. The proposed restoration plan is unlikely to adversely affect the regional economy and may provide minor beneficial effects on the economy by avoiding flood damages and providing suitable recreation and quality of life factors, including aesthetics to nearby residents.

7.19 UNAVOIDABLE ADVERSE IMPACTS

The only unavoidable adverse impacts would be temporary and short-term associated with construction, such as fish salvage and handling, minor increases in turbidity, minor increases in traffic from construction vehicles, minor air emissions, and noise associated with pile driving and the use of construction equipment. These short-term effects will be minimized to the maximum extent practicable by the implementation of construction BMPs and other conservation measures. These impacts are not considered significant.

7.20 MITIGATION MEASURES

Construction BMPs will be implemented to minimize any adverse effects to the maximum extent practicable, including implementation of erosion and pollution control measures (i.e., silt curtains, silt fencing, mulching), only working in waters during allowable in-water work windows, work area isolation (such as using coffer dams and silt curtains), fish salvage and removal per an approved fish salvage plan and under a valid Scientific Collection Permit approved by NMFS and ODFW, noise reduction measures for pile driving such as using coffer dams and driving piles out of waters, and other appropriate measures to be developed during the design phase.

7.21 ENVIRONMENTAL OPERATING PRINCIPLES

The recommended plan will be consistent with the current Corps' Environmental Operating Principles as identified below.

1. *Foster sustainability as a way of life throughout the organization.* – This project is intended to contribute to the restoration of natural habitat formation processes and reconnect off-channel habitats to the Coast and Middle Forks of the Willamette River. This is to allow sustainable processes to continue into the future with limited necessary human intervention and management in the future. This will help restore habitats for sensitive fish and wildlife species and contribute to the recovery of these species populations.
2. *Proactively consider environmental consequences of all Corps activities and act accordingly.* – As identified above, this project is intended to allow natural physical processes to function more effectively to create and form habitats for fish and wildlife. This will incrementally address some of the consequences that past Corps programs have caused to floodplain connections and quantity/quality of habitat downstream of Corps dams.
3. *Create mutually supporting economic and environmentally sustainable solutions.* – This project will reconnect floodplain habitats to the rivers in areas with limited development or infrastructure to purposefully restore natural systems and functions. The project will not have adverse effects on residents or infrastructure and may incrementally increase flood storage and reduce velocities in the main channels providing some reduced risk of damages to adjacent infrastructure and development.
4. *Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.* – This project provides restoration of natural systems and is intended to avoid adverse effects on human health and welfare and may incrementally reduce risks to human health and welfare by promoting flood storage and diversification of channel velocities.
5. *Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.* – This project has been designed in the context of ongoing watershed processes including hydrology and sediment transport. It is designed to function over the long-term with potential changes in the operation of dam outflows and promote restoration of these processes. It has also been designed in consideration of climate change effects and may incrementally help to buffer those effects by providing additional flood storage during lower events and promoting groundwater recharge that can supplement low flows.
6. *Leverage scientific, economic, and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.* – The Corps and the local sponsor have worked extensively with stakeholders and the public during this feasibility study to solicit the input of academic researchers and others in the subbasins on problems and needs and the potential effectiveness of proposed restoration measures. The tools developed for this study will be used by stakeholders in the basin as well as monitoring results for the post-construction condition.
7. *Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.* – The Corps and the local sponsor have worked extensively with stakeholders and the public during this feasibility study to solicit their input and feedback on proposed restoration measures and alternatives.

8. SUMMARY OF PUBLIC INVOLVEMENT

8.1 STAKEHOLDER AND AGENCY INVOLVEMENT

A wide variety of stakeholders were involved in both the development of the Subbasin Plan in Phase 1 and in scoping this feasibility study – now identified as Phase 2 (Table 41). These stakeholders have also been consulted at key points in the feasibility phase.

Table 41. Stakeholders Involved in Feasibility Study

Watershed Councils	**Local Governments**
Coast Fork Willamette Watershed Council	Lane County
Middle Fork Willamette Watershed Council	Lane Council of Governments
Federal Agencies	City of Springfield
USDA Forest Service	City of Cottage Grove
National Marine Fisheries Service	City of Creswell
Natural Resources Conservation Service	City of Lowell
Bureau of Land Management	City of Oakridge
U.S. Fish and Wildlife Service	East Lane Soil and Water Conservation District
U.S. Environmental Protection Agency	**Other Interest Groups**
State Agencies	Willamette Restoration Initiative
Oregon Department of Agriculture	Friends of Buford Park & Mt. Pisgah
Oregon Dept. of Environmental Quality	McKenzie River Land Trust
Oregon Dept. of Fish and Wildlife	The Nature Conservancy
Oregon Dept. of Forestry	Oregon State University
Oregon Dept. of Geology & Mineral Industries	Pacific Northwest Ecosystem Research Consortium
Oregon Dept. of Land Conservation and Development	The Trust for Public Land
Oregon Watershed Enhancement Board	Willamette Riverkeepers

A series of stakeholder meetings has occurred from 2008-2011 to discuss restoration measures and alternatives. Key feedback has been provided on the importance of the confluence area and other key off-channel areas, and recommendations for backwater versus flow-through connections and other features. Once the top ranked projects were identified in the first run of the CE/ICA, meetings with landowners occurred to identify interest and willingness to participate. This resulted in the removal of some sites where landowners were not willing. Additionally, Oregon State Parks and the City of Cottage Grove indicated that they were already proceeding with some sites that were then also removed from the list as they would be implemented sooner than this study would be completed.

Public involvement has also occurred at several points during the feasibility study. To date, a series of public meetings were held in June 2006 in the Coast and Middle Fork watersheds. A variety of landowners, stakeholders, and others attended and discussed the general study purpose and overview, study area, defined floodplain restoration and potential ideas, and asked for feedback on issues. Primary concerns of the public in the study area are the existing flooding and erosion damages, some as a result of culverts and other constrictions as well as unintended consequences of bank protection. Many landowners are supportive of restoration but are also concerned that the local jurisdictions continue to allow development in the floodplain and riparian zones.

Additional public meetings were held in October and November 2008. At these meetings large maps were presented with the potential restoration alternatives identified to solicit comments and concerns from the attendees. A number of stakeholder expressed interest in habitat and floodplain restoration, especially State Parks. Private landowners are concerned about flooding effects or bank erosion. The City of Springfield indicated that some of their drainage problems could be helped by floodplain and/or side channel restoration.

The draft report was published for public review and comment on March 12, 2013. A public workshop was held on March 28, 2013 in Springfield City Hall. A number of public comments were provided by email, voicemail, and in writing to the Corps and are summarized in the following bullets. A more detailed summary of the stakeholder and public involvement conducted, to date, is provided in Appendix H. As invasive species management was a major concern during public review, Appendix J has been developed that identifies key invasive species of concern and outlines a strategy for management.

- Numerous invasive species are present on the sites. Concerns about introducing these species into the river if ponds are connected. One or more commenters provided a list of invasive species they have seen on the sites.
- Concerns about potential contaminants present on Site C1B. Anecdotal stories of turbid water, debris, unknown drums, catch basin dumping, etc.
- Concerns about water quality and water temperature in the ponds.
- Concerns about gravel deposition in the lower Coast Fork and low flows in the river during summer and potential effects of erosion/flooding.
- Numerous comments about recent Lane County fencing off public access to Site C1B. Would like to see public access restored.
- Would like Coryell Pass plaque recognized (located near Highway 99 overlooking Glassbar Island on Site C1A – not included in recommended plan).
- Concerns about effects to sensitive habitats and species during construction. Would like assessment to ensure these habitats/species are not affected.
- Interest in having debris removed from Site C1B
- Concerns about public safety if wood or ELJs are installed in the river.
- Would like more public involvement to be conducted.
- Interest in not changing current condition of Site C1B.
- Questions about whether this plan includes development on any of the sites (i.e., more gravel mining).
- The project will likely be subject to Lane County review of floodplain fill/removal.

9. ENVIRONMENTAL COMPLIANCE REQUIREMENTS

9.1.1 National Environmental Policy Act

This integrated Feasibility Report and Environmental Assessment has been prepared to achieve NEPA compliance for the proposed restoration plan. This report describes existing environmental conditions within the study area, the proposed action and alternatives, potential environmental impacts of the proposed restoration plan, and measures to avoid and minimize environmental impacts. Public review of the draft report occurred in March and April 2013. Comments received during the review have been evaluated and changes incorporated as appropriate into this final report. A Finding of No Significant Impact (FONSI) has been determined and is included in Appendix I.

9.1.2 Endangered Species Act

The Endangered Species Act (ESA) of 1973, as amended, declares that all Federal agencies "...utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to Section 4 of this Act.". Section 7 of the ESA requires Federal agencies to ensure that any agency action (any action authorized, funded, or carried out by the agency) is not likely to jeopardize the continued existence of any threatened, endangered, or proposed species. Agencies are further required to develop and carry out conservation programs for these species.

In accordance with Section 7(a)(2) of the ESA, federally funded, constructed, permitted, or licensed projects must identify and evaluate any threatened and endangered species, and their critical habitat, that may be affected by an action proposed by that agency. The Corps consulted under Section 7(a)(2) of the ESA with NMFS and USFWS and received Biological Opinions from each agency in June 2013. Both agencies have concurred with the preliminary determinations made by the Corps of "may affect, likely to adversely affect" for Upper Willamette Chinook salmon and Oregon chub, and a determination of "may affect, not likely to adversely affect" for bull trout, as well as no effect on Bradshaw's desert parsley. Specific conservation measures required include:

1. Survey suitable habitats during the growing season prior to construction for Bradshaw's desert parsley, and if any are found, flag and protect the individual plants during construction.
2. Survey areas where Oregon chub may be present prior to construction. If any are found, reinitiate consultation for that site to determine if further conservation measures are warranted.
3. If any Oregon chub are captured during fish salvage/removal operations during construction, contact USFWS and ODFW immediately to identify if any additional site-specific conservation measures are warranted. Capture and release Oregon chub to minimize stress.
4. Design site-specific projects consistent with the applicable conservation measures of the SLOPES IV Restoration Biological Opinion or SLOPES Transportation Biological Opinion (most recent version).
5. Provide notice to NMFS of projects carried out under the terms of the proposed action (project notification 60 days prior to start of construction; project completion notice 60 days prior to end of construction; fish salvage notice within 60 days of fish capture; annual reporting).
6. Coordinate final designs with NMFS to confirm estimated take.

7. Submit fish salvage and monitoring results to NMFS.

9.1.3 Clean Water Act

Section 404 of the Clean Water Act authorized a regulatory program for the disposal of dredged or fill material into waters of the United States, and defined conditions which must be met by Federal projects before they may make such discharges. The Corps retains primary responsibility for this permit program. The Corps does not issue itself a permit under the program it administers, but rather demonstrates compliance with the substantive requirements of the Act through an equivalency analysis of the potential effects following the procedures required under the regulatory program.

The recommended plan meets the criteria for qualifying under Nationwide Permit #27 for aquatic habitat restoration, establishment and enhancement activities. Within the State of Oregon, Nationwide Permit #27 qualifying projects are pre-approved under the Section 401 Water Quality Certification and these projects should comply with the general conditions of the State's water quality program. The Corps will comply with the Section 404 nationwide permit general and regional conditions and the State's Section 401 general conditions to meet water quality standards.

Section 402 of the Act requires a National Pollutant Discharge Elimination System (NPDES) permit and the associated implementing regulations for General Permit for Discharges from large and small construction activities for construction disturbance over one acre. This permit will be obtained for each project site during the design phase.

9.1.4 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC 661) requires that wildlife conservation receive equal consideration and be coordinated with other features of water resource development projects. This goal is accomplished through Corps funding the USFWS to participate in the planning process and provide recommendations for avoiding or minimizing such impacts. Coordination with USFWS has been ongoing throughout the study process and a letter with recommendations was provided (Appendix I). A number of recommendations for the design and construction phases were provided including: consideration of climate change, obtaining all required permits, working during designated in-water work windows, proper removal and disposal of any contaminants, proper environmental compliance and documentation during construction, appropriate staging and stock-piling and the use of best management practices, erosion and sediment control, spill prevention, protection of sensitive habitats and species during construction, invasive species control, work area isolation and fish salvage, proper treatment of construction discharge water, minimizing duration/extent of disturbance, site restoration, revegetation, and post-construction monitoring.

One recommendation has already been completed during feasibility: site assessments for contaminants have been completed on all five sites included in the recommended plan during the feasibility study and the results indicate that there is low potential for contamination. There is debris and trash and this material will be removed during construction.

One recommendation will be further coordinated during design:

- Recommendation to not conduct in-water work in occupied Oregon chub habitat between June 1 and August 15. As the designated in-water work window on the Middle Fork is only from July 1 through August 31 and the one location where Oregon chub have been found is at site M2A. During design, an appropriate in-water work window will be determined in consultation with ODFW and USFWS to allow the limited in-water work proposed at this site to proceed, while protecting Oregon chub appropriately.

9.1.5 National Historic Preservation Act

The National Historic Preservation Act (16 USC 470) requires that the effects of proposed Federal undertakings on sites, buildings structures, or objects included or eligible for the National Register of Historic Places must be identified and evaluated. The Willamette Floodplain Restoration project is a Federal undertaking and a preliminary evaluation has been conducted to determine if historic structures are adjacent to the undertaking, or if the projects are within immediate view sheds that are eligible for the National Register. No sites either listed on or eligible for listing on the National Register have been identified on any of the parcels included within the recommended plan. Therefore, no adverse effects to cultural or historic sites will occur. The SHPO has concurred with the Area of Potential Effects (APE) and proposed management plan for implementation.

9.1.6 Magnuson-Stevens Fishery Conservation and Management Act

The evaluation of project impacts to essential fish habitat (EFH) was conducted as part of the Section 7 ESA consultation with NMFS described in Section 9.1.2 above. Conservation measures from the ESA consultation are required, along with monitoring and documentation on the effectiveness of the restoration actions based on species recovery requirements.

9.1.7 Bald and Golden Eagle Protection Act (16 USC 668-668d)

The Bald and Golden Eagle Protection Act prohibits the taking, possession or commerce of bald and golden eagles, except under certain circumstances. Amendments in 1972 added penalties for violations of the act or related regulations.

Although bald eagles are generally known to occur in the study area, no take of either bald or golden eagles will occur during project construction. No nests are known to be present. Therefore, no adverse effects to eagles are anticipated. The Act's management guidelines (USFWS 2007) will be followed if any new or previously unknown bald eagle nests are identified during the design or construction phases. Generally, the proposed restoration activities can be classified as Category A construction activities. Buffers of 660 feet will be maintained around nests if the construction work is visible from the nest. Buffers of 330 feet will be maintained around nests if the construction work is not visible from the nest and no vegetation clearing in the buffer will occur during the nesting season.

9.1.8 Wild and Scenic Rivers Act (16 USC 1271-1287)

No portions of the Coast or Middle Forks of the Willamette River have been designated as a Wild and Scenic River so this Act is not applicable to the proposed work.

9.1.9 Executive Order 12898, Environmental Justice

Executive Order 12898 directs every Federal agency to identify and address disproportionately high and adverse human health or environmental effects of agency programs and activities on minority and low-income populations. Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The Federal government has this goal for all communities and persons across this nation. It would be achieved when everyone enjoys the same degree of protection from environmental and health hazards, equal access to the decision-making process, and the opportunity to have a healthy environment in which to live, learn, and work.

The demographics of the project area include a 2009 population estimate for Lane County of 351,109, of which 222,386 are 25 years and older. The median household income is $42,852, with 16.2 percent of individuals below the poverty level. Of the total population 89.7 percent has a high school education and 27.3 percent have a bachelor's degree or higher. The majority of the population is white (89.5 percent) with Hispanic or Latino and Asian races at 3.2 percent and 2.8 percent, respectively. The majority of the population lives within the city centers, with Eugene being the largest with a population of 153,272. This demographic analysis did not identify an ethnic minority, low-income, or subsistence population in the project area

The project would only temporarily affect noise, traffic, and air quality during construction, and should enhance aesthetics after construction is complete. The project does not involve the siting of a facility that would discharge pollutants or contaminants, so no human health effects would occur. This project will not have a disproportionately negative effect on an ethnic minority, low-income, or subsistence populations and may provide benefits via the contributions to recovery of fishable salmon populations. Therefore the proposed action is in compliance with this order.

9.1.10 Executive Order 11990, Protection of Wetlands, May 24, 1977

The goal of the project is to restore and preserve the functions and values of wetlands in order to restore the functions of the floodplain. The project is in compliance with this executive order because it will not induce adverse effects to wetlands and will restore, enlarge, and enhance wetlands.

9.1.11 Executive Order 11988, Floodplain Management, 24 May 1977

Executive Order 11988 requires Federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of the floodplain, and to avoid direct and indirect support of floodplain development where there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains."

The proposed action would not create a change that would affect occupancy or modification of the floodplain and will actually ensure that the project sites are not developed in the future. The project will restore natural functions of approximately 574 acres of floodplain, restoring and preserving the natural and beneficial values of the floodplain such as flood storage and attenuation, sediment deposition, habitats for fish and wildlife and groundwater recharge.

10. MONITORING AND ADAPTIVE MANAGEMENT PLAN

Monitoring and adaptive management will conform with the requirements of Section 2039 of WRDA 2007 and subsequent Corps implementation guidance, and monitoring will be conducted until such time as the Corps determines that the project has achieved success.

This monitoring and adaptive management plan has been developed to ensure the success of the recommended restoration plan in meeting project objectives and a process to identify if any adaptive management actions are warranted during the 10-year period. Monitoring is proposed to occur for 10 years as geomorphic changes and vegetation community conditions develop slowly and a shorter period of monitoring may not detect sufficient changes or threats to the success of the project. The proposed monitoring plan will measure the following key elements: vegetation, connector channel hydrology and hydraulics, river and floodplain morphology, wildlife, physical habitat, and fish and typical methods are described as the basis for the monitoring cost estimate in this section. Detailed protocols (including specific sampling locations) will be developed further for each site during the design phase. Photo-monitoring will also be conducted to document site changes over time including vegetation establishment and physical habitat features.

The non-Federal sponsor will conduct all monitoring activities for 10 years after completion of construction at each site as part of the total project cost-share. The total estimated monitoring costs are $429,000 and are based on actual costs from similar activities conducted during the feasibility phase. Any monitoring conducted after 10 years would not be part of the total project cost and will be 100% non-Federal costs.

Project Objectives:

1. Restore lost historic channel complexity and diversity
2. Restore connectivity of river to floodplain habitats
3. Restore and protect native floodplain habitats including riparian and wetland habitats

The monitoring elements described below are proposed for monitoring the success in meeting each objective.

Restore lost historic channel complexity and diversity

Target(s):

1. Increase pool habitat in adjacent reach of mainstem rivers by 25 percent by 2020, and maintain or increase proportion of pools for life of project. This target was developed based on the area of potential effect of the ELJs on the river and targets for percent pools for native salmonids of approximately 50% from the HEP model.
2. Increase LWD abundance in adjacent reach of mainstem rivers by 50 percent by 2020, and maintain or increase proportion of LWD for life of project. This target was developed based on the expected increase per project design in the project reaches and targets for instream cover or shoreline cover for native salmonids, native amphibians, wood duck, Oregon chub, and western pond turtle ranging from 50% to 100%.
3. Increase diversity of habitat unit types in adjacent reach of mainstem rivers by 25 percent by 2025, and maintain or increase proportion of habitat unit types for life of project. This target was developed based on the area of potential effect of the ELJs on the river and targets for native salmonids for pool:riffle ratios of 50:50.

Monitoring Protocol:

1. Habitat Unit Assessment. Use U.S. Forest Service, Timber-Fish-Wildlife, or similar appropriate protocol to quantify habitat unit types and areas in adjacent reach of mainstem river to each site pre and post-construction (except Site M1B where no in-channel work is proposed). As these protocols are designed for wadable streams, will need to use boat access to supplement wadable parts of reaches. Primary focus is on mapping pools, riffles, and LWD abundance and location. Conduct a baseline survey in summer prior to construction at each site to develop baseline map/areas for comparison to all post-construction periods. Conduct post-construction assessment in Years 5 and 10 after construction. Estimated cost $12,000 each year; total of $24,000
2. Geomorphic Comparison. At Years 5 and 10 after construction, evaluate river and floodplain morphology using river cross-section surveys (every 200 feet from top of bank to top of bank, assume underwater survey conducted using boat-mounted RTK GPS and single beam/single frequency or single beam/dual frequency echosounder); total of 78) and full floodplain cross-section surveys at every mile to replicate the existing floodplain survey locations (total of 4) and also evaluate aerial photos from base year and evaluation year to document morphologic changes (planform, habitat types, etc.) and compare and correlate any changes to potential effects from restoration actions. Estimated cost $45,000 each year; total of $90,000.

Adaptive Management Trigger(s):

1. If any of the targets are not achieved by the year specified, then additional LWD should be installed in the river channel. The Corps and non-Federal sponsor to identify preferred location and number of pieces of wood to install to promote in-channel habitats.

Restore connectivity of river to floodplain habitats

Target(s):

1. Sustain floodplain connection frequencies per design at each site for life of project. Target based on winter-spring primary off-channel rearing season for salmonids.
2. Ensure fish passability through channels during designated connection season per design (6-inch depth minimum, 2 fps velocities) for life of project.
3. Document fish presence/absence to verify accessibility to all connected areas.

Monitoring Protocol:

1. Install recording crest gage and recording velocity gage at primary connection channel on each site (downstream backwater connection channel) to record water surface elevation and flow velocity in Years 1, 5 and 10 following construction. Record hourly and download at bi-monthly intervals during designated connection season (i.e., October through June). Estimated cost $10,000.
2. Conduct channel cross-section and profile surveys at all connector channels on each site (estimate 2 cross-sections, approximately 100 feet apart on each channel) in Years 1, 5, and 10 following construction. Document changes and identify frequency of connection based on elevation and recording crest gage data. Identify causal factors for changes observed. Estimated cost $10,000 each year; total of $30,000.
3. Conduct fish use of the off-channel and floodplain habitats surveys in a minimum of 3 locations at each site (i.e., 2 ponds and one channel) via methods such as fyke nets, seining, and/or electroshocking. Sampling will occur every two weeks during the primary rearing and refuge connection period (i.e., January through June) and include at least one night-time sampling per month. All fish species collected will be identified and measured for length.

Sampling will occur in Years 1, 3, and 5 following construction. Estimated cost $60,000 per year; total of $180,000.

4. Install recording temperature gages in all locations where fish are surveyed to document water quality conditions and potential suitability of habitat for native fish use. Maintain year-round for 5 years following construction. Estimated cost $10,000.

Adaptive Management Trigger(s):

1. If channel connection frequency and fish passage requirements are not met more than 20 percent during design flows, then the Corps and non-Federal sponsor will review the data and causal factors to identify preferred management actions. Possible management actions could include installation of large wood to promote scour (i.e., if sediment deposition has occurred) or reduce channel velocities (via increased roughness); additional excavation if frequency targets are not met but no substantial channel deposition has occurred; reorientation of channel location (i.e., if sediment deposition or erosion is caused by orientation and localized scour/deposition conditions); or additional revegetation (to increase roughness or provide sediment trapping capacity).
2. If fish surveys document that salmonids are not present in specific locations, identify potential causal factors in relation to channel connection frequencies and fish passage requirements. If any channel physical factor appears to be creating a barrier, then the Corps and the non-Federal sponsor will evaluate management actions such as those described for the channels above. Also evaluate temperature data to determine suitability of habitat for native and non-native species and correlate to fish presence/absence.

Restore and protect native floodplain habitats including riparian and wetland habitats

Target(s):

1. Achieve 80 percent cover of native vegetation species per design at each site within 5 years post-construction and sustain through life of project. Target based on percent cover suitability for beaver and yellow warbler is best from 50-100%.
2. Reduce non-native vegetation species to less than 25 percent cover per design at each site within 5 years post-construction and sustain through life of project.
3. Document changes in habitat suitability for wildlife species included in habitat model. Compare and correlate presence/absence of native amphibians and native songbirds to habitat suitability parameters.

Monitoring Protocol:

1. Establish minimum of five permanent vegetation plots on each site to be representative of the plant communities and restored areas within the project site. Permanent plots shall be 33 foot diameter circular plots (centerpoint of each plot will be documented via GPS coordinates to reoccupy in each of sampling). Percent cover will be visually assessed and documented for each strata (herbs, shrubs, trees, woody vines) and each species with more than 5 percent cover. Sampling will occur in Years 1, 3, 5, and 10 following construction. Percent survival of planted stock should be a minimum of 80 percent during Years 1 and 3 otherwise supplemental plantings will be required to replace plants that have died. Percent cover of native species will be measured in the permanent plots and should reach 30 percent in year 1, 50 percent in year 3, and >80 percent in years 5 and 10 (total percent cover in all strata). Estimated cost $10,000 per year; total $40,000.
2. Map non-native vegetation species throughout restored areas on each site in Years 1, 3, and 5 after construction and document percent cover in all locations with more than 100 square

feet of presence. Document average percent cover by species across the site and estimate total area of infestation. Estimated cost $5,000 per year; total $15,000.

3. Conduct habitat evaluation using multi-species HEP model in Years 5 and 10 following construction at each site. Document changes from baseline. Estimated cost $5,000 per year; total $10,000.
4. Conduct amphibian and songbird surveys in Years 5 and 10 following construction at each site. Amphibian surveys to be conducted during breeding season following red-legged frog protocol and document all species observed. Conduct bird nesting surveys in summer at each site in Years 5 and 10 following construction. Document amphibian and bird survey data to habitat model parameters (i.e., quantify water temperatures, shrub height and density and other parameters where species observed). Estimated cost $10,000 per year; total $20,000.

Adaptive Management Trigger(s):

1. If native plant survival or percent cover does not meet targets in any year of monitoring then the non-Federal sponsor will undertake supplemental plantings to achieve the targets. The Corps and non-Federal sponsor will evaluate at the end of 10 years the overall quality of habitat in each restored plant community to identify if
2. If average non-native invasive species cover exceeds 25 percent cover in any of the monitoring years then the non-Federal sponsor will undertake invasive species removal actions such as pulling, mowing, and spot application of herbicide.
3. Corps and non-Federal sponsor to evaluate habitat suitability indices and presence/absence of native amphibians and birds and modify models as appropriate based on quantitative data of presence relative to specific model parameters.

Adaptive management would be triggered by the above identified conditions if the monitoring targets are not met. At this time, it is difficult to predict which specific triggers might not be met, but for the purposes of estimating an adaptive management cost, it is assumed that a potential condition that could result is the lack of sufficient geomorphic change and formation of habitats in the rivers associated with the engineered log jams. Thus, for purposes of estimating the potential cost of adaptive management, it has been assumed that an additional engineered log jam may need to be installed at each of the three sites where engineered log jams are included (Sites C1B, C1C, and M1A), and an equivalent cost of vegetation maintenance may be required at Site M2A. The average cost of an engineered log jam is approximately $100,000. Thus, the potential cost of adaptive management is estimated at $400,000 ($535,000 with contingency) over the 10-year period of this monitoring and adaptive management plan.

Adaptive management actions may be identified prior to completion of the 10-year monitoring, or could also be identified later during any extended non-Federal sponsor monitoring.

11. RECOMMENDATIONS

In conclusion, I recommend the approval of the recommended restoration plan described in this feasibility report that includes floodplain restoration at five sites in the lower Coast and Middle Forks of the Willamette River. The total project cost is estimated at $42,155,000 and will restore 574 acres of floodplain and off-channel habitats that are essential habitats for multiple listed fish and wildlife species, as well as incrementally restoring natural watershed processes of floodplain hydrologic connections, sediment transport, and channel migration.

This plan is being recommended with such modifications thereof as in the discretion of the Chief of Engineers, HQ Corps may be advisable. The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

The non-Federal sponsor shall:

- Provide 35 percent of total project costs as cash or in-kind services, as further specified below:
  - Provide the required non-Federal share of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;
  - Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs;
  - Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the project.
  - Provide, during construction, any additional funds necessary to make its total contributions equal to 35 percent of total project costs.
- Provide work-in-kind during final design and construction as well as providing the post-construction monitoring. The value of the LERRDs needed for the project are credited against the non-Federal sponsor's cost-sharing requirement. The sponsor anticipates contributing the balance of funds from grant funding that will not include funds from Federal agencies.
- Not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal funds verifies in writing that such funds are authorized to be used to carry out the Project;
- Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project's proper function;
- Not use the project or lands, easements, and rights-of-way required for the project as a wetlands bank or mitigation credit for any other project;

- Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. §§ 4601-4655), and the Uniform Regulations contained in 49 C.F.R. part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;
- For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;
- Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;
- Hold and save the United States free from all damages arising from construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;
- Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management;
- Comply with all applicable Federal and State laws and regulations, including but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. § 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. §§ 3141-3148 and 40 U.S.C. §§ 3701-3708;
- Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. §§ 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;
- Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project;
- Agree, as between the Federal Government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and,

- Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. § 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. § 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

Date: 15 August 2013

John W. Eisenhauer

John W. Eisenhauer, P.E.
Colonel, Corps of Engineers
District Commander

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13. APPENDICES

A. CONCEPTUAL ALTERNATIVES

B. HABITAT EVALUATION MODEL

C. COST

D. BIOLOGICAL ASSESSMENT

E. HYDROLOGY AND HYDRAULICS

F. DESIGN AND ENGINEERING

G. REAL ESTATE PLAN

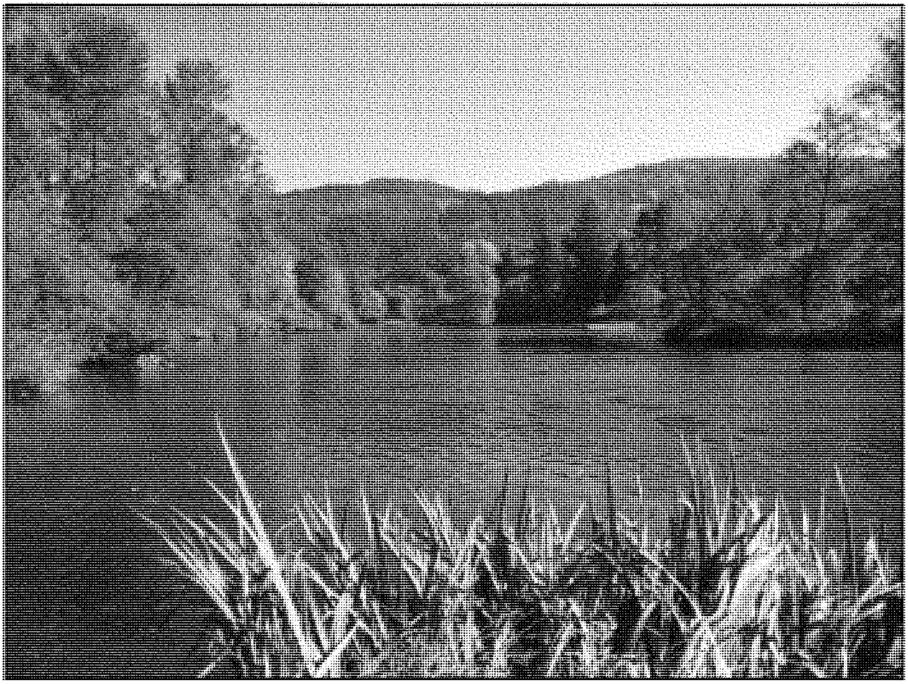
H. PUBLIC AND STAKEHOLDER INVOLVEMENT

I. ENVIRONMENTAL COMPLIANCE DOCUMENTS

J. INVASIVE SPECIES MANAGEMENT

U.S. Army Corps
of Engineers
Portland District

Willamette River Floodplain Restoration, Oregon
Integrated Feasibility Report/Environmental Assessment



Lower Coast and Middle Fork Willamette River Subbasins

VOLUME 2: APPENDICES A THROUGH E

November 2013

Prepared by:

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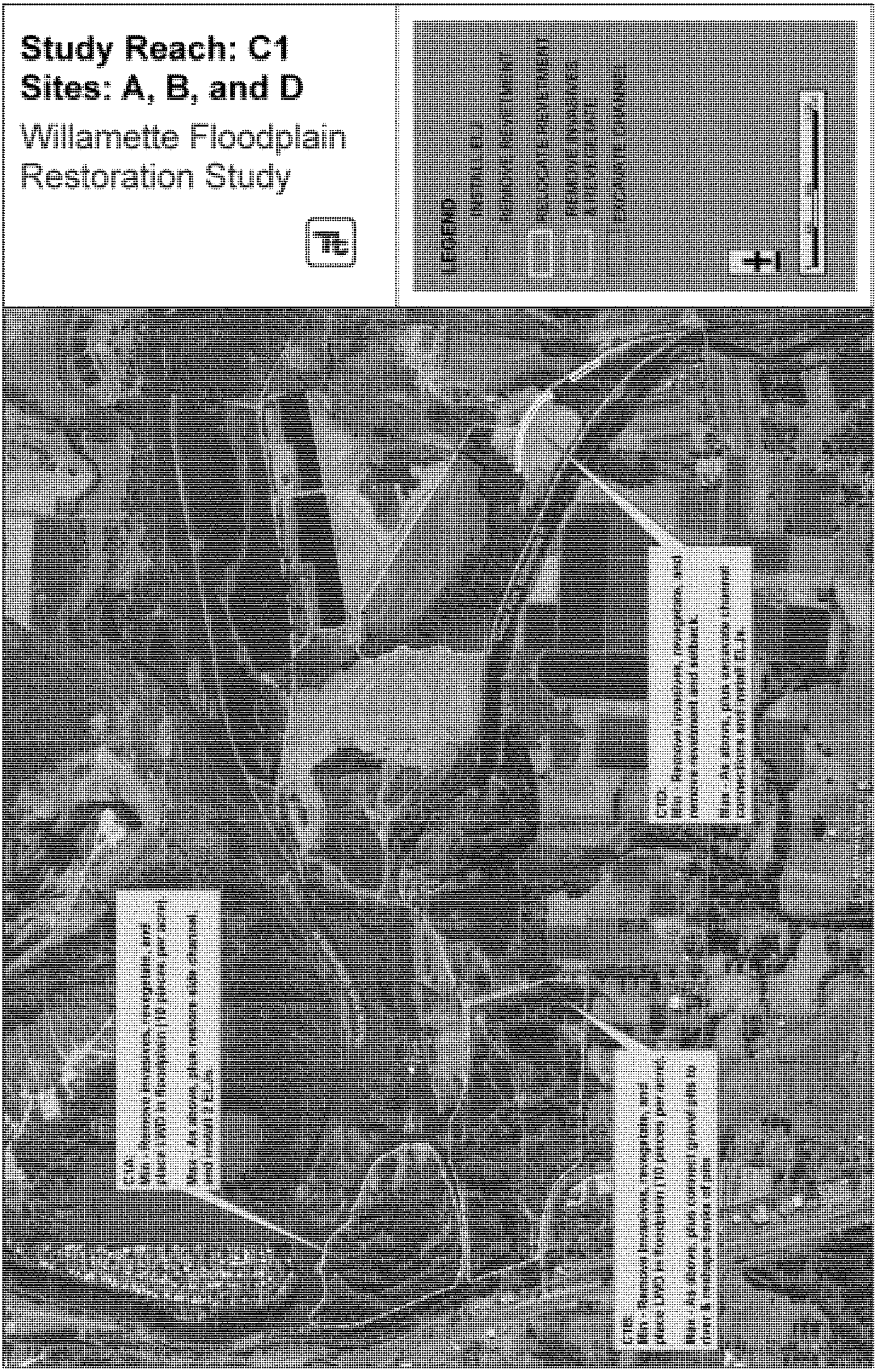
APPENDIX A: Conceptual Alternatives

November 2013

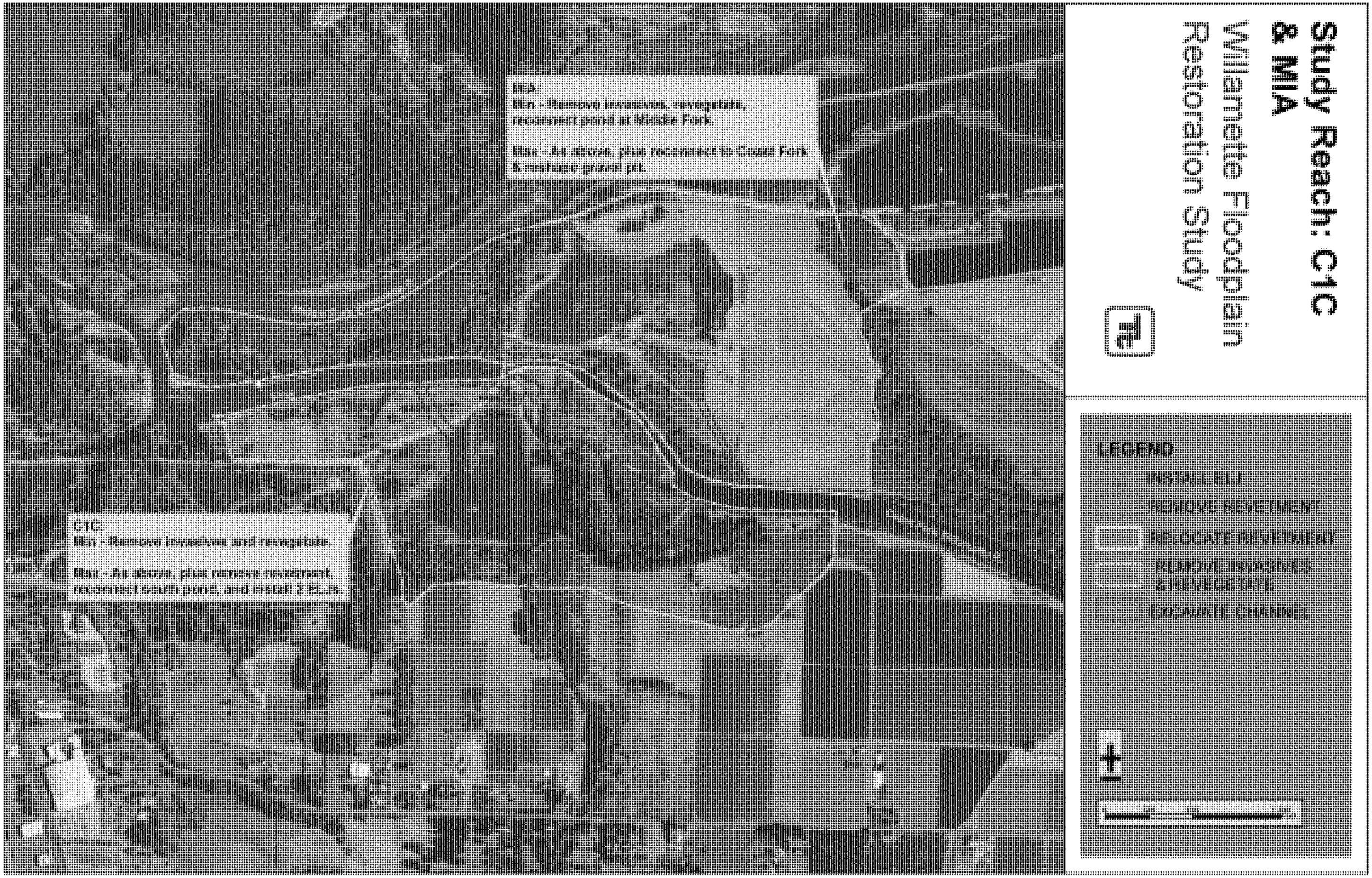
Study Reach: C1
Sites: A, B, and D

Willamette Floodplain
Restoration Study



Study Reach: C1C & MIA

Willamette Floodplain Restoration Study



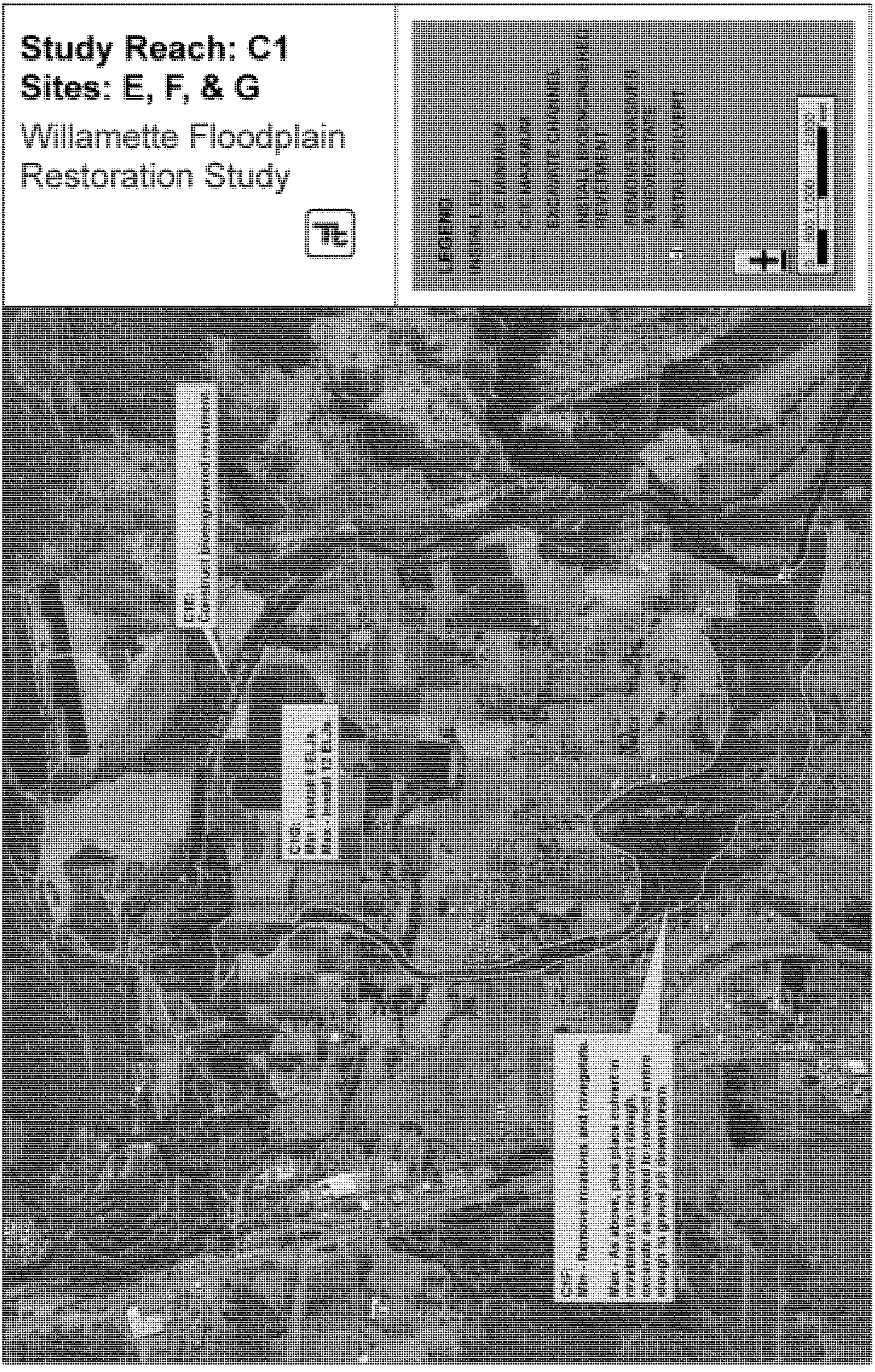
MIA
Min - Remove invasives, revegetate, reconnect pond at Middle Fork.

Max - As above, plus reconnect to Coast Fork & reshape gravel pit.

C1C
Min - Remove invasives and revegetate.

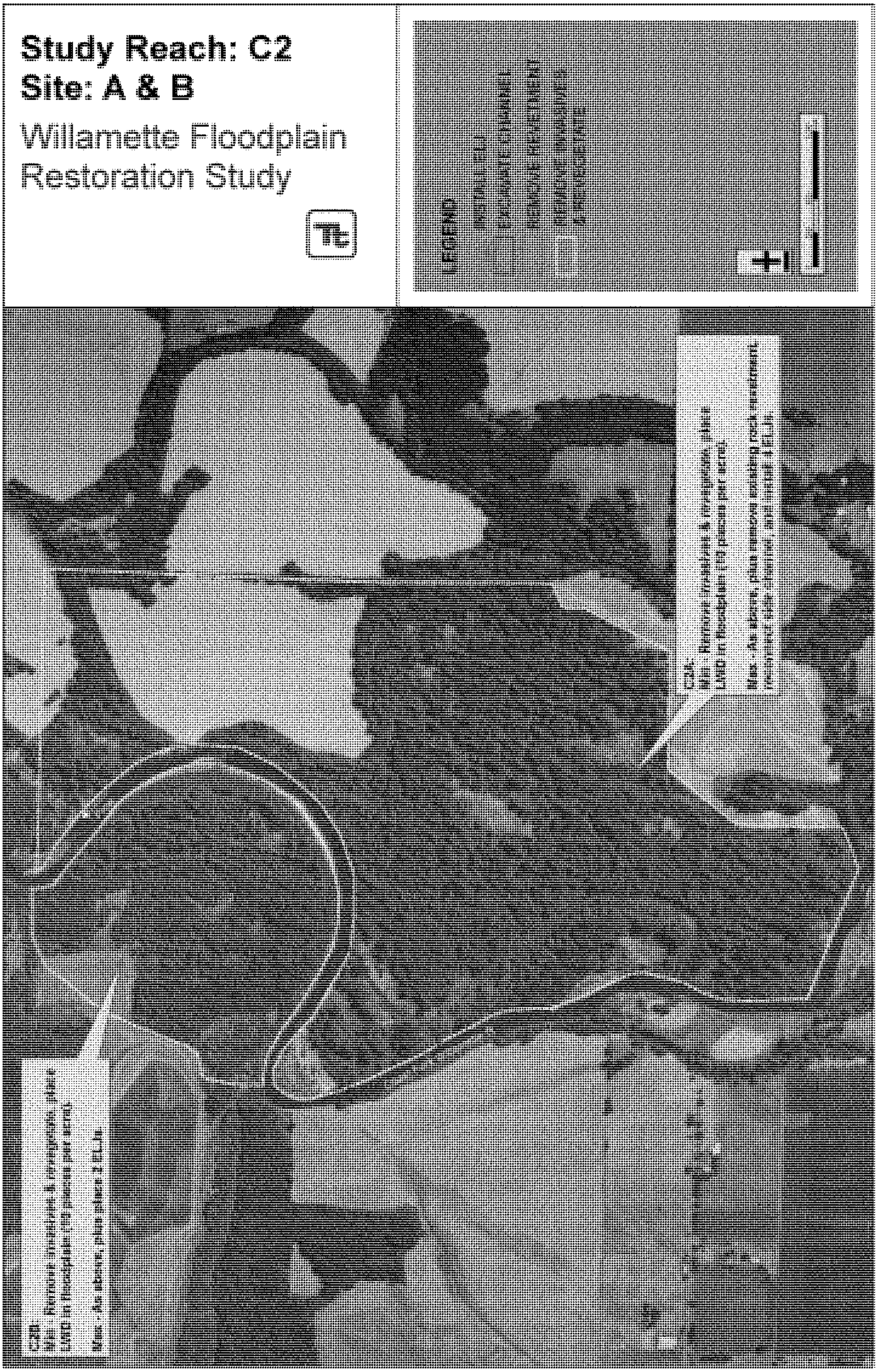
Max - As above, plus remove revetment, reconnect south pond, and install 2 ELJs.

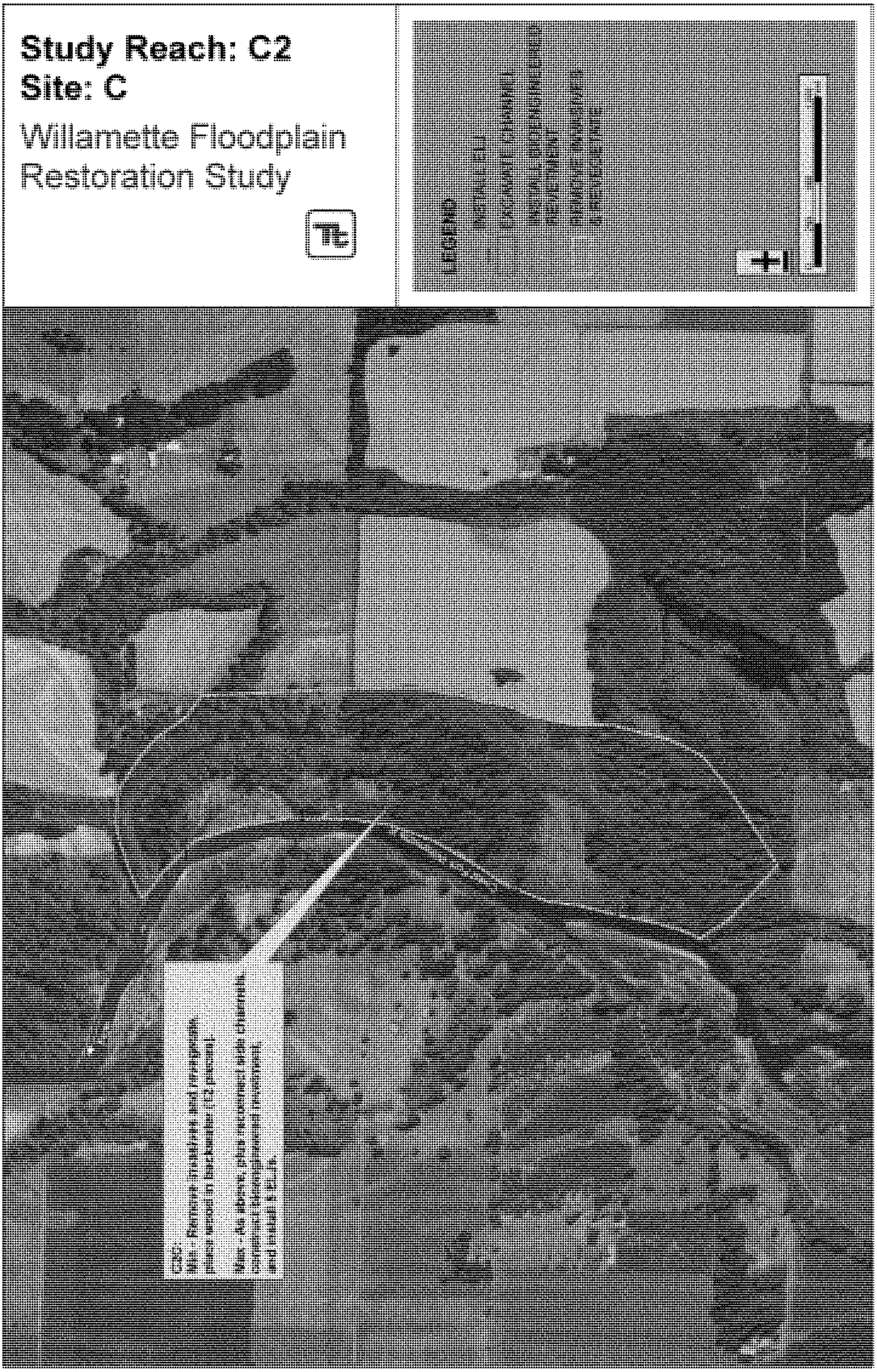
Study Reach: C1
Sites: E, F, & G
Willamette Floodplain
Restoration Study



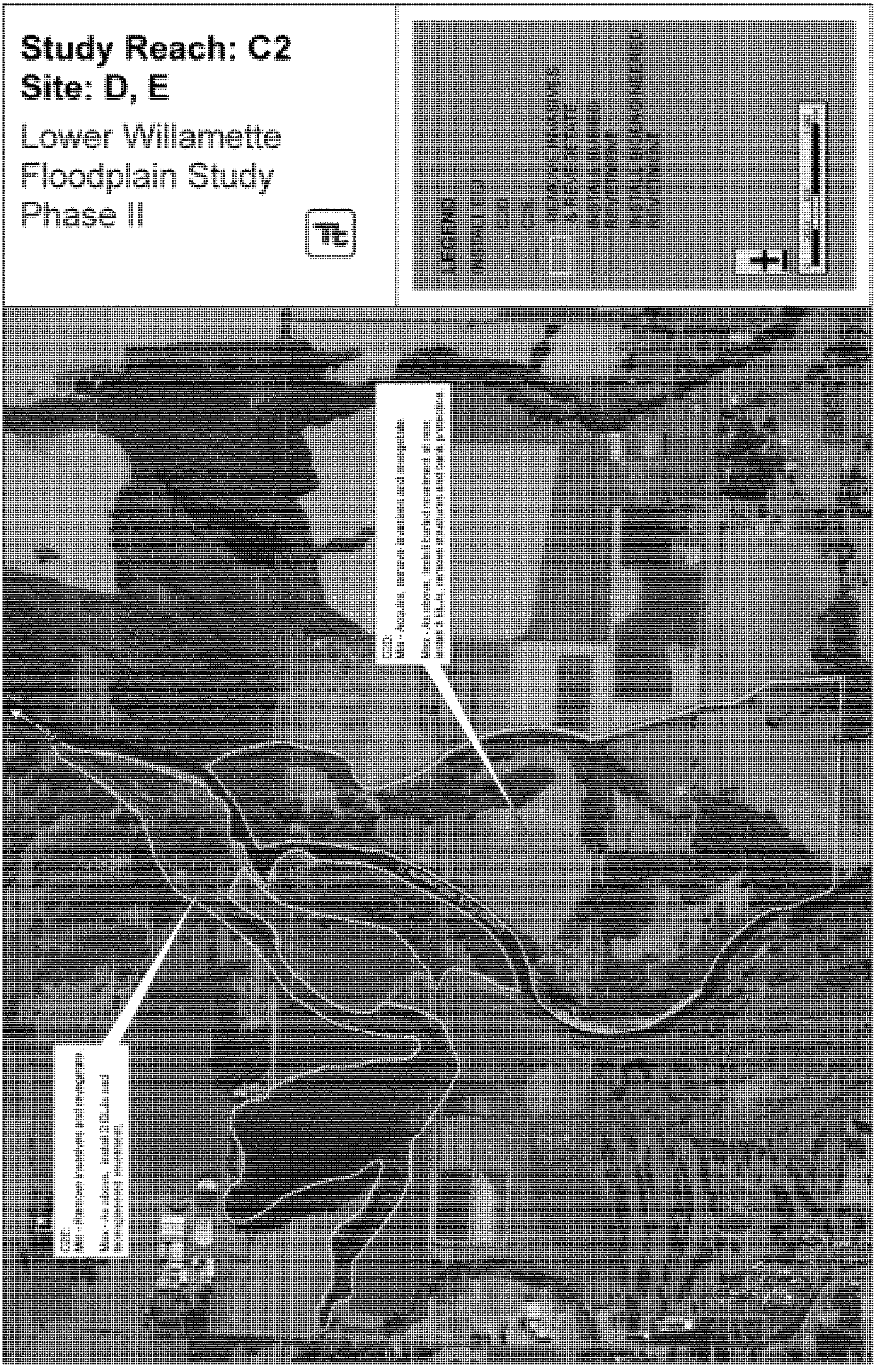
Study Reach: C2
Site: A & B

Willamette Floodplain
Restoration Study



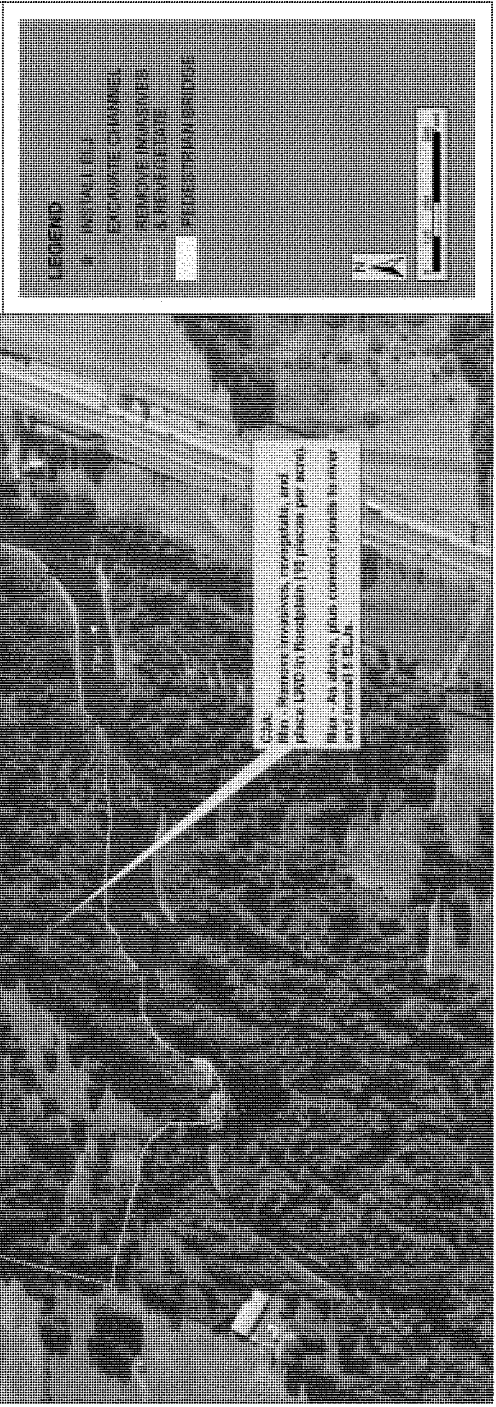


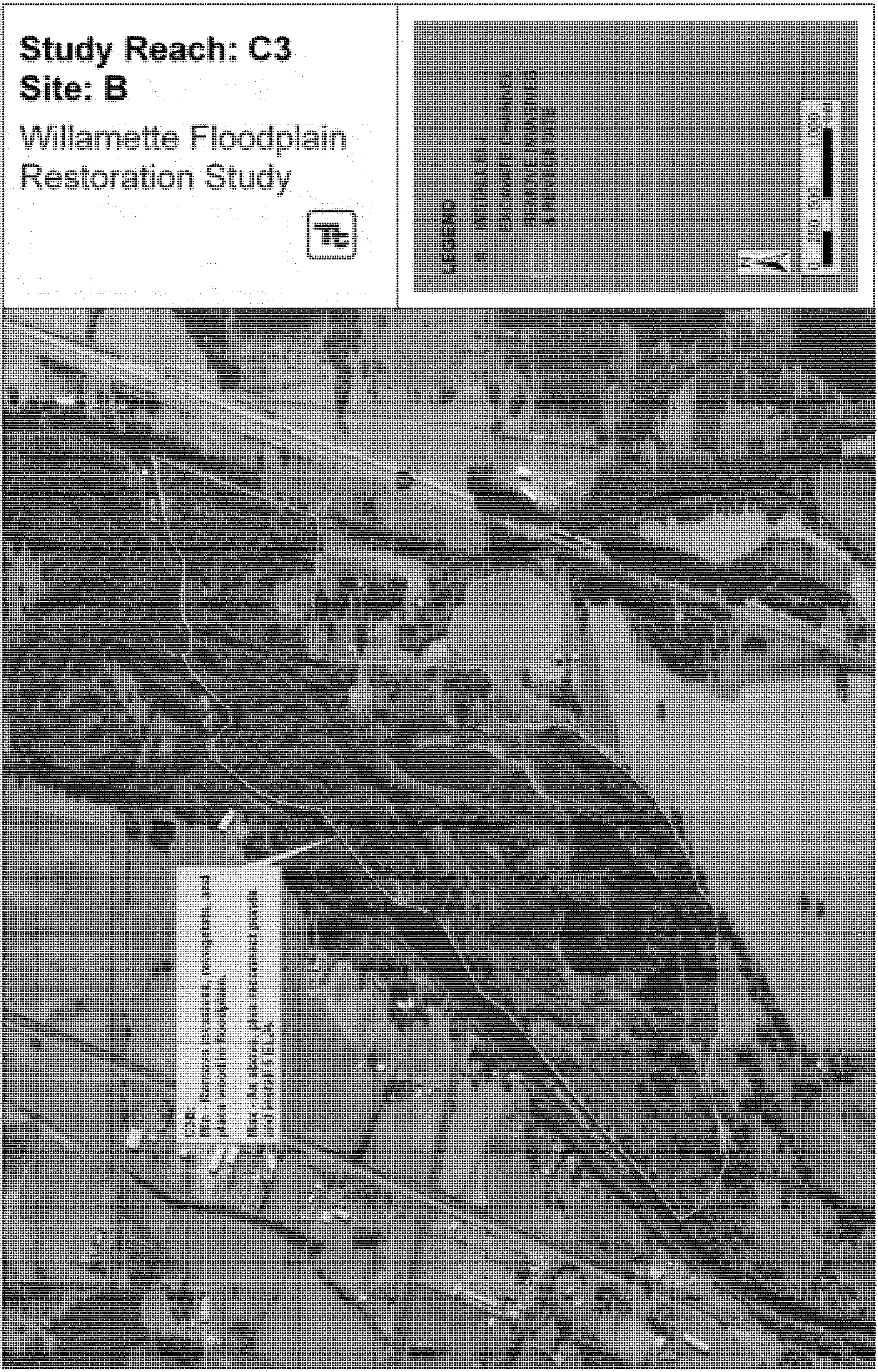
Study Reach: C2
Site: C
Willamette Floodplain Restoration Study


Study Reach: C2
Site: D, E
Lower Willamette Floodplain Study Phase II
LEGEND
INSTALL LWD
C-D
C-E
REMOVE INVASIVES & REVEGETATE
INSTALL BURIED REVETMENT
INSTALL BIOENGINEERED REVETMENT

Study Reach: C3
Site: A

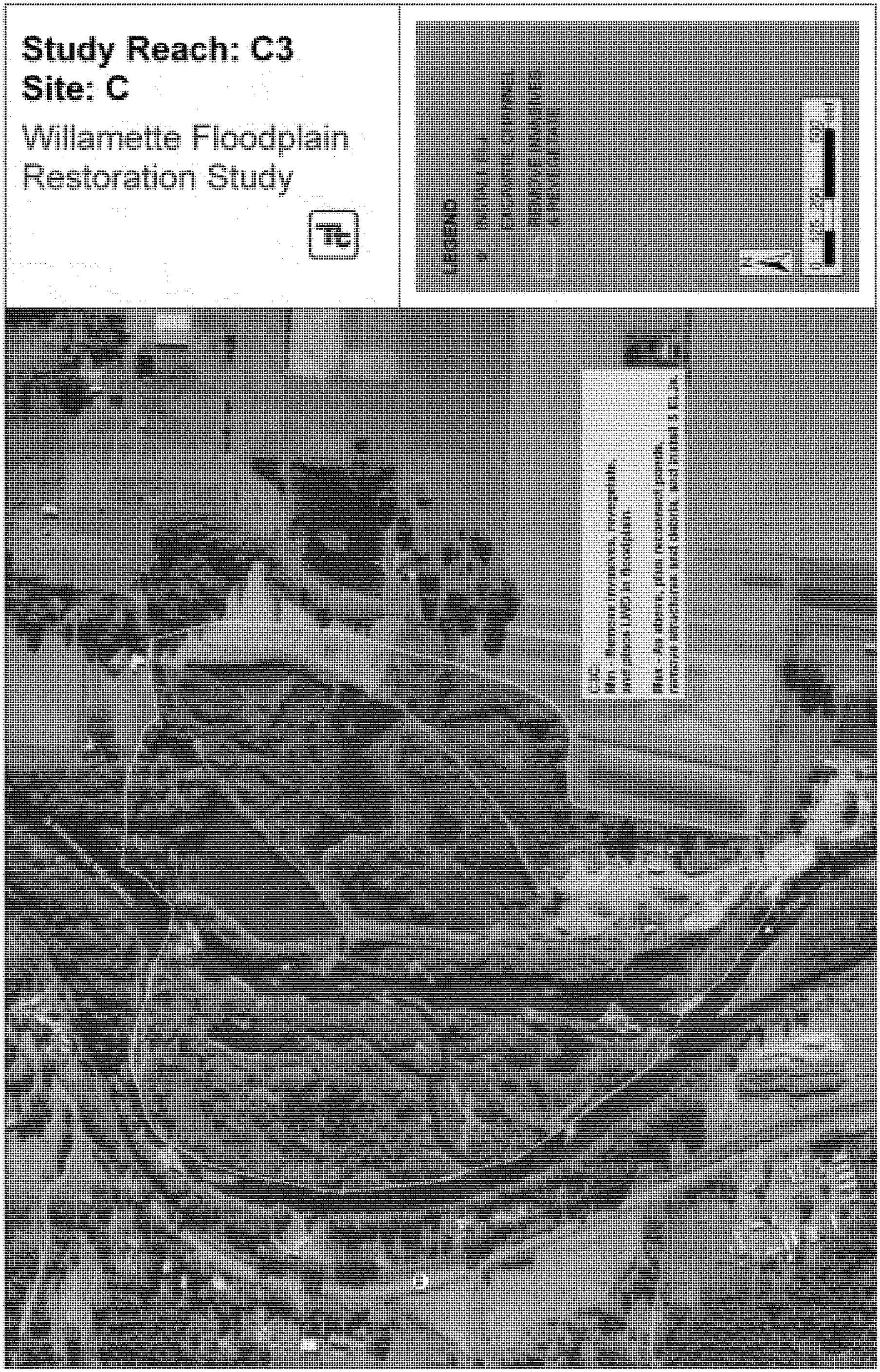
Willamette Floodplain
Restoration Study

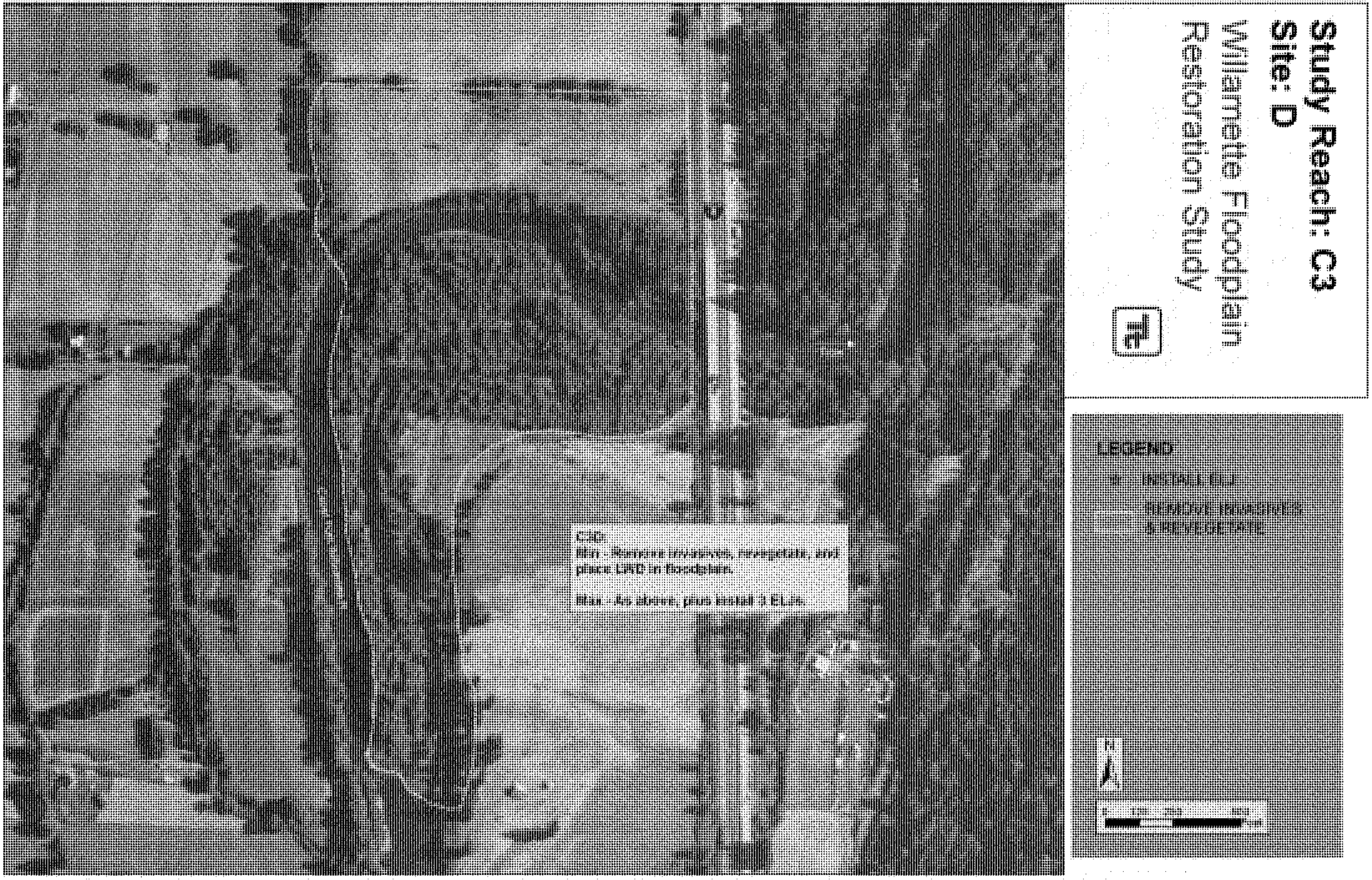




Study Reach: C3
Site: B
Willamette Floodplain
Restoration Study

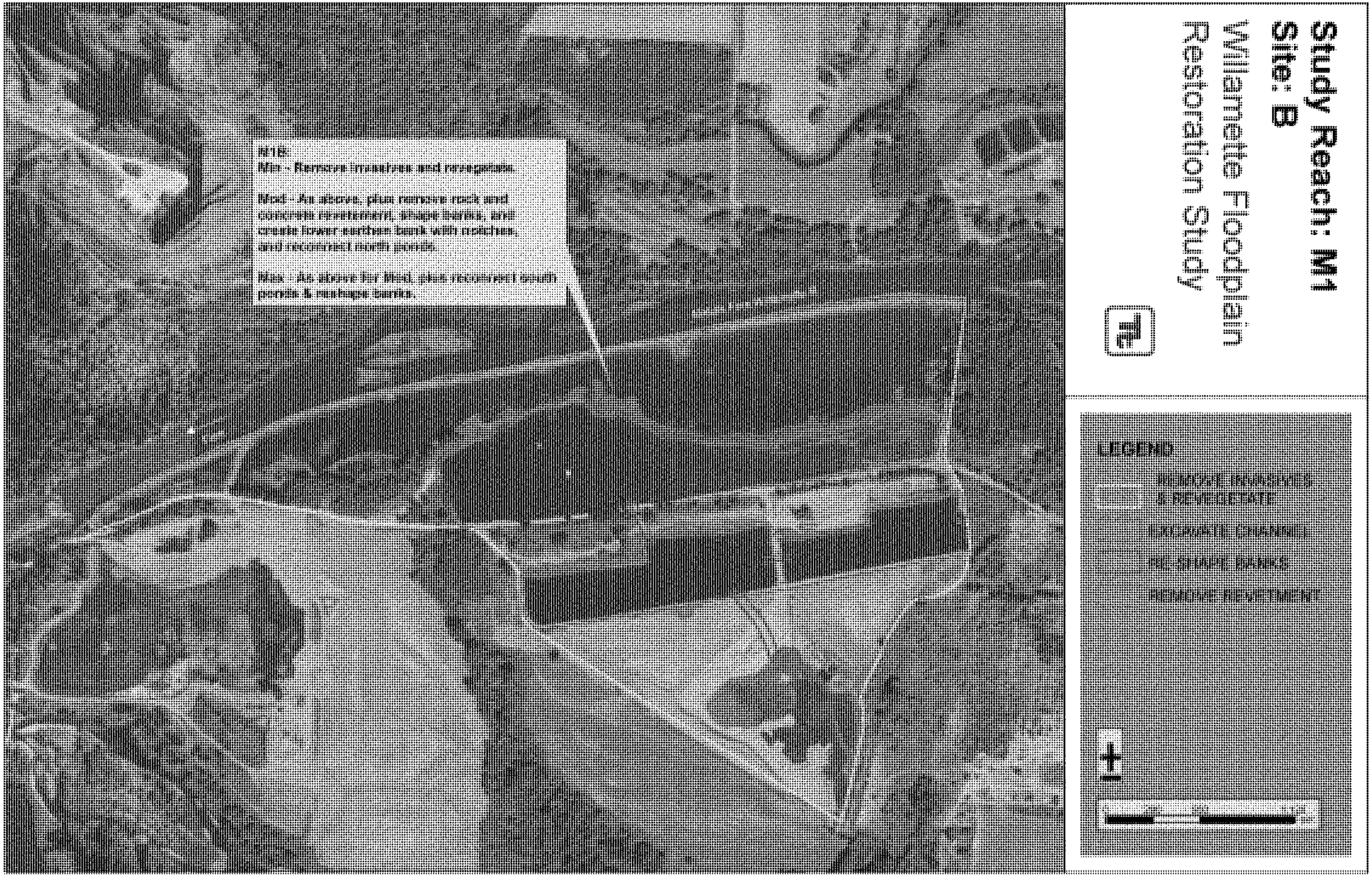
Study Reach: C3
Site: C
Willamette Floodplain
Restoration Study




Study Reach: C3
Site: D
Willamette Floodplain Restoration Study
LEGEND
INSTALL ELJ
REMOVE INVASIVES & REVEGETATE
C3D:
Min - Remove invasives, revegetate, and place LWD in floodplain.
Max - As above, plus install 3 ELJs.

Study Reach: M1
Site: B

Willamette Floodplain Restoration Study



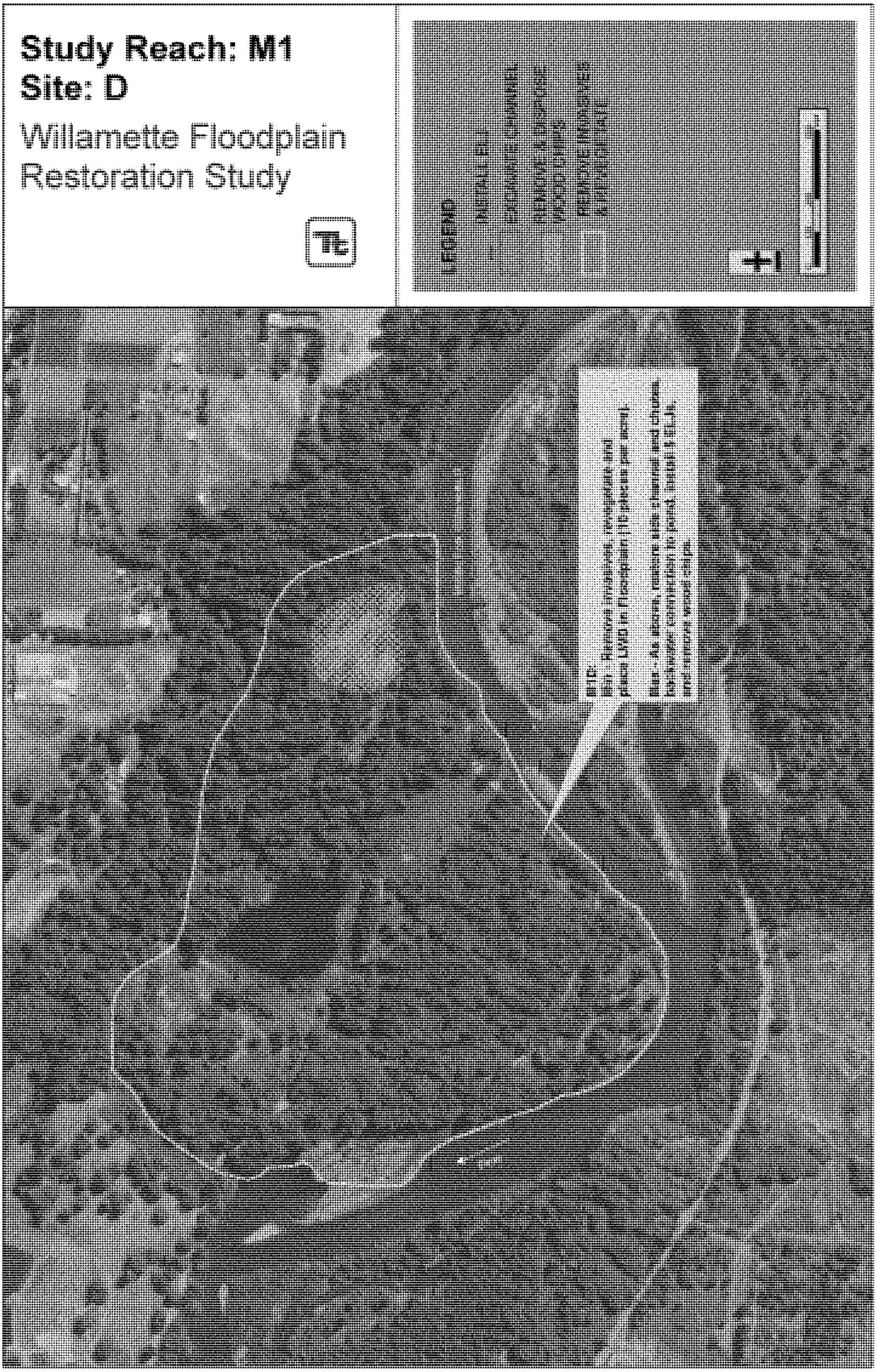
M1B:
Min - Remove invasives and revegetate.

Med - As above, plus remove rock and concrete revetment, shape banks, and create lower surface bank with notches, and reconnect north ponds.

Max - As above for Med, plus reconnect south ponds & reshape banks.

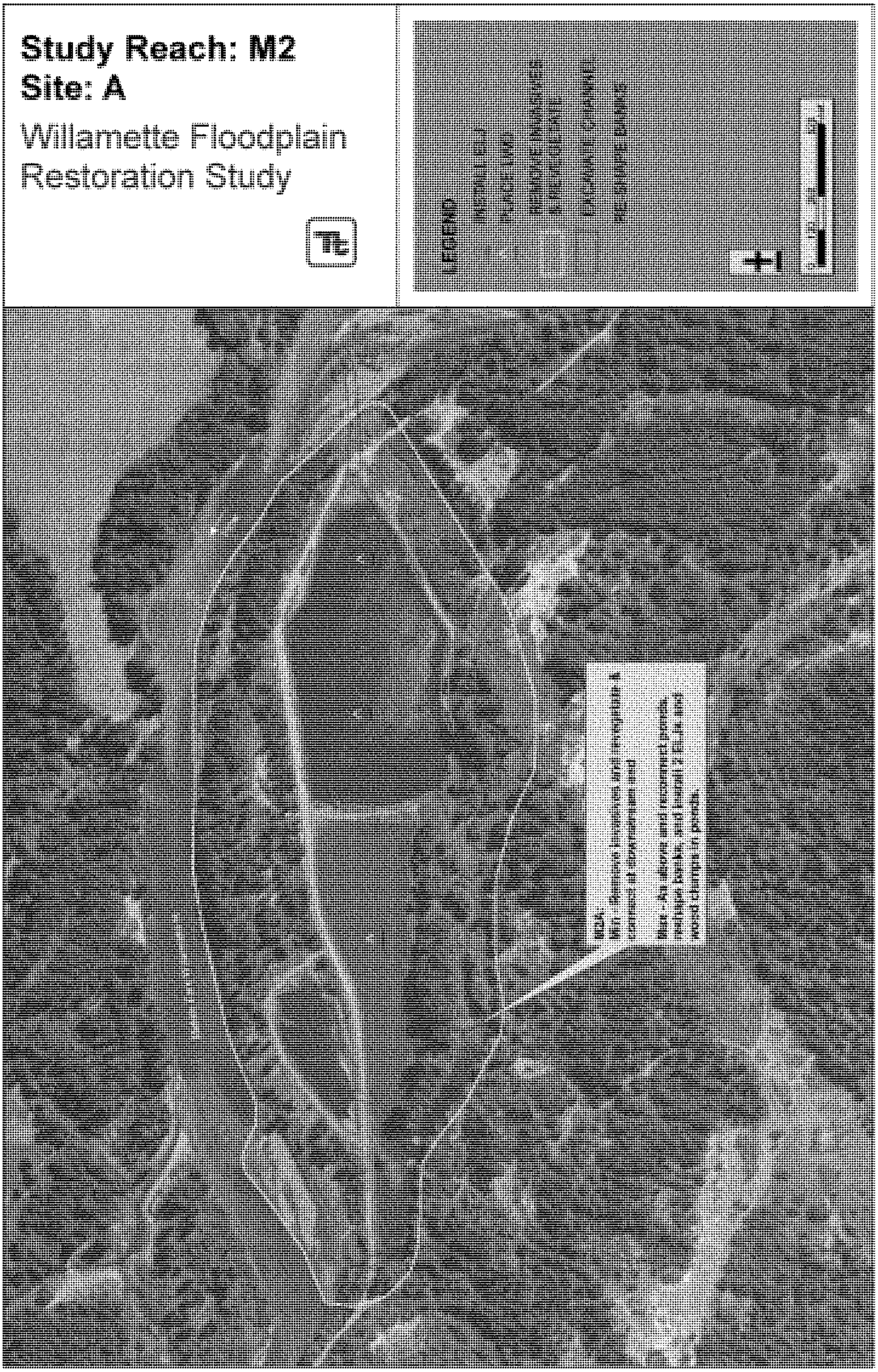
Study Reach: M1
Site: C
Willamette Floodplain
Restoration Study

Study Reach: M1
Site: D
Willamette Floodplain
Restoration Study



M1D:
Min - Remove invasives, revegetate and place LWD in Floodplain (10 pieces per acre).

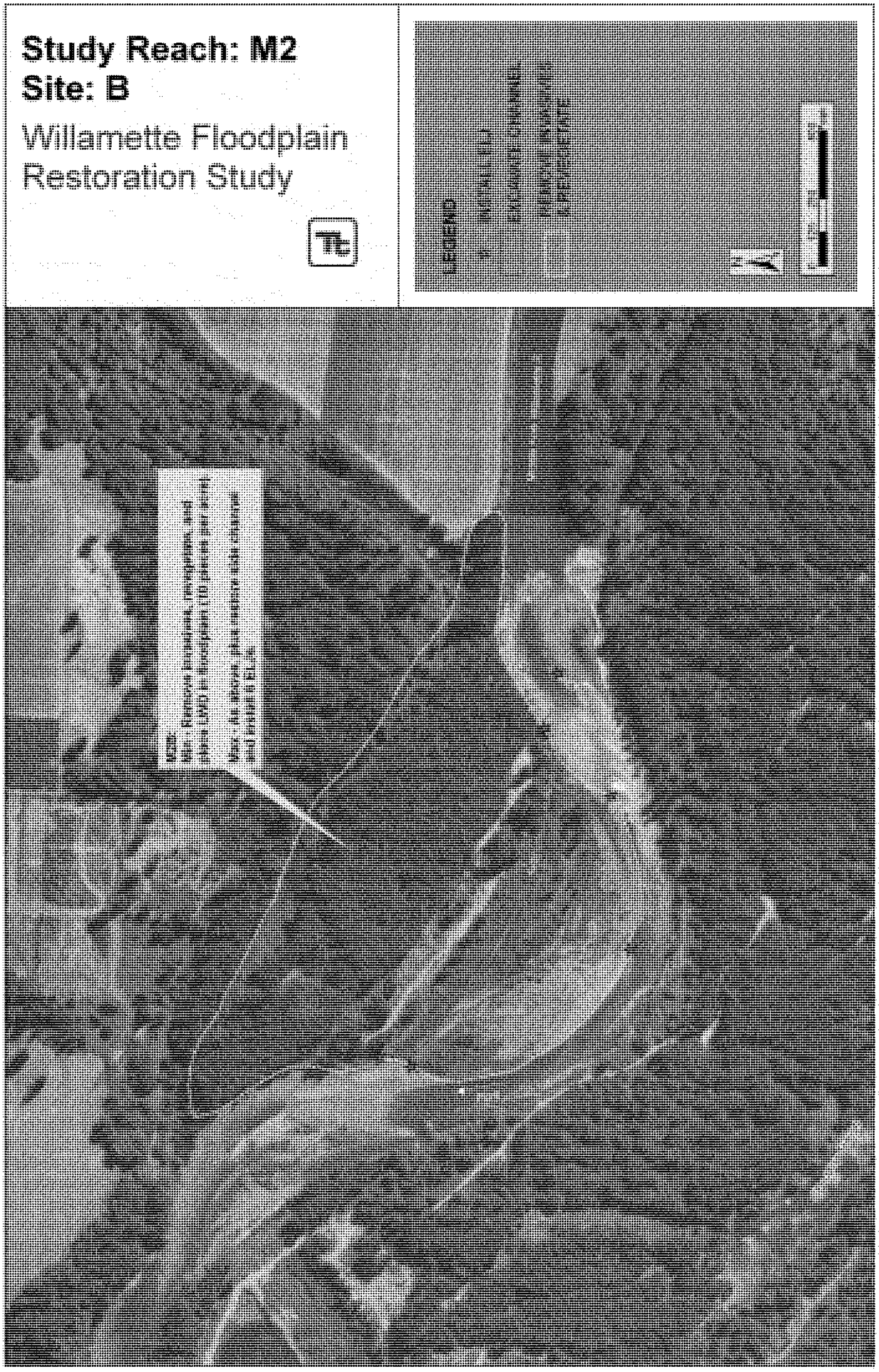
Max - As above, restore side channel and chutes, backwater connection to pond, install 5 ELJs, and remove wood chips.



Study Reach: M2
Site: A
Willamette Floodplain
Restoration Study

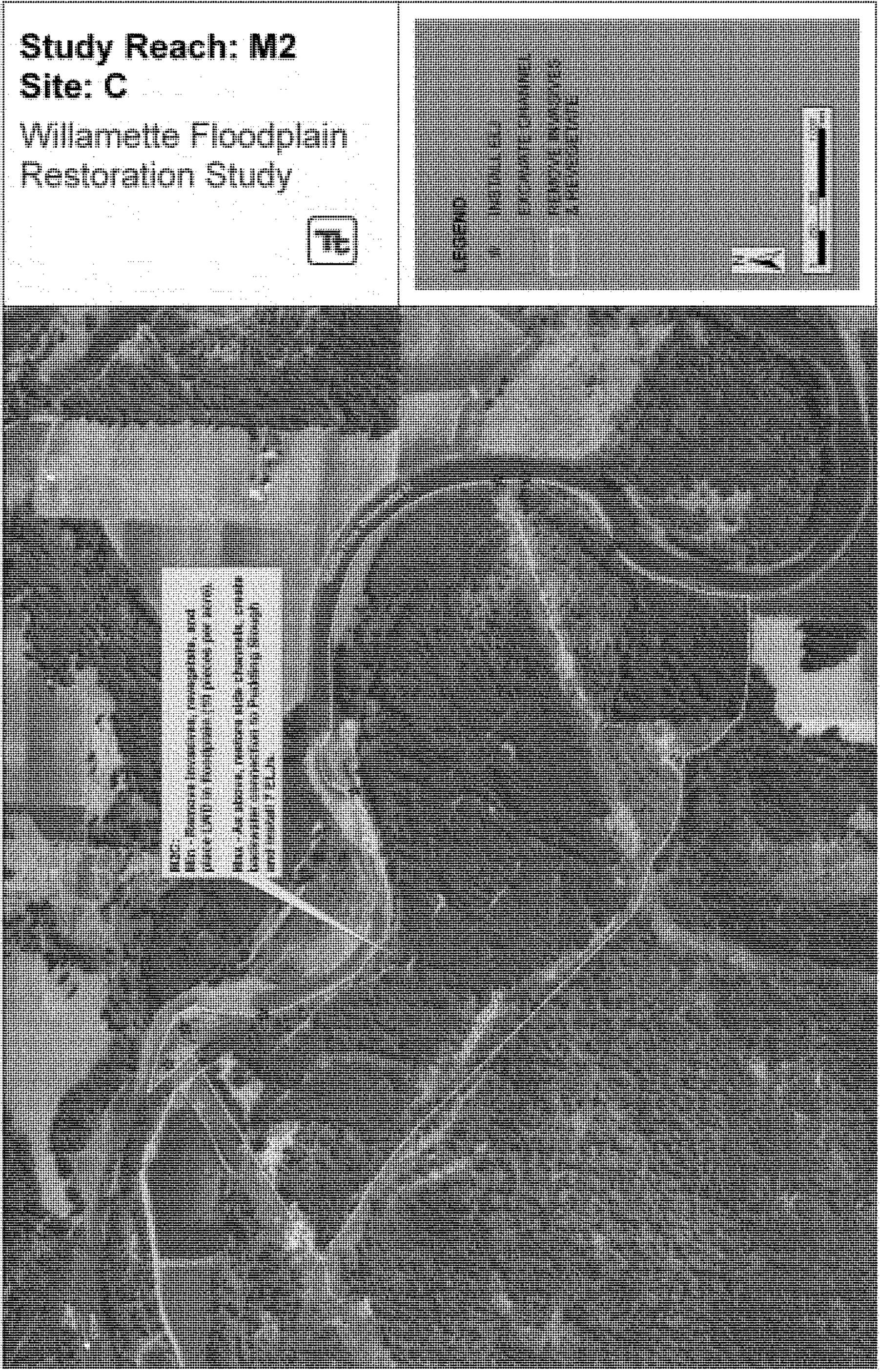
M2A:
Min - Remove invasives and revegetate & connect at downstream end

Max - As above and reconnect ponds, reshape banks, and install 2 ELJs and wood clumps in ponds.


Study Reach: M2
Site: B
Willamette Floodplain Restoration Study
LEGEND
INSTALL ELJ
EXCAVATE CHANNEL
REMOVE INVASIVES & REVEGETATE
M2B:
Min - Remove invasives, revegetate, and place LWD in floodplain (10 pieces per acre).
Max - As above, plus excavate side channel and install 6 ELJs.

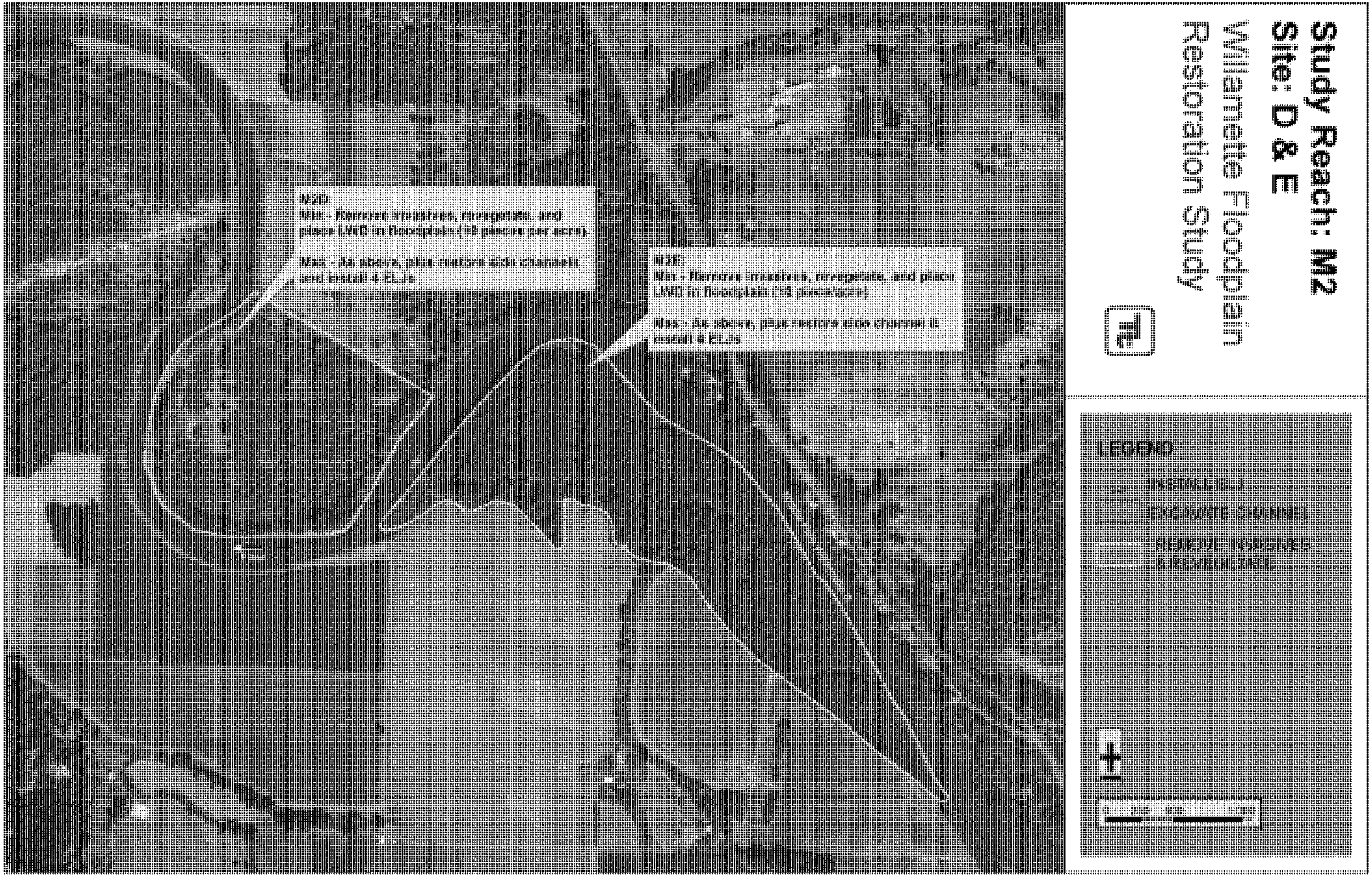
Study Reach: M2
Site: C

Willamette Floodplain
Restoration Study



M2C:
Min - Remove invasives, revegetate, and place LWD in floodplain (5 pieces per acre).

Max - As above, restore side channels, create backwater connection to Pudding Slough and install 7 ELJs.



Study Reach: M2
Site: D & E

Willamette Floodplain
Restoration Study

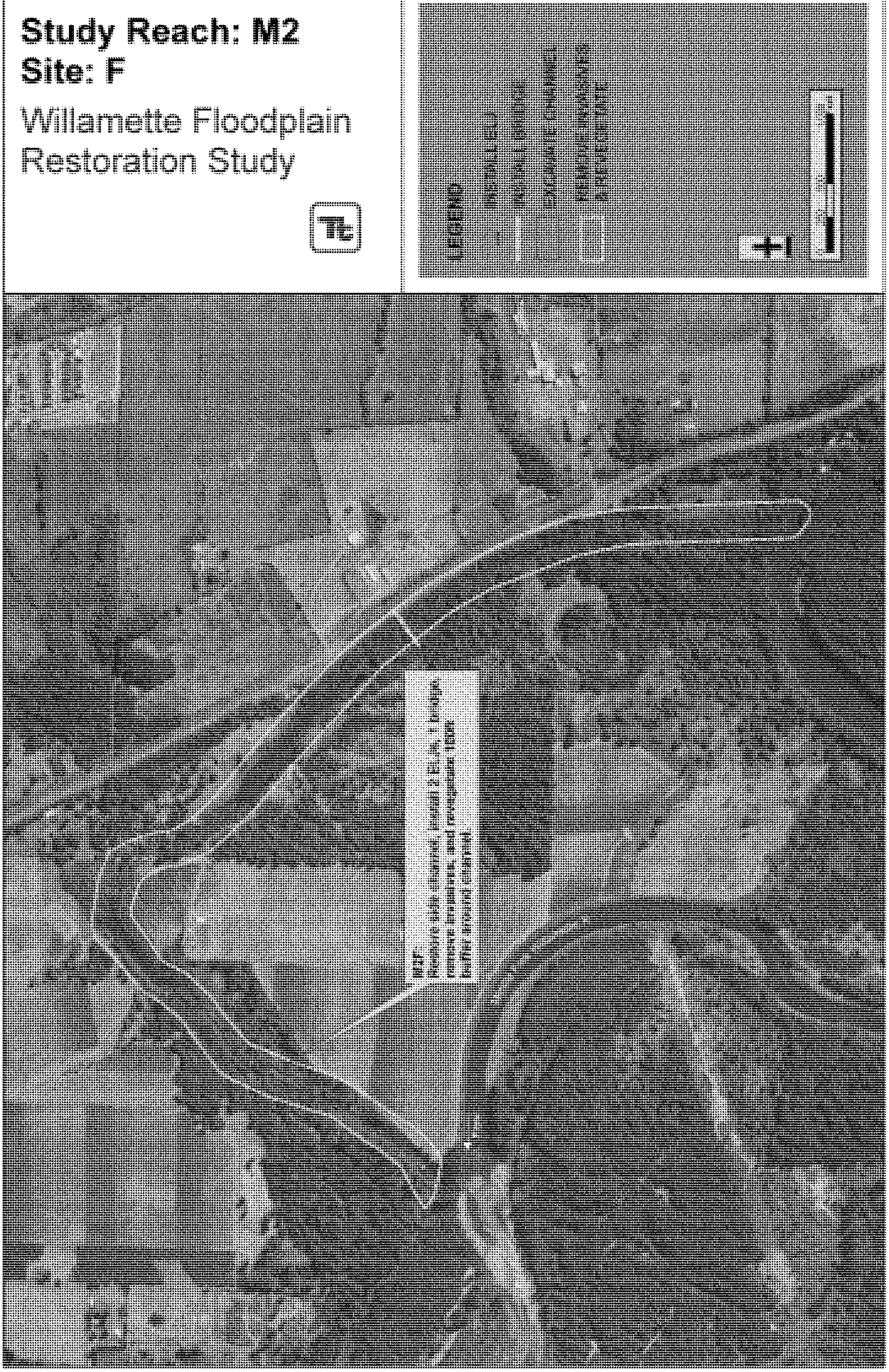
M2D:
Min - Remove invasives, revegetate, and place LWD in floodplain (50 pieces per acre)

Max - As above, plus restore side channels and install 4 ELJs

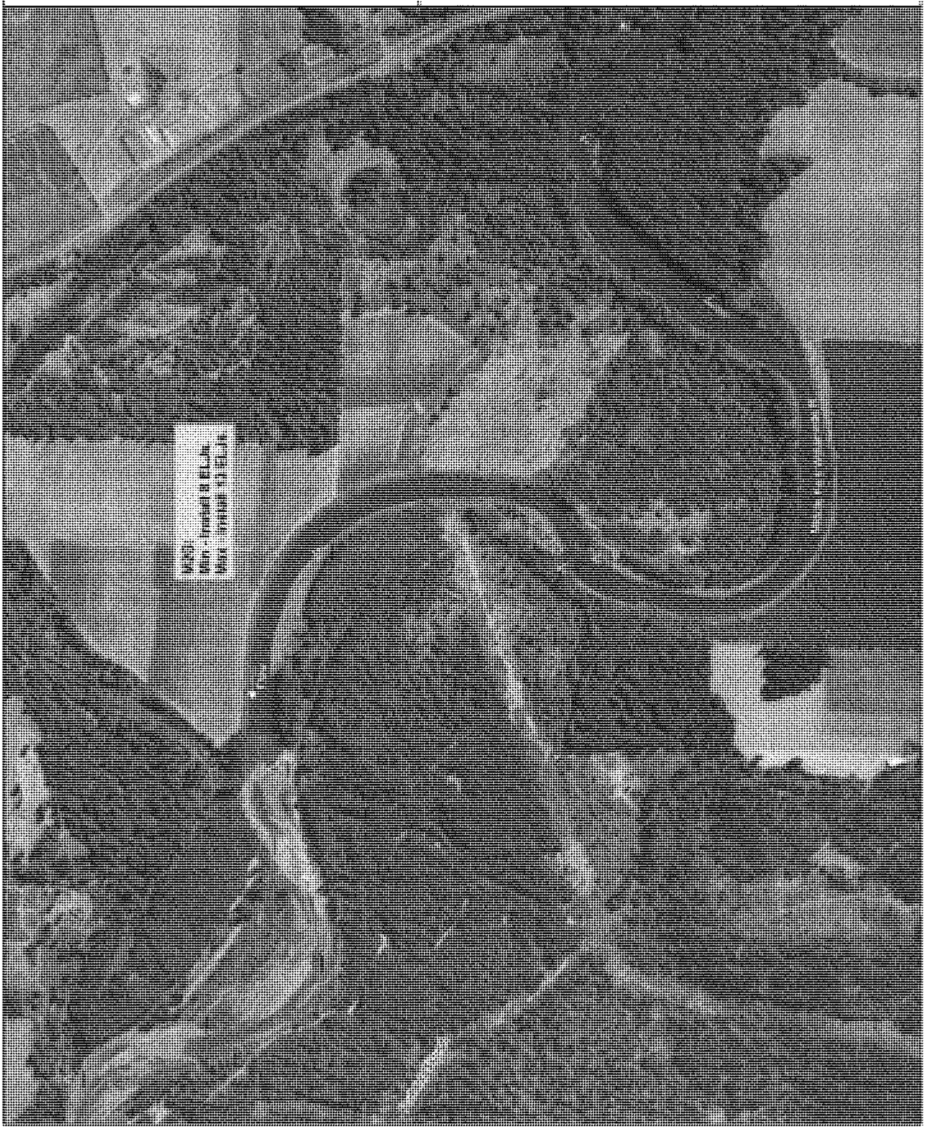
M2E:
Min - Remove invasives, revegetate, and place LWD in floodplain (50 pieces/acre)

Max - As above, plus restore side channel & install 4 ELJs

Study Reach: M2
Site: F
Willamette Floodplain
Restoration Study

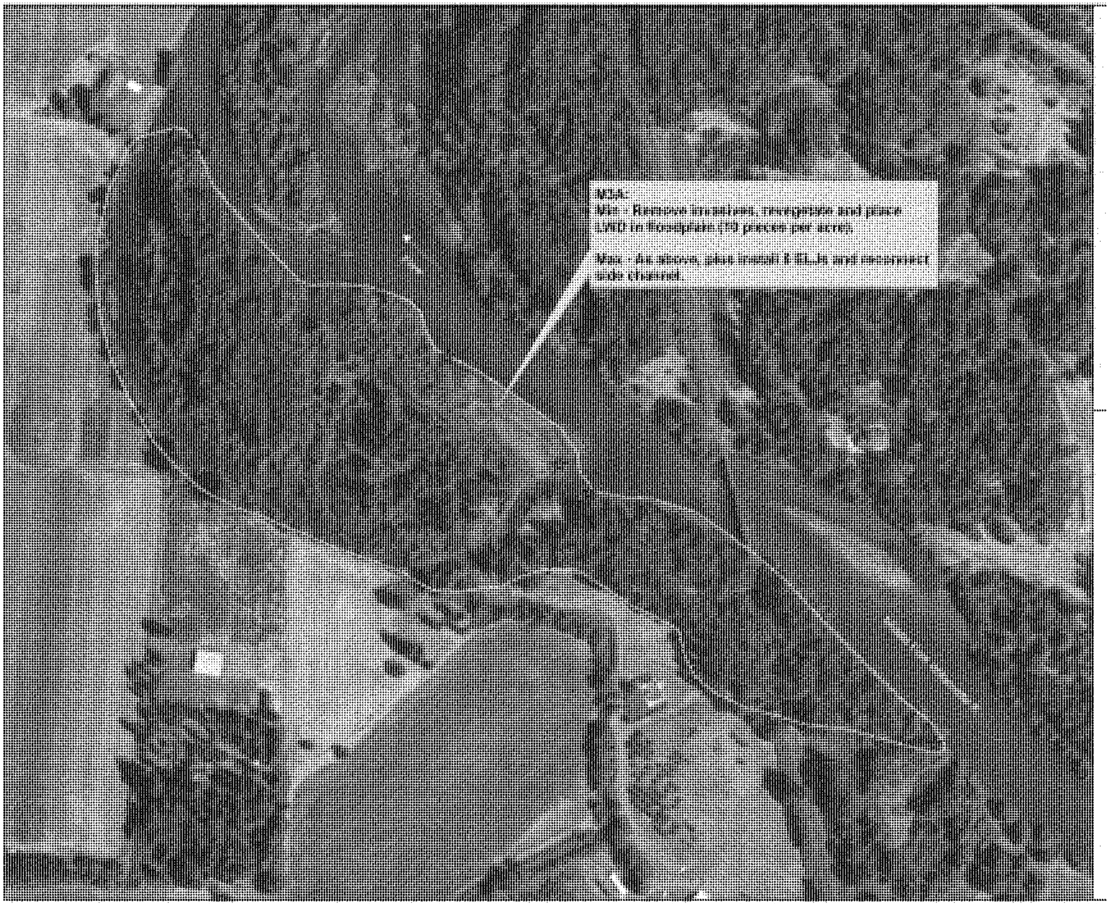


Study Reach: M2
Site: G
Willamette Floodplain
Restoration Study

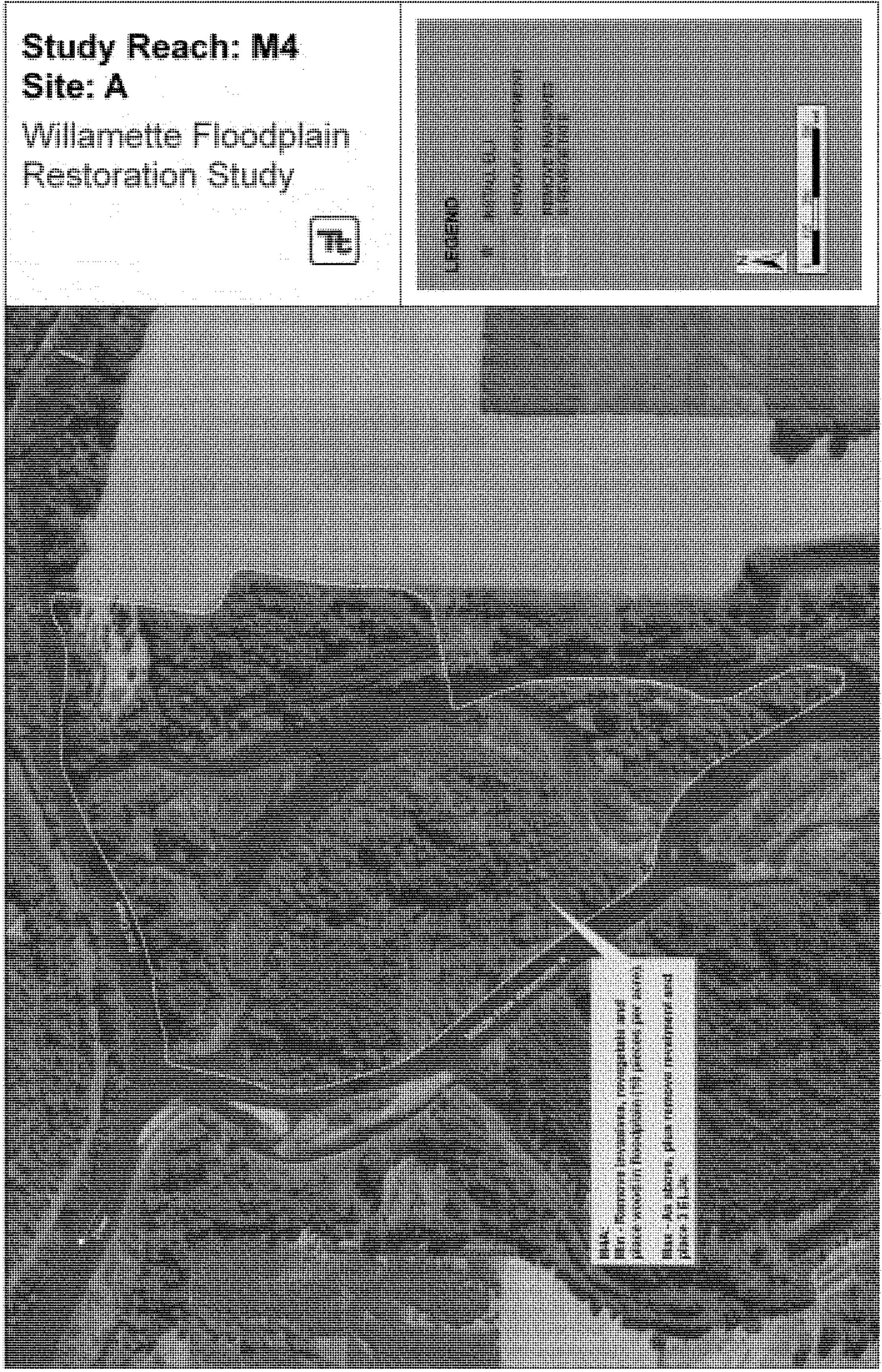


Study Reach: M3
Site: A

Willamette Floodplain
Restoration Study

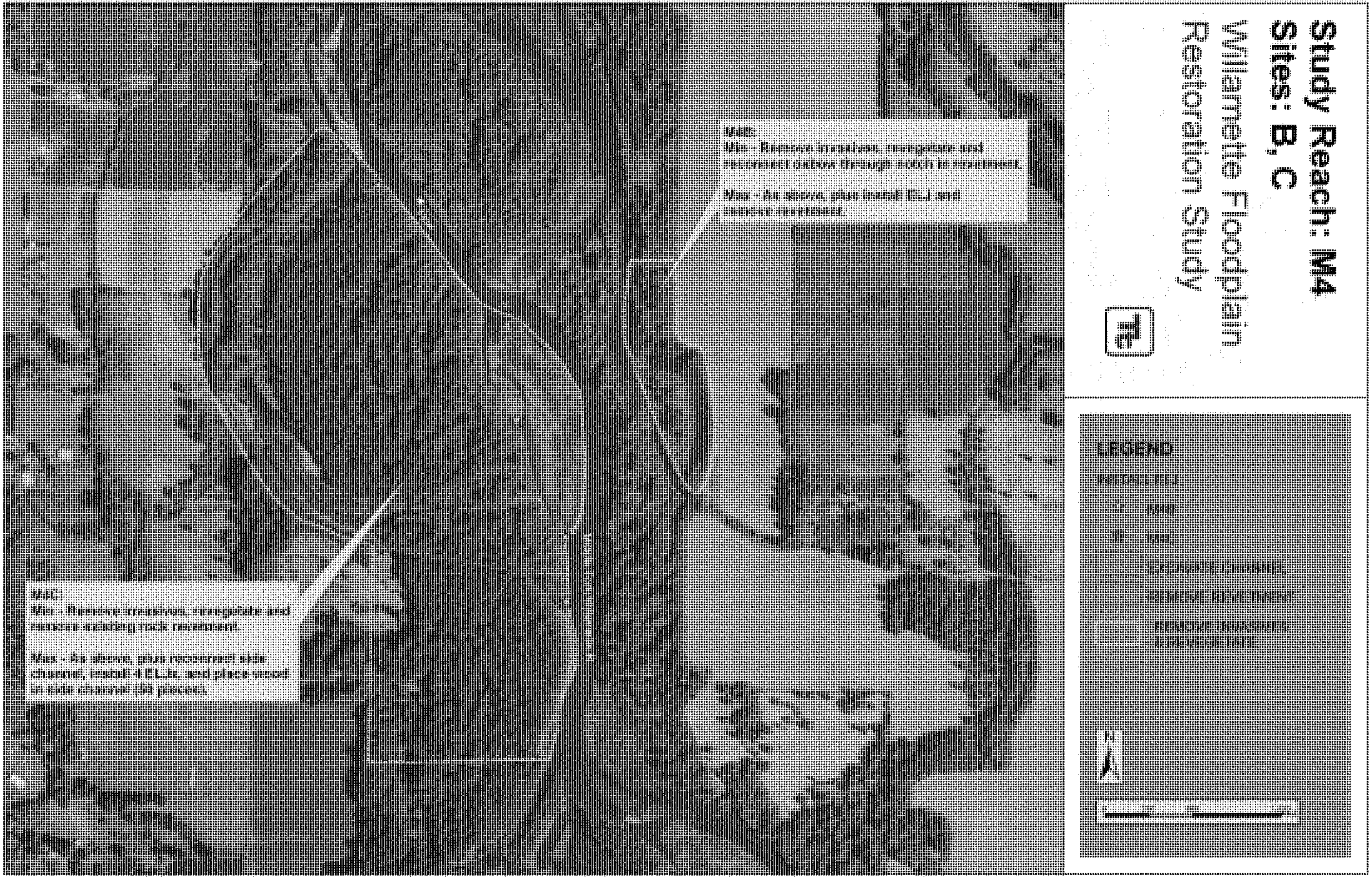


Study Reach: M4
Site: A
Willamette Floodplain
Restoration Study



M4A:
Min - Remove invasives, revegetate and place wood in floodplain (50 pieces per acre)

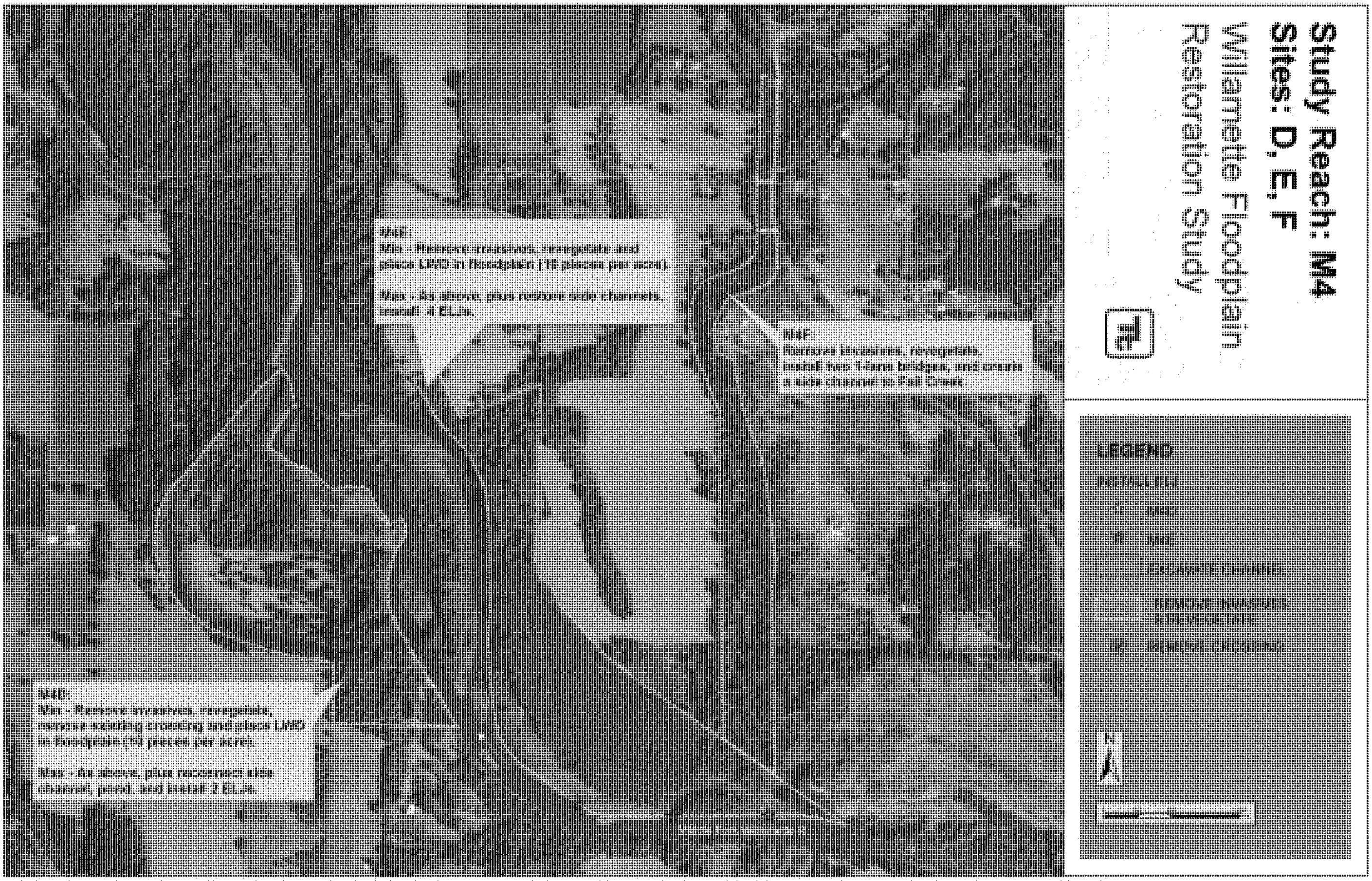
Max - As above, plus remove revetment and place 3 ELJs.

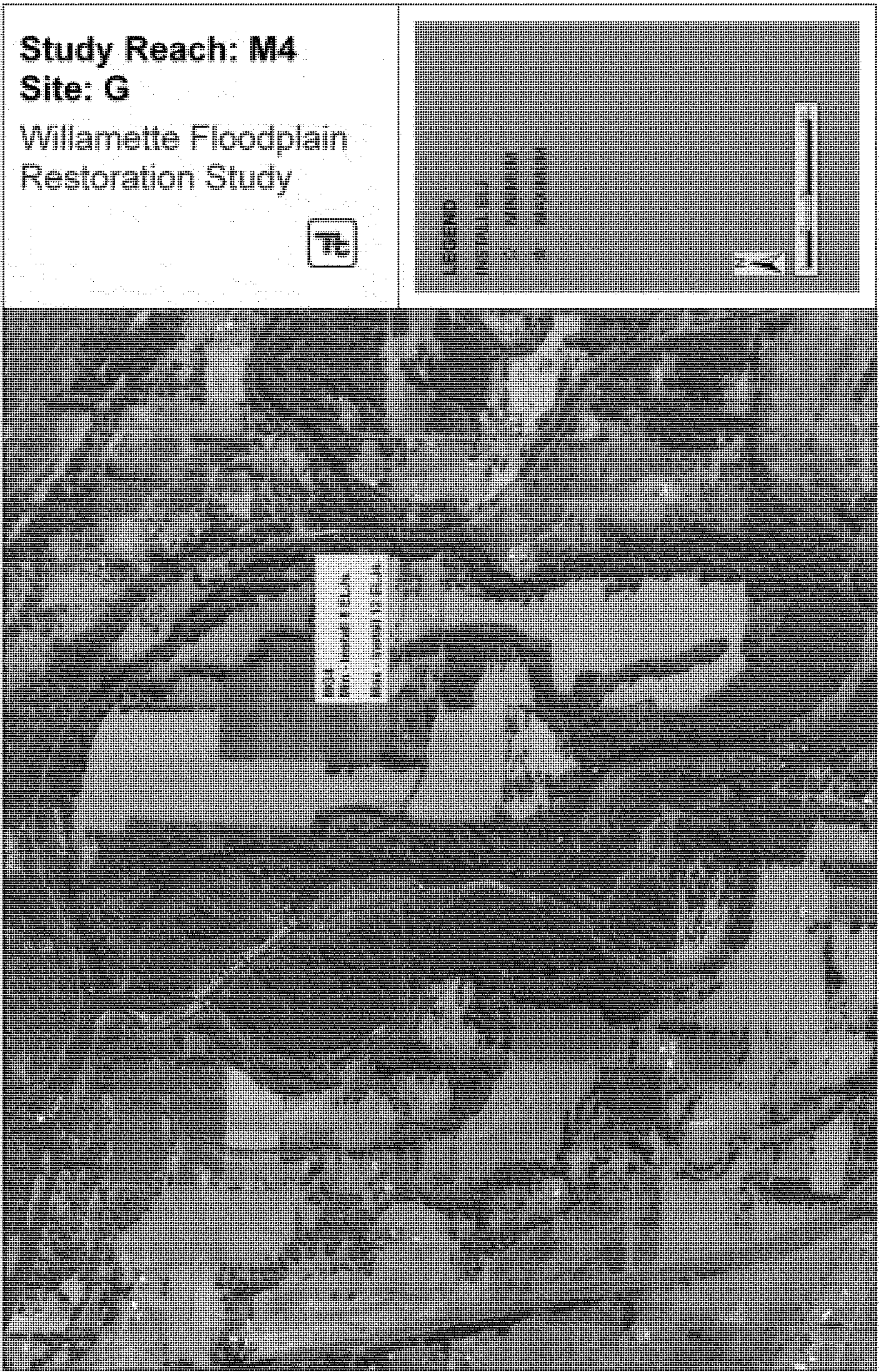


Study Reach: M4
Sites: B, C
Willamette Floodplain
Restoration Study

Study Reach: M4
Sites: D, E, F

Willamette Floodplain
Restoration Study

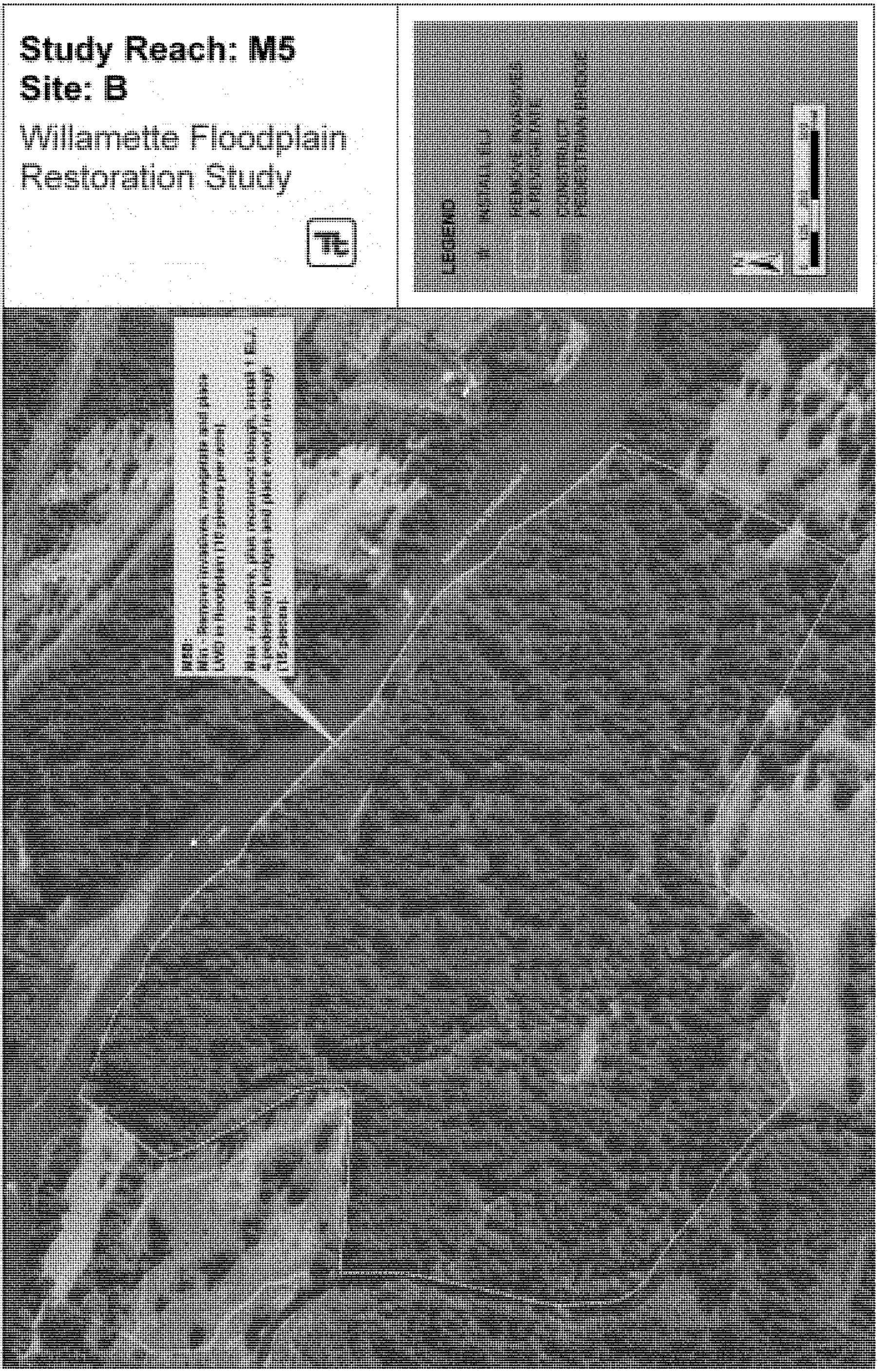




Study Reach: M4
Site: G

Willamette Floodplain
Restoration Study

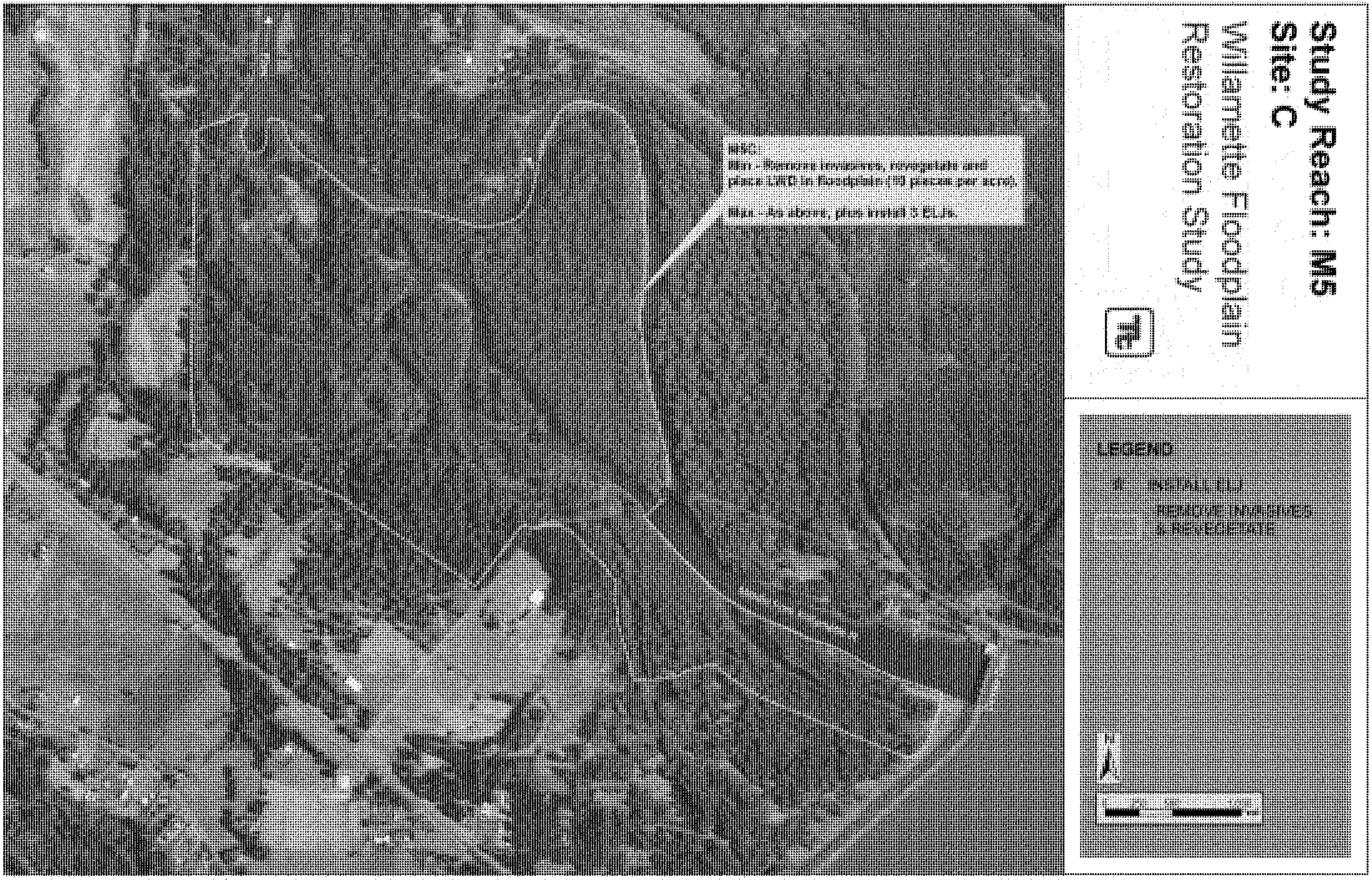
Study Reach: M5
Site: A
Willamette Floodplain
Restoration Study



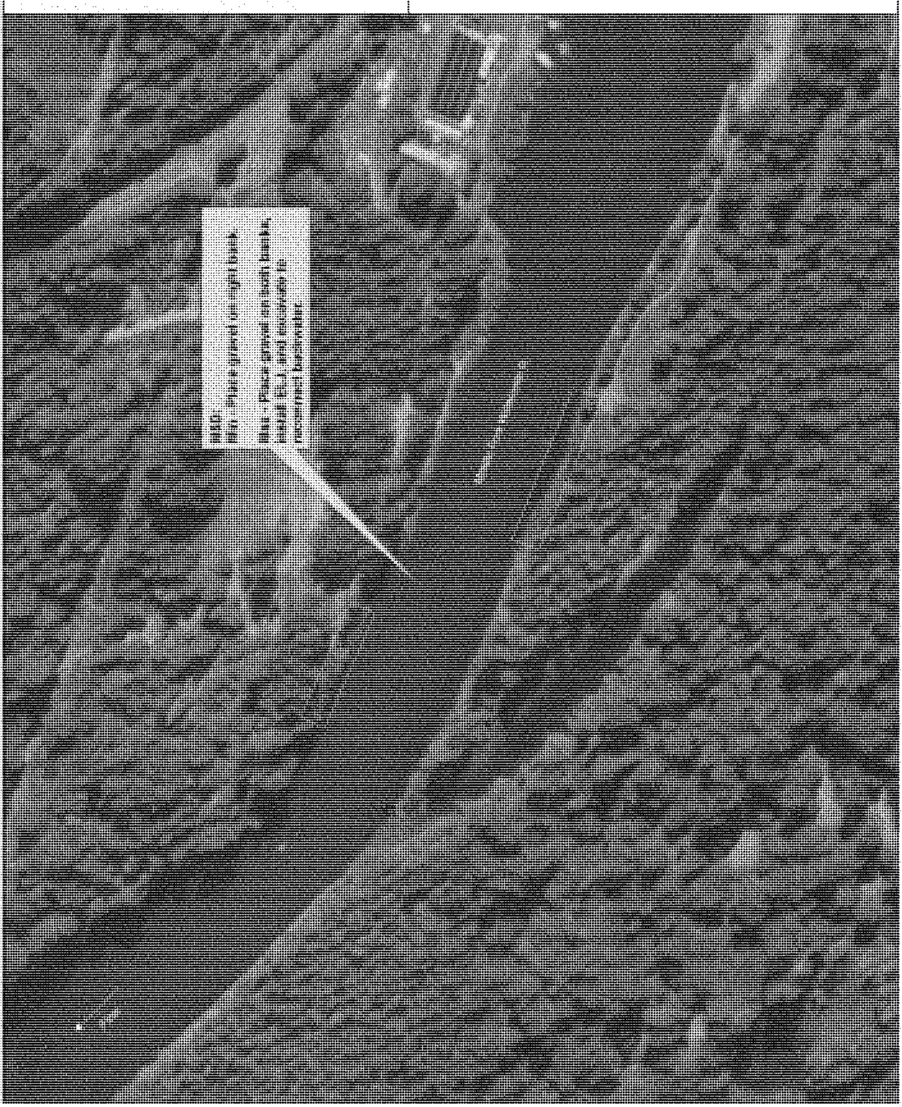
Study Reach: M5
Site: B
Willamette Floodplain
Restoration Study

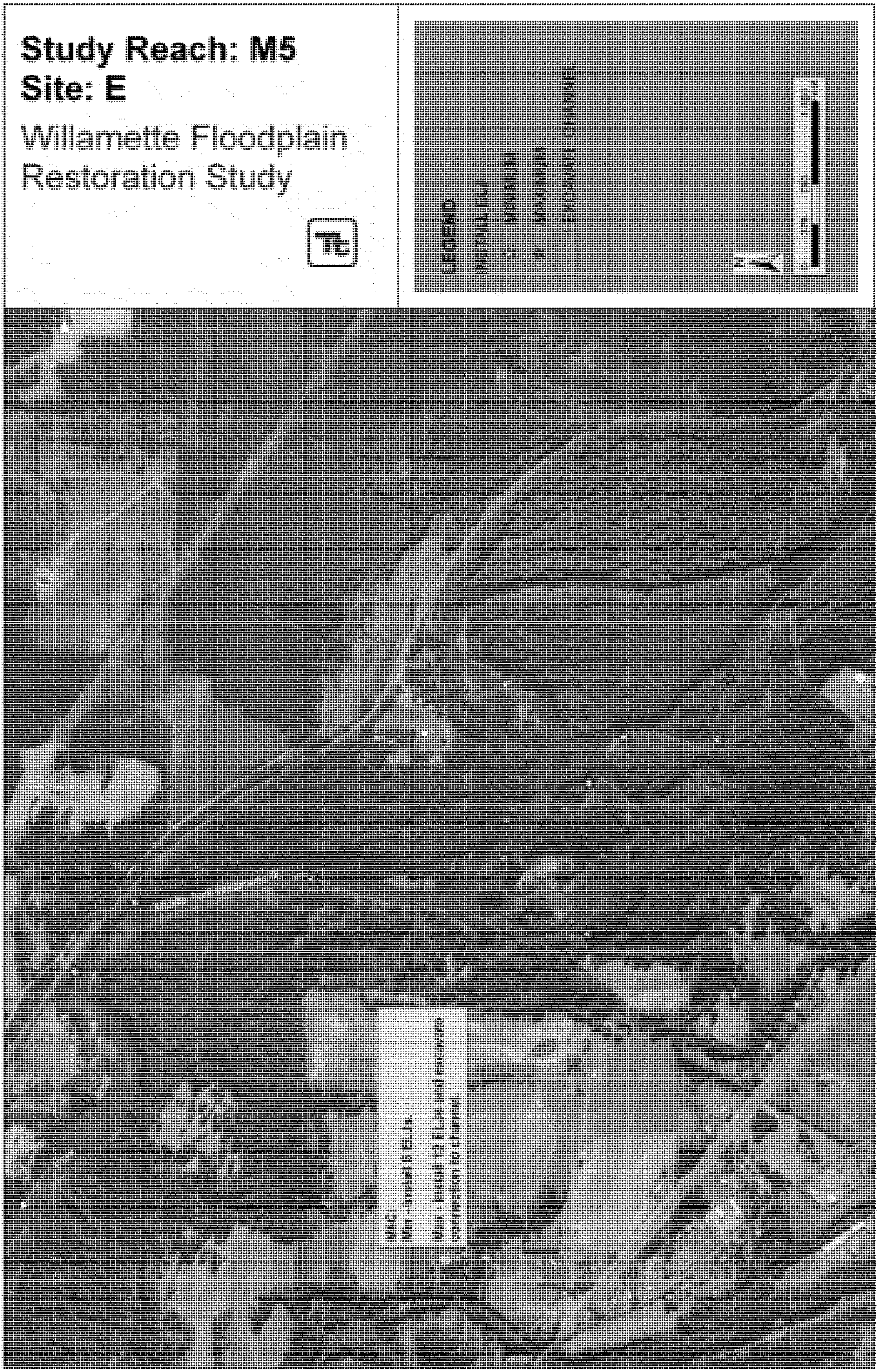
M5B:
Min - Remove invasives, revegetate and place LWD in floodplain (10 pieces per acre)

Max - As above, plus reconnect slough, install 1 ELJ, 4 pedestrian bridges and place wood in slough (15 pieces)

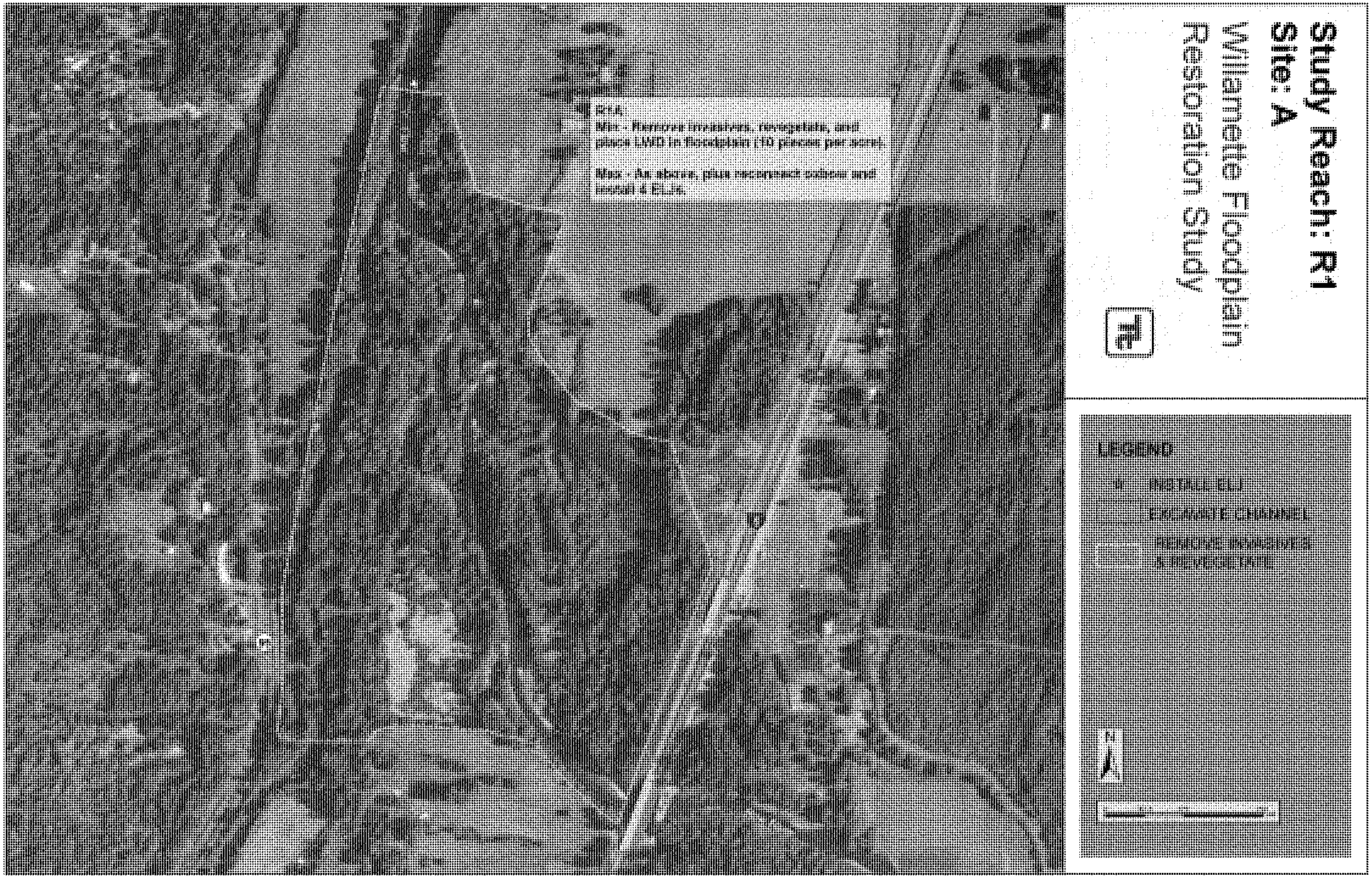

Study Reach: M5
Site: C
Willamette Floodplain
Restoration Study
M5C:
Min - Remove invasives, revegetate and place LWD in floodplain (10 pieces per acre).
Max - As above, plus install 3 ELJs.
LEGEND
INSTALL ELJ
REMOVE INVASIVES & REVEGETATE

Study Reach: M5
Site: D
Willamette Floodplain
Restoration Study





Study Reach: M5
Site: E
Willamette Floodplain
Restoration Study

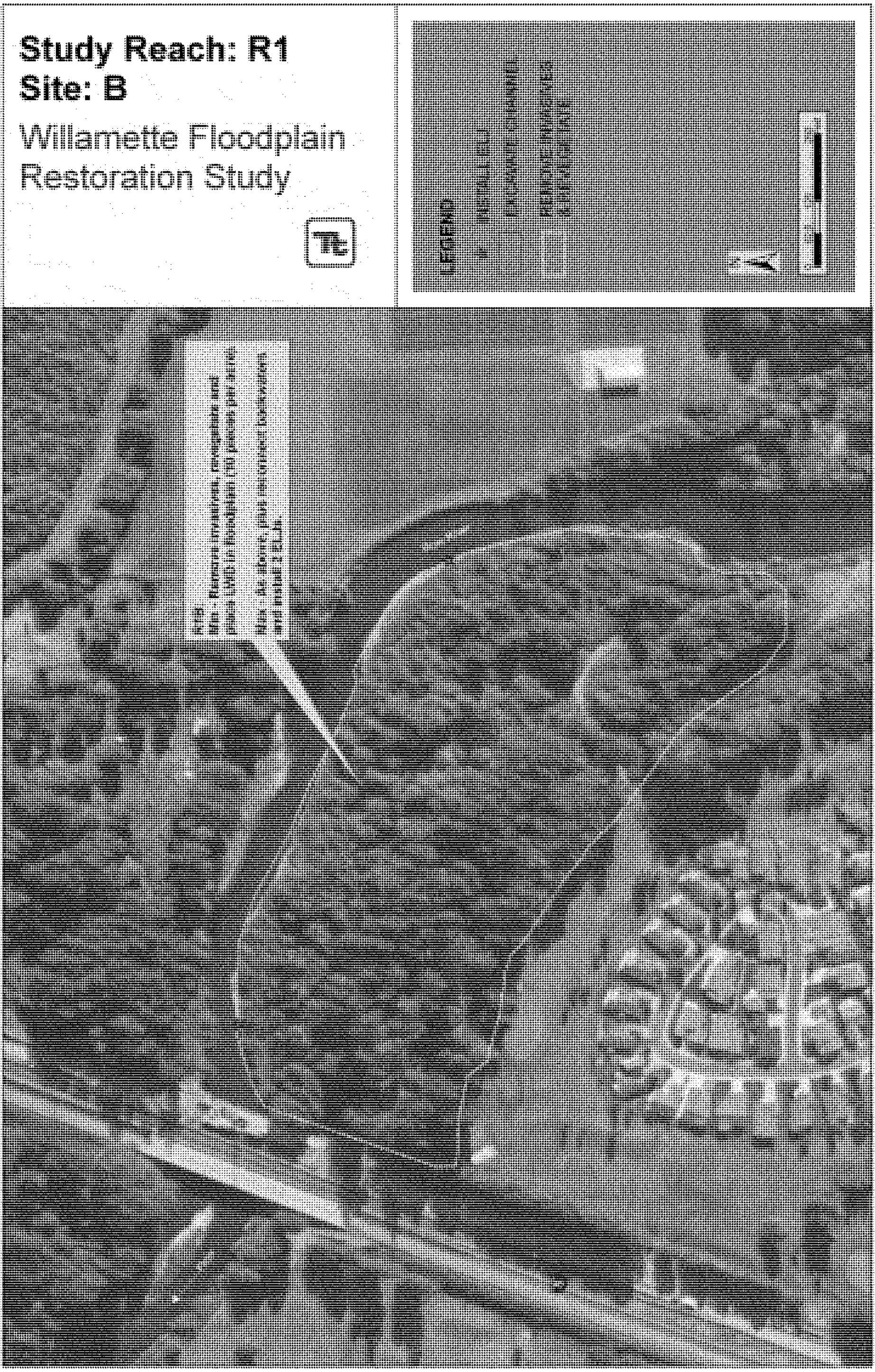


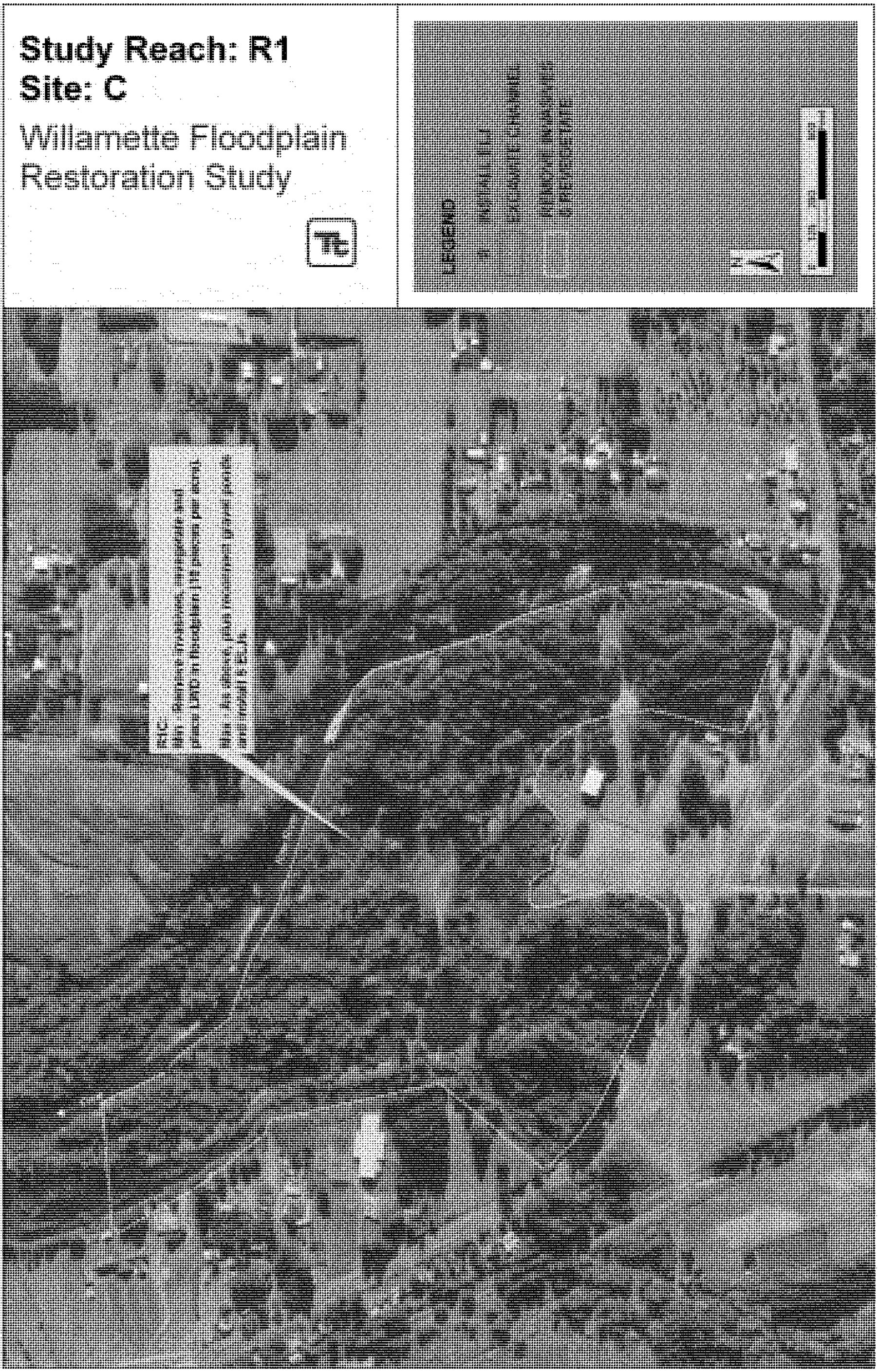
Study Reach: R1
Site: A

Willamette Floodplain
Restoration Study

R1A
Min - Remove invasives, revegetate, and place LWD in floodplain (10 pieces per acre).

Max - As above, plus reconnect oxbow and install 4 ELJs.


Study Reach: R1
Site: B
Willamette Floodplain
Restoration Study
LEGEND
INSTALL ELJ
EXCAVATE CHANNEL
REMOVE INVASIVES & REVEGETATE
R1B
Min - Remove invasives, revegetate and place LWD in floodplain (10 pieces per acre).
Max - As above, plus reconnect backwaters and install 2 ELJs.



Study Reach: R1
Site: C

Willamette Floodplain
Restoration Study

R1C
Min - Remove invasives, revegetate and place LWD in floodplain (10 pieces per acre).

Max - As above, plus reconnect gravel ponds and install 5 ELJs.

APPENDIX B: Habitat Evaluation Model

November 2013

WILLAMETTE RIVER FLOODPLAIN RESTORATION STUDY FLOODPLAIN HABITAT INDEX

PLANNING MODELS DOCUMENTATION

Prepared for:
U.S. Army Corps of Engineers, Portland District

Prepared by:

Tetra Tech, Inc.
Portland, Oregon

Revised November 2012

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WILLAMETTE RIVER FLOODPLAIN RESTORATION FLOODPLAIN HABITAT INDEX

1. PURPOSE

The purpose of this multi-species floodplain restoration habitat index is to evaluate the potential ecological benefits of restoring and reconnecting floodplain areas along the Willamette River in Oregon. Specifically, the index and its components will address the extent to which floodplain restoration will benefit multiple key fish and wildlife species. The index is comprised of multiple species Habitat Suitability Indices (HSIs) within the Habitat Evaluation Procedures (HEP) framework developed by the U.S. Fish and Wildlife Service (USFWS 1980).

The index will be used for the Willamette River Floodplain Study being conducted by the U.S. Army Corps of Engineers, Portland District and its local sponsors, the Willamette Partnership, the Nature Conservancy, the Coast Fork Willamette Watershed Council and the Middle Fork Willamette Watershed Council. There are several federal authorities for the Willamette River Floodplain Restoration Study.

- Section 202 of the Water Resources Development Act of 2002 (P.L. 106-541, 11 December 2000). Titled "Watershed and River Basin Assessments". Section 202 amended Section 729 of the Water Resources Development Act of 1986 (100 Stat. 4164), authorizing the Secretary of the Army to assess the water resources needs of river basins and watersheds of the United States, including needs relating to: (1) ecosystem protection and restoration; (2) flood damage reduction; (3) navigation and ports; (4) watershed protection; (5) water supply; and (6) drought preparedness.
- The Senate Committee on Public Works resolution for the Willamette River Basin Comprehensive Study, adopted November 15, 1961, authorized the Chief of Engineers to determine "...whether any modification of the existing project is advisable at the present time, with particular reference to providing additional improvements for flood control, navigation, hydroelectric power development, and other purposes, coordinated with related land resources, on the Willamette River and Tributaries, Oregon."
- House Committee on Public Works resolution for the Willamette Basin Review Study, adopted September 8, 1988, authorized the Chief of Engineers to determine "...whether modifications to the existing projects are warranted and determine the need for further improvements within the Willamette River Basin (the Basin) in the interest of water resources improvements."

Floodplain habitats have been significantly reduced and degraded along the Willamette River since Euro American settlement began (Hulse 2002). Floodplains have been modified for agricultural, industrial, residential and urban land uses and the natural hydrology of various tributaries has been significantly changed as a result of the construction and operation of federal and non-federal dams. The Willamette River no longer experiences frequent peak events that form and sustain in-channel, off-channel, and floodplain habitats.

2. BACKGROUND

Initial planning for a comprehensive ecological response model was discussed in several previous reports for this study including the *Willamette River Basin Floodplain Restoration Feasibility Study Ecological Response Model Recommendations* (Primozich, *et al.* 2004); *An Approach for Synthesis of Willamette Floodplain Aquatic and Terrestrial Attributes* (McConnaha, *et al.* 2005); and the *Analysis of the Potential Benefits of Floodplain Habitats in the Middle Fork Willamette River Using Geomorphic Splice Analysis* (McConnaha, *et al.* 2006). These previous reports defined functions that floodplains provide and included the use of expert panels to recommend the types of indicators that could be used to represent those functions. It was recommended that indicators of geomorphic functions, terrestrial and aquatic habitats be used in the model to provide a comprehensive evaluation of the potential benefits that could be gained by restoring floodplain habitats. Indicators are fish and wildlife species, plant communities, or functions. Indicator attributes are the actual physical or biological features or processes that can be measured either in the field or via GIS analysis. Attributes can include channel length, floodplain habitat types, temperature, pieces of large woody debris, etc.

The approach recommended by those previous reports was deemed to be to time consuming and costly to apply to both the Coast and Middle Forks watershed. Thus, our approach has been to identify riverine and floodplain environments into major habitat types and address the response of each habitat type through Habitat Suitability Indices for species closely associated with each habitat type (Figure 1). The results from each of the component suitability indices can be examined independently and/or combined into a single overall index of floodplain function we have termed the Floodplain Habitat Index. Each of the component HSIs are described in detail below.

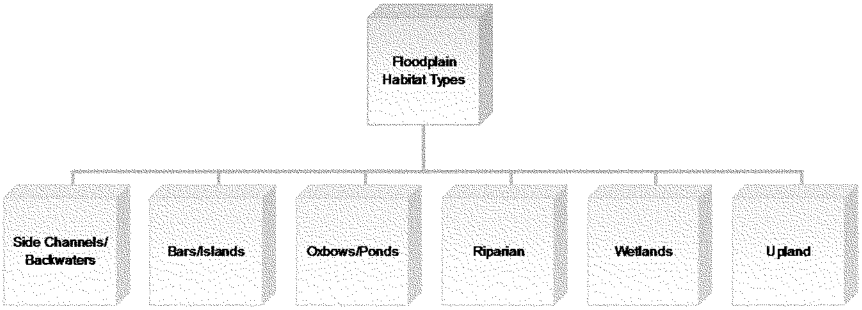

Figure 1. Floodplain Habitat Types.

The floodplain habitat index will assess the existing and proposed future condition of riverine and floodplain habitats and their relationships to fish and wildlife species production and survival.

3. FLOODPLAIN HABITAT INDEX

3.1 Habitat Evaluation Procedure (HEP)

The Habitat Evaluation Procedure (HEP) is a procedure developed by the U.S. Fish and Wildlife Service (1980a and 1980b) to facilitate the identification of impacts from various types of actions on fish and wildlife habitat. The basic premise of HEP is that habitat quantity and quality can be numerically described. HEP can provide a comparison of habitat quality between different sites or between different times at one site (for example, pre-construction versus post-construction). A key assumption in HEP is that an individual species "prefers" (or survives/reproduces better) in habitats with certain physical characteristics that can be measured. For example, if yellow warblers typically nest in deciduous shrubs, then sites with greater deciduous shrub cover are more suitable for yellow warblers than sites which have little or no deciduous shrub cover.

A Habitat Suitability Index (HSI) is the typical format used in HEP which is a mathematical relationship between a physical, chemical, or biological habitat attribute and its suitability for a single species or assemblage of species. The Suitability Index is a unit less number between 0 and 1 that describes the requirements of a species for certain attributes such as cover, distance to foraging, water temperature, etc. A set of one or more Suitability Indices that represent key habitat requisites for the species during one or more life history stages are combined into an overall Habitat Suitability Index (HSI) by adding or multiplying the individual indices. The attributes are measured in the field or via GIS analysis and their corresponding index values are inserted into the model to produce a score that describes existing habitat suitability. The overall HSI value is also an index score between 0 and 1. This index value can be multiplied by the area of the site to yield Habitat Units (HUs), or it can be used as an index score for a habitat quality comparison only.

A number of HSIs have been published for either individual species or guilds or other attributes, including those that may occur in Oregon (both native and non-native): bald eagle, beaver, black-capped chickadee, black bullhead, bullfrog, brook trout, carp, channel catfish, cutthroat, downy woodpecker, great blue heron, hairy woodpecker, belted kingfisher, long nose dace, marsh wren, mink, osprey, red-winged blackbird, smallmouth bass, and wood duck. HSIs can be created or modified using literature and other data. Local or draft models have been developed for green heron (USFWS 1980c), native amphibians (WDFW 1997), Oregon chub (Scheerer 2006) and western pond turtle (Tetra Tech 2000), and are based on the literature for the species.

HEP has typically been used on a site-specific basis. The indicator attributes selected will need to be appropriate for the scale of analysis. A more detailed monitoring plan should be developed that will compare species diversity and abundance before and after the project is implemented, and to also compare the validity of the HEP model in predicting habitat improvements.

4. DESCRIPTION OF MODEL

As identified previously, the proposed model will be a combination of multiple individual species HSIs. The resultant indices may be averaged or geometrically combined, and during the use of the model, it will be tested and documented which combination of components provides the most meaningful estimation of the quality of habitat.

4.1 Description of Input Data

Input data for a HEP model almost always should be collected specifically at the project site or by the use of aerial photographs or a GIS database for the project area. The input data required varies substantially from one Habitat Suitability Index to another. It is important to utilize or develop an HSI where the variables can be measured within the cost and time constraints of a particular study or project. Typical variables that are measured include percent canopy cover, diameter of trees, water depth, water velocity, number of pieces of downed wood, vegetation composition, etc. These measured variables are then assigned a Suitability Index based on the Suitability Curve or discreet Suitability Values developed in the model.

Typically, input variables are measured at multiple locations on the project site and then averaged to yield an overall percent canopy cover or similar value. If the project site is comprised of several distinctly different vegetation communities, then variables can be measured specifically for each community to yield multiple scores for the overall site. Users must be capable of using basic ecological data collection techniques and, depending upon the model, capable of identifying plant species on the site.

4.2 Description of Output Data

The output data from a HSI is one or several individual suitability indices (unit less number from 0 to 1) that are then entered into the HSI model equation to yield an overall habitat suitability index for the species. For example, the yellow warbler model includes four variables: 1) V1, percent deciduous shrub crown cover; 2) V2, percent overall canopy cover; 3) V3, average height of deciduous shrub cover; and 4) V4, percent shrub canopy comprised of hydrophytic vegetation. The equation for combining these variables is an average as shown below, because none of the variables are limiting factors (such that a score of zero should render the habitat completely unsuitable for yellow warbler), and it appears that the variables are compensatory (such that while a low suitability score for one variable will reduce the overall habitat suitability, the other variables can somewhat compensate and still provide suitable habitat).

$$HSI = (V_1 + V_2 + V_3 + V_4) / 4$$

4.3 Capabilities and Limitations of the Model

A major assumption of HEP is that there is a linear relationship between the HSI and either carrying capacity for a species or an observed preference/requirement for a specific habitat feature. When developing specific HSI models, it is necessary to define varying qualities of habitat (i.e. optimum, good, fair, poor) based on observed relationships in the literature. For example, if the majority of observations of yellow warbler nests were in deciduous shrubs ranging from 1.5 to 4 meters, then deciduous shrubs of that height are assumed to provide optimal nesting habitat, and thus yield a high index score (in the range of 0.8 to 1.0). Shrubs of lesser height are assumed to be less suitable and yield lower index scores.

Specific limitations have been observed in the use of HEP and HSIs and include: 1) many of the developed models have not been tested sufficiently to match observed "preferred" habitats by the various species or to match species experts' knowledge of optimal habitat; 2) high values generated from the HSIs do not necessarily match observed higher species diversity or abundance than sites with lower values; 3) difficulty in collecting sufficient data to use the models (particularly when models have numerous variables); 4) use of one species model to represent suitability for wider guilds or assemblages may not accurately represent those other species; and 5) lack of variables that describe landscape scale effects on species diversity and abundance. (Barry, *et al.* 2006; O'Neil, *et al.* 1988; Wakeley 1988)

These limitations have been recognized in the development of this integrated model. Because it may be inaccurate to represent habitat suitability for large guilds or assemblages of species, multiple species were selected for the HEP portion of this model (and are described later) to encompass the habitat requirements for relatively small guilds or individual species of interest. This proposed model has also been reviewed by a number of fish and wildlife biologists in the watershed with specific expertise with the species of interest to solicit feedback on the species selected and the relationships between variables and habitat suitability.

Another limitation in the use of ecological models is that other factors beyond the specific parameters evaluated in the models could have greater effects on species populations. Examples could be infectious diseases that could wipe out a localized population, climate change effects on temperatures and hydrology, and invasive species. These are important considerations for the success of any habitat restoration project and while not amenable to analysis in this proposed model, they should be considered by the project team during design development and implementation.

This study will not be used to restore or manage habitat for a single species, nor is it intended to specifically increase the population of a single species. This project is intended to allow the Willamette River to form floodplain habitats over time, rather than creating a specific static habitat type. The models have been modified or created to reflect local or regional data, as well as to simplify the models so that only the variables (and habitat types) likely to change as a result of the restoration project are included.

4.4 Model Development Process

All HSIs proposed for use in this model have been documented and reviewed. The Oregon chub and amphibian models were developed by multi-agency teams based on regional literature and expert opinions. The western pond turtle model was developed based on regional literature and reviewed and modified based on expert reviews. Testing and validation of the models is more limited. A recommendation for future use of these models is that the monitoring plan developed for this project should incorporate many of the parameters included in the HSI models to test and validate assumptions on habitat suitability. This monitoring data could inform future refinements or changes to the models and improve their predictive capability.

4.5 Identification of Formulas and Proof Computations are Done Correctly

All equations used in the HEP model are specifically stated and described below, as well as the Suitability Curves. Calculations are done in standard spreadsheet software (i.e. Microsoft Excel). The models are completely transparent and all assumptions can be verified.

4.6 Availability of Input Data

Input data used for this model will be collected from on-site field surveys and from the use of aerial photography.

4.7 Proposed HSI Models

Primozich, *et al.* (2004) proposed the use of plant communities and wildlife species as indicators. Published HSIs for the following species or guilds were reviewed for potential inclusion in the HEP including: beaver, mink, yellow warbler, belted kingfisher, green heron, great blue heron, hairy woodpecker, downy woodpecker, red-winged blackbird, wood duck, mallard, lesser scaup, osprey, bald eagle, black-capped chickadee, marsh wren, cutthroat trout, Oregon chub, native amphibians, native salmonids, American kestrel, and bullfrog.

It is recommended that HSIs for several species be utilized to capture the range of benefits that could be provided by a floodplain restoration project. The recommended HEP model includes the following species or guild: (1) Western pond turtle; (2) Oregon chub; (3) beaver; (4) wood duck; (5) yellow warbler (highly riparian associated); (6) native amphibians (red-legged frog, Oregon spotted frog, Pacific tree frog, rough-skinned newt, Northwestern salamander, long-toed salamander); (7) native salmonids (Chinook, steelhead, cutthroat); and (8) American kestrel (grasslands/ag lands). The Western pond turtle and Oregon chub are both species of concern in the study area and utilize backwaters and ponds. The beaver is a mammal species dependent on native riparian species for food (cottonwood, willow, and alder). The wood duck is a cavity nesting waterfowl species that utilizes riparian areas for nesting. The yellow warbler is highly associated with riparian habitat for nesting. The six amphibians are native amphibians that primarily represent aquatic amphibians utilizing riparian and wetland habitats. Chinook salmon, steelhead and cutthroat trout utilize off-channel aquatic habitats for rearing and refuge. American kestrel are raptors that utilize open grasslands and agricultural lands for foraging, as well as riparian and woodlands for nesting and perching.

Primozich, *et al* (2004) proposed using geomorphic features for aquatic habitats and the following terrestrial indicators/species/guilds: 1) native riparian shrub and forest community; 2) off-channel marsh and pond community; 3) turtles and amphibians; 4) riverbank wildlife; and 5) bar/flat wildlife. The model recommended here includes species that can represent all of those indicators. For example, the native riparian shrub and forest community can be represented by the riparian dependent yellow warbler. Table 3 shows the species/guilds selected and the habitat types and physical parameters (attributes) they will represent.

Table 1. Recommended species for HEP model.

Species/Guild Selected	*Variables/Attributes*	*Habitat Type Associated With*
Western pond turtle	**Water depth, water temperature, percent cover, availability of nesting sites**	**Off-channel ponds, sloughs, and backwaters**
Oregon chub	**Waterbody type, velocity, submergent and emergent vegetation, water depth, substrate type, slope, woody debris, riparian, marsh, water temperature, non-native fish, habitat isolation**	**Off-channel ponds, sloughs, and backwaters**
Beaver	**Tree canopy closure, tree size class, shrub crown cover, height of shrub canopy, species composition**	**Riparian and floodplain vegetation communities (particularly cottonwood and willow)**
Wood duck	**Cover**	**Riparian and floodplain vegetation communities and near shore aquatic habitats**
Yellow warbler	**Deciduous shrub crown cover, canopy cover, height of shrub canopy, hydrophytic shrubs, velocity**	**Riparian and floodplain vegetation communities (particularly cottonwood and willow)**
Native amphibians	**Permanent water, water velocity, emergent and submergent vegetation, ground cover along water's edge, riparian zone width, water temperature, land use**	**Slow velocity stream reaches/alcoves, off-channel ponds, sloughs, and backwaters and other wetlands**
Native salmonids	**Maximum water temperature, percent pools, instream cover, predominant substrate size**	**Side channels, backwaters, oxbows/ponds**
American kestrel	**Distance to woodland, distance to suitable perch sites, distance to open land, average dbh of trees**	**Grasslands, ag lands, riparian forest, woodland**

Several of the existing HSI models do not appear appropriate to use in their current condition and the reasons for not selecting the species and models are briefly described in Table 4.

Table 2. Species not selected for HEP model.

Species	*Description of Variables*	*Reason for Not Selecting*
Bald eagle	Size of waterbody for foraging; morphoedaphic index; distance from nest to foraging area	Model designed for breeding season at lacustrine habitats and based on volume of forage base. Not relevant to project area or proposed alternatives. Could have created new model for wintering habitat, but primarily based on availability of perching habitat and proximity to waterbodies, which will not change significantly as a result of proposed restoration measures.
Black-capped chickadee	% Tree canopy closure, average height of trees, # of snags	Restoration of floodplain and riparian habitats will benefit these attributes and habitat requirements, but are not directly predictable from proposed changes.
Black bullhead	% Pools/backwaters, % cover, average current velocity, temp, DO, pH, salinity, turbidity, substrate, % cover objects	Could use as a negative HEP because it is a non-native warmwater species, but currently using bullfrog as the negative HEP that requires similar attributes.
Brook trout	Average thalweg depth, %	Non-native species likely present in the project area,

Species	*Description of Variables*	*Reason for Not Selecting*
	instream cover, % pools, pool class, % substrate size, % riffle fines, average maximum temperature, average minimum DO, average water velocity, pH, average annual base flow, dominant substrate type, average % vegetation, % streamside vegetation, % midday shade	but similar requirements to cutthroat trout. All attributes are in-channel, may not see significant change.
Channel catfish	% Cover, substrate type, % pools, average current velocity, temperature, DO, turbidity, salinity, length of growing season	Could use as a negative HEP because it is a non-native warmwater species, but currently using bullfrog as the negative HEP that requires some similar attributes.
Cutthroat trout	Average thalweg depth, % adult cover, % pools, pool class, % juvenile cover, % substrate size, % riffle fines, average maximum temperature, DO, water velocity, average gravel size, % fines, pH, base flow, dominant substrate, % vegetation, % vegetation erosion, midday shade	Could use as a comparison to EDT model for in-channel attributes.
Downy woodpecker	Basal area per hectare, # snags/ha	Will likely benefit from floodplain/riparian restoration, but attributes are not directly relevant.
Great blue heron	Distance between foraging areas and heronry sites, shallow clear water, distance from human activities	Attributes not likely to show a significant change from future without-project to future with-project condition.
Hairy woodpecker	# of snags, mean dbh of overstory trees, % canopy cover	Will likely benefit from floodplain/riparian restoration, but attributes are not directly relevant.
Belted kingfisher	% of shoreline subject to severe wave action, average water transparency, % water surface obstructed, % water area < 60 cm, % riffles, number of stream reaches with 1 or more perches, distance to suitable soil bank	Will likely benefit from floodplain/riparian restoration, but attributes are not directly relevant to project site.
Longnose dace	Average current velocity, maximum depth of riffles, % riffles, substrate type, average maximum temperature, % cover	In-channel attributes that will not likely show a significant change. Also, primarily a species of swift flowing smaller tributaries.
Marsh wren	Growth form of emergent hydrophytes, % canopy cover of emergents, mean water depth, % canopy cover of woody vegetation	Will benefit from wetland restoration, but attributes not directly relevant.
Osprey	Obstructions over water, transparency, human activities	Attributes will not show a significant change.
Red-winged blackbird	Dominant emergent vegetation type, water present/absent, carp present/absent, larvae of odonates, patchiness of vegetation, layers of wetland vegetation	Will benefit from floodplain wetland restoration, but attributes not directly relevant.
Smallmouth bass	Substrate type, % pools, % cover, depth of pools, pH, DO, turbidity,	Could use as a negative HEP, but in-channel attributes are not likely to show a significant change.

Species	*Description of Variables*	*Reason for Not Selecting*
	temperature, fluctuations in water level, gradient	

Western Pond Turtle Life History and Habitat Requirements

The western pond turtle (*Clemmys marmorata*) is found in the Pacific northwest generally west of the Cascade Range from Puget Sound south to Baja California Norte. There are two subspecies: the northern subspecies occurs north of the American River in California (C. *marmorata marmorata*) and the southern subspecies occurs south of the American River (C. *marmorata pallida*). In Oregon, the species occurs in the western Cascades, the Willamette Valley, Coast Range, and Klamath Mountains and possibly east of the Cascades in the Deschutes and John Day drainages (likely from introductions, Holland, 1994). Western pond turtles are in the family of Emydidae that includes many species of semi-aquatic pond and marsh turtles including slider turtles. Life history requirements of the turtles in this family have many similarities (Rosenberg et al. 2009). The model described herein was based on the slider turtle model developed by the U.S. Fish and Wildlife Service (Morreale and Gibbons 1986) with the addition of key parameters identified by regional Western pond turtle experts. Based on the co-occurrence of Western pond turtles and red eared sliders in most habitats in the Willamette Valley and similar life history uses of habitats, the parameters included in the model appear appropriate for Western pond turtle (K. Beale, USACE, 2012, pers. comm.).

Western pond turtles are very wary and sensitive to human disturbance, particularly movements of pedestrians even as far as 100 meters away (Holland, 1994). They forage in water and eat a wide variety of aquatic invertebrates, and terrestrial insects. Pond turtles likely eat small fish, crayfish and frogs as well, but much less frequently, and possibly only via scavenging. Scavenging of carrion may also be an important food source, particularly seasonally (early spring). Pond turtles typically overwinter in the northern part of the range from one to six months, but may frequently emerge on sunny days to bask. Overwintering can occur in mud on the bottom of ponds, under overhanging banks, or in forested areas under a thick layer of leaf litter. Pond turtles may also use terrestrial habitats if their aquatic habitat seasonally dries up (Rosenberg et al 2009). During the rest of the year, turtles generally occur in aquatic habitats, with a slow to moderate current. A significant amount of time is used for basking on rocks, logs or emergent vegetation. Nesting habitat is a key terrestrial component of Western pond turtle life history. Terrestrial nesting habitat is typically sparsely vegetated with grass and/or forbs. It is typically on south-facing gentle slopes or other areas with good sun exposure and typically fairly compact soil with silt or clay, although sandy loam and gravel/cobble mixed with soil have also been used (Rosenberg et al. 2009). Nesting habitat within approximately 200 meters to aquatic habitats may be preferred. The various studies cited in Rosenberg et al. (2009) generally found that solar exposure and warmer temperature soils were the most consistent trait. It appears that hatchlings remain in the nest over the winter and emerge the following spring. Predation on eggs and hatchlings is typically very high by raccoons, fox, coyote, and skunks as well as domestic dogs. Small turtles may also fall prey to largemouth bass, bullfrogs, trout, other resident fish and waterfowl. Larger turtles typically do not have many predators, but may occasionally be taken by the mammals listed above, and also by bear, river otter, dogs and humans. Minimizing habitat for bullfrogs and other non-native predators will benefit western pond turtles, although unfortunately the turtles typically prefer warm waters that bullfrogs also prefer. Some significant limiting factors to western pond turtle survival in the Willamette Valley appear to be: 1) predation of nests; 2) hatchling predation by bullfrogs; and 3) lack of nesting habitat (B. Castillo, ODFW, pers. comm.). Loss of aquatic habitat and road mortality are also major threats to this species (Rosenberg et al. 2009).

Oregon Chub Life History and Habitat Requirements

The Oregon chub (*Oregonichthys crameri*) was listed as endangered under the federal Endangered Species Act in 1993. This small minnow is endemic to the Willamette River system from Oregon City to Oakridge, Oregon. Currently, there are estimated to be 15 populations of Oregon chub with at least 500 individuals. Eight of these populations are stable, with 6 populations in the Middle Fork system, 1 in the Santiam, and 1 in the mainstem Willamette (Scheerer, *et al* 2003 cited in draft HSI). The Oregon chub prefers off-channel habitats including sloughs, oxbows, beaver ponds and flooded marshes. The habitat requirements for this species include low- or zero-velocity water with depths of less than 2 meters (6.6 feet), silty and organic substrates, and considerable aquatic or overhanging riparian vegetation for cover (USFWS 1993). Spawning occurs from the end of April through early August when water temperatures range from 15° C to 21° C. Spawning activity in Oregon has only been observed at temperatures exceeding 16° C (Scheerer 1999). Off-channel habitats have been nearly eliminated from the Willamette Basin due to changes in hydrology as a result of the construction of dams, channelization of the Willamette River and its tributaries, removal of large woody debris (LWD), and agricultural and other development (USFWS 1998; Scheerer and McDonald 2003). Remaining off-channel habitats have been invaded by non-native predators and competitors introduced into the Willamette River. Species such as bass, mosquito fish and bullfrogs may present the largest obstacle to the recovery of the Oregon chub (Scheerer 2002). Habitats that currently support healthy populations of Oregon chub are isolated from adjacent aquatic habitats and do not typically have non-native fish species present. However, the fragmentation of populations has likely reduced the viability of the species as a whole reducing genetic exchange and the potential for recolonization of new habitats.

A key area that should be considered for future research and monitoring is the potential effects of non-native invasive plant species on Oregon chub habitat. In areas of dense aquatic plant growth, the senescence of the plants each fall/winter can cause low dissolved oxygen conditions that might prohibit fish use of certain habitats.

Beaver Life History and Habitat Requirements

Beaver are herbivorous aquatic mammals found throughout North America wherever suitable riparian and wetland habitats occur. Beaver were once so numerous (50-100 million) those most aquatic habitats in North America were shaped by beaver activity (do we have a citation for this?). The HSI model for beaver is described in Allen (1982) and habitat requirements are summarized below. Beaver are generalized herbivores, but have strong preferences for specific plant species and size classes. Aspen, willow, cottonwood, and alder are the preferred species. Woody stems less than 10 centimeters in diameter near water are preferred and herbaceous vegetation and leaves are consumed during the summer. Aquatic vegetation is also utilized.

Wood Duck Life History and Habitat Requirements

Wood duck range and life history are summarized in Sousa and Farmer (1983). Wood ducks inhabit creeks, rivers, floodplain lakes, swamps, and beaver ponds. A Pacific population breeds from British Columbia south to California and east to Montana of which, a majority winters in the Sacramento Valley. Wood ducks have been referred to as primarily herbivorous, although invertebrates also make up a part of their annual diet. Suitable cover for wood ducks may be provided by trees or shrubs overhanging water, flooded woody vegetation, or a combination of these two types. For nesting, wood ducks utilize bottomland hardwood forests with trees of sufficient size to contain usable cavities that are near water.

Yellow Warbler Life History and Habitat Requirements

The yellow warbler is a riparian dependent neotropical migratory songbird that breeds throughout Oregon and much of North America. The existing model and habitat requirements are described in Schroeder (1982). The yellow warbler prefers riparian habitats composed of abundant, moderately tall, deciduous shrubs ranging in height from 1.5 to 4 meters. Shrub densities between 60 and 80% are considered optimal and coniferous areas are avoided. Greater than 90% of prey are insects and foraging takes place primarily on small limbs in deciduous foliage. Nests are generally located 0.9 to 2.4 meters above the ground in willows, alders, and other hydrophytic shrubs and trees, including box elders and cottonwoods. Male yellow warblers have greater mating success in shrubs less than 3 meters tall.

Native Amphibians Life History and Habitat Requirements

This habitat suitability index is a combination of the habitat requirements of both aquatic and terrestrial amphibians that commonly occur in Western Washington and Oregon including; Northwestern salamander (*Ambystoma gracile*), long-toed salamander (*Ambystoma macrodactylum*), roughskin newt (*Taricha granulosa*), red-legged frog (*Rana aurora*), Oregon spotted frog (*Rana pretiosa*) and the Pacific treefrog (*Hyla regilla*). The habitat requirements of these species in the HSI for native amphibians are summarized below (WDFW 1997; Corkran & Thoms 1996). This model was developed by an interagency team and has been used on a number of project sites in the lower Willamette and lower Columbia Rivers. While these amphibian species included in the model are considered aquatic, they also use adjacent riparian areas extensively for wintering and feeding. Due to the multiple species included, additional parameters such as water depth requirements for breeding are not applicable across all species and have not been included.

Northwestern salamanders occur in western Oregon, Washington and British Columbia, and are considered to be aquatic salamanders that breed in ponds and stream backwaters. They live in moist forest or woodlands as juveniles and adults. They lay their eggs in moderately deep water (0.5-2 m) attached to small sticks or rigid stems. Larvae live in surface sediments or under debris or logs in their natal waterbodies.

Long-toed salamanders occur throughout much of Oregon, Washington and British Columbia, are are also considered to be aquatic salamanders that breed in seasonal ponds, lake shores and slow-moving streams through wet meadows. They live in a variety of terrestrial habitats (grasslands, woodlands, disturbed areas) as juveniles and adults. They lay their eggs in shallow water (<0.5 m) attached to stems, leaves, or pebbles. Larvae live in surface sediments or under debris in shallow water.

Roughskin newts occur in most of Oregon, and are also considered to be aquatic salamanders, which utilize ponds and slow-moving streams for most of the year or year-round. They prefer forested or partially wooded habitats adjacent to ponds, lakes or sloughs, often where there is extensive aquatic vegetation. They lay their eggs in moderately deep water (0.5-2 m) in mid to late spring, attaching the eggs to stems or floating vegetation. Juveniles and adults live in and under rotting logs and forage in the ponds or moist forest floors.

Red-legged frogs occur on the west side of the Cascade crest in Oregon, Washington and British Columbia. They prefer moist coniferous or deciduous forest and forested wetland habitats. They breed in cool slow-moving waters such as shaded ponds and sloughs in winter to early spring. They lay their eggs in moderately deep water (0.5 - 2 m) and attach the eggs to submerged branches or aquatic vegetation. Juveniles and adults will live in emergent wetlands, logs, or brush adjacent to pond edges. During the rainy season, they move into forest habitats and live under logs and debris, foraging on the forest floor. A major limiting factor for native amphibian survival is lack of adjacent moist forest habitat (B. Castillo, ODFW, pers. comm.).

Oregon spotted frogs occur in British Columbia, western Washington and the Cascade Mountains of Washington and Oregon. Historically they were found in the Willamette Valley, but they appear to have been eliminated from this habitat (Leonard et al. 1993). Oregon spotted frogs are aquatic and require water for breeding, foraging and wintering habitats. They use seasonal waterbodies such as ponds or flooded sloughs/overflows that dry up by summer. However, connections to permanent water must be present to allow tadpoles to metamorphose. Juveniles and adults inhabit marshes, and marshy edges of ponds, streams and lakes with abundant vegetation.

Pacific treefrogs are the most common frog in the northwest and can live in a variety of habitats including marshes, wet meadows, forests and brushy disturbed areas. They breed in shallow water (<0.5 m) attaching their eggs to grasses or twigs. Adults live in wet meadows and riparian areas.

Native Salmonid Life History and Habitat Requirements

Chinook Salmon

Spring and fall Chinook occur in the Willamette River, although the fall run is considered to be entirely derived from plantings of hatchery fish from 1964-1994. Wild spring-run Chinook are listed as a threatened species for the Upper Willamette River (upstream of Willamette Falls). Spring Chinook enter the Willamette River from approximately April through early July and then migrate upstream to spawning grounds, spawning later in the year from August to October. Fall Chinook enter the Willamette River from August to October, spawning immediately from early September through early October. Fry emerge from the spawning grounds from January through April. Spring Chinook are frequently stream-type, in that juveniles may rear in freshwater streams for up to a year or more before migrating to the ocean. Some spring Chinook and most fall Chinook are typically ocean-type, and only rear for 2-6 months in freshwater before migrating to the ocean. Some ocean-type Chinook migrate as fry to estuarine areas and rear for extended periods there. Chinook fry and juveniles rear along stream margins, back eddies, behind woody debris and in side channels. As juveniles become larger, they move into higher velocity areas. Chinook juveniles appear to prefer areas with slow to moderate velocities, <30 cm/s (Healey 1991). The channelization of the Willamette River has drastically reduced off-channel and other low velocity rearing habitats for juvenile Chinook (Kostow 1995).

Coho Salmon

Coho were introduced to the Upper Willamette River starting in 1952. Releases of hatchery fish continued through 1988, but are no longer conducted, except in the Tualatin River. Adult coho enter the Willamette River from late August through early December, migrating into tributaries all along the length of the River. Adult coho will often hold for extended periods in deep pools, where they are less vulnerable to predation. Spawning occurs typically from September through December. Fry emerge from the spawning grounds from late February through April. Coho fry and juveniles rear in freshwater for one or two years typically, although even longer freshwater residence can occur. Coho typically spend only one year in saltwater. Fry typically congregate after emerging from the gravel and within a few days begin swimming along the bank margins, especially near overhanging vegetation. Coho often hold in pools and periodically come out to capture prey in riffle areas. Coho will also typically settle on the bottom during darkness. Areas with a high percentage of margin habitat (narrow streams) and with woody debris and pools are the most productive for coho. Coho move into side channels and under debris for wintering. Outmigration occurs from March through June.

Steelhead Trout

Summer and winter runs of steelhead trout occur in the Willamette River. The winter run is the most significant run and is listed as a threatened species in the Upper Willamette River, although distribution information indicates that winter steelhead occur only downstream of the Calapooia River. Upstream of the Calapooia River are resident rainbow trout. For the purposes of this HEP, we treat anadromous and resident trout equivalently. Adults typically enter the river from mid-February through mid-May, with spawning occurring from March through May. The summer run is derived from introduced hatchery fish planted in the basin starting in the late 1960s. Summer steelhead adults typically enter the river from late March through July. Juveniles rear in freshwater for one to four years utilizing areas with rubble, woody debris or other cover, and frequently feed in riffles. Areas with dense riparian vegetation and other cover provide the best habitat for steelhead juveniles. Outmigration of smolts typically occurs from April through June.

Cutthroat Trout

Coastal cutthroat trout occur throughout the Willamette River basin and are a polytypic species with multiple life-history forms including resident, fluvial, anadromous, and potamodromous (NOAA 1999). The anadromous life history form was unlikely to have been a major component of the Upper Willamette population historically due to the difficulty of ascending Willamette Falls. The primary form is likely to have been freshwater migratory. Spawning typically occurs from December through June, with a peak in February (NOAA 1999). Cutthroat juveniles migrate within the stream systems and utilize pools, cover, and off-channel habitats. Cover is considered one of the essential elements of cutthroat habitat (Hickman & Raleigh 1982).

American Kestrel Life History and Habitat Requirements

The American kestrel is a small raptor of open country. They typically hunt over open fields, consuming insects, birds and small mammals. Kestrels hunt from perches such as trees. Kestrels nest in tree cavities, banks, cliffs, and structures. Interspersion between open lands and woodland or riparian zones provides suitable habitat for both feeding and nesting. (USFWS 1978)

Table 3. HSI models.

Western Pond Turtle	V_1 = Percent area with water depth preferred by adults V_2 = Percent cover along water's edge V_3 = Water temperature during low flows V_4 = Percent area with water depth less than 0.3 meters V_5 = Availability of suitable nesting sites $HSI_{W\ Pond\ Turtle} = (V_1 + V_2 + V_3 + V_4 + V_5) / 5$
Oregon Chub	V_1 = Waterbody type V_2 = Water velocity V_3 = % Submergent/emergent vegetation present V_4 = Water depth V_5 = Substrate type V_6 = Slope V_7 = Large woody debris V_8 = Small woody debris V_9 = Riparian V_{10} = Marshes V_{11} = Water temperature V_{12} = Non-native fish V_{13} = Habitat isolation $HSI_{Oregon\ Chub} = [V_1(V_2 + V_3 + V_4 + V_5 + V_6 + V_7 + V_8 + V_9 + V_{10})/9 * (V_{11} * V_{12})]^{1/4}$
Beaver	V_1 = Percent tree canopy closure V_2 = Percent of trees in 2.5 to 15.2 cm dbh size class V_3 = Percent shrub crown cover V_4 = Average height of shrub canopy V_5 = Species composition of woody vegetation $HSI_{Beaver} = [(V_1 \times V_2)^{1/2} \times V_5]^{1/2} + [(V_3 \times V_4)^{1/2} \times V_5]^{1/2}$ *(within 100 m)* + $0.5[(V_1 \times V_2)^{1/2} \times V_5]^{1/2} + [(V_3 \times V_4)^{1/2} \times V_5]^{1/2}$ *(100-200 m)* / 1.5
Wood Duck	V_4 = Percent of the water surface covered by potential brood cover $HSI_{Wood\ Duck} = V_4$
Yellow Warbler	V_1 = Percent deciduous shrub crown cover V_2 = Percent overall canopy cover V_3 = Average height of deciduous shrub canopy V_4 = Percent of shrub canopy comprised of hydrophytic shrubs $HSI_{Neotropical\ Songbirds} = (V_1 + V_2 + V_3 + V_4) / 4$
Native Amphibians	V_1 = Percent area with permanent water V_2 = Water current in breeding areas during spring V_3 = Percent area with emergent or submergent wetland/aquatic vegetation V_4 = Percent ground cover along the water's edge V_5 = Width of riparian zone V_6 = Maximum temperature during low flows V_7 = Land use within 200 meters of the wetland edge $HSI_{Native\ Amphibians} = (V_1 + V_2 + V_3 + V_4 + V_5 + V_6 + V_7) / 7$
Native Salmonids	V_1 = Maximum water temperature during low flow V_2 = Percent pools during low water period V_3 = Instream cover present V_4 = Predominant substrate type in riffle or run areas $HSI_{Salmonids} = (V_1 + V_2 + V_3 + V_4) / 4$

American Kestrel	V_1 = Distance to woodland V_2 = Distance to suitable perching sites V_3 = Distance to open land V_4 = Average dbh of trees $HSI_{Riparian}$ = the lower of X_1 or X_2; $X_1 = (V_1 * V_2)^{1/2}$; $X_2 = V_2$

Western Pond Turtle HSI

The Habitat Suitability Index for western pond turtle is described in the following equation. None of the variables are considered to be so limiting that a score of zero would render the habitat totally unsuitable.

$$\mathbf{HSI_{WPondTurtle} = (V_1 + V_2 + V_3 + V_4 + V_5) /5}$$

V_1 = % Area with water depth preferred by adults (1-2 m) ***(Morreale & Gibbons, 1986)***

% Area	SI
0	0
20	0.5
50	1.0
75	1.0
100	0.2

V_2 = % Cover along water's edge including canopy, LWD, emergent wetland vegetation, etc. ***(Morreale & Gibbons, 1986)***

% Cover	SI
0	0
25	0.2
50	0.5
75	1.0
100	1.0

V_3 = Water temperature during low flows ***(Morreale & Gibbons, 1986; Holland, 1994)***

Temperature (°C)	SI
5	0
10	0.2
15	0.6
20	1.0
25	1.0
30	0.6

V_4 = % Area with water depth less than 0.3 meters ***(Bill Castillo, ODFW, pers. comm.)***

% Area	**SI**
0	0.1
25	1.0
50	1.0
75	0.3
100	0

V_5 = Availability of suitable nesting sites (qualitative) ***(Bill Castillo, ODFW, pers. comm.)***

Availability	**SI**
None	0
Very few (1-2 in project area)	0.2
Sparse (3-4 in project area)	0.5
Moderate (5-7 in project area)	0.8
Abundant (>7 in project area)	1.0

Oregon Chub HSI

The Habitat Suitability Index for Oregon chub is described in the following equation. V_1, V_{11} and V_{12} are considered limiting and a score of zero would render the habitat unsuitable for Oregon chub.

$$\mathbf{HSI_{Oregon\ Chub} = [V_1(V_2 + V_3 + V_4 + V_5 + V_6 + V_7 + V_8 + V_9 + V_{10})/9 *(V_{11}*V_{12})]^{1/4}}$$

V_1 = Waterbody type (*Scheerer draft HEP 2006*)

Waterbody Type	**SI**
Oxbows and backwater pools	1.0
Open water and beaver dammed pools	1.0
Pools (incl. secondary channel and lateral scour pools)	0.8
Seeps or springs	0.8
Riverine wetlands	1.0

V_2 = Water velocity (*adapted from Scheerer draft HEP 2006*)

Velocity	**SI**
<25% of surface area has no velocity	0
25-50% of surface area has no velocity	0.5
>50% of surface area has no velocity	1.0

V_3 = % Submergent or emergent vegetation present ***(adapted from Scheerer draft HEP 2006)***

% Vegetation	**SI**
<25% cover of submergent or emergent vegetation	0
25-50% cover submergent or emergent vegetation	0.5
>50% cover submergent or emergent vegetation	1.0

V_4 = Water depth ***(adapted from Scheerer draft HEP 2006)***

Water depth	SI
<25% of site <1 m depth in late summer	0
<25% of site <2 m depth in late summer	0.25
>25% of site <2 m depth in late summer	0.5
>50% of site <2 m depth in late summer	1.0

V_5 = Substrate type ***(adapted from Scheerer draft HEP 2006)***

Substrate Type	SI
<25% substrate comprised of silt/organics	**0**
25%-50% substrate comprised of silt/organics	**0.67**
>50% substrate comprised of silt/organics	**1.0**

V_6 = Shallow Water Zone Slope ***(adapted from Scheerer draft HEP 2006)***

Shallow Water Zone Slope	SI
> 15:1	**0**
< 15:1	**1**

V_7 = Large woody debris ***(adapted from Scheerer draft HEP 2006)***

Large Woody Debris	SI
Common or abundant	**1**
Absent or sparse	**0**

V_8 = Small woody debris ***(adapted from Scheerer draft HEP 2006)***

Small Woody Debris	SI
Common or abundant	**1**
Absent or sparse	**0**

V_9 = Riparian zone ***(adapted from Scheerer draft HEP 2006)***

Riparian Zone	SI
1. Dominated by native tree and shrub species and at least 100 feet in width	**1**
2. Dominated by native tree and shrub species at less than 100 feet in width	**0.67**
3. Significant presence of non-native species or very narrow width	**0.33**
4. Dominated by herbaceous species	**0**

V_{10} = Marsh habitat ***(adapted from Scheerer draft HEP 2006)***

Marsh Habitat	SI
Marsh habitat present as appropriate for habitat type	1
No marsh habitat present	0

V_{11} = Water temperatures between May 1st and August 31st ***(adapted from Scheerer draft HEP 2006)***

Water temperature	SI
> 29 C (lethal) during summer	0
Daily temperatures commonly between 16 and 25 C	1
Daily temperatures typically < 16 C	0.5

V_{12} = Presence of non-native fish ***(adapted from Scheerer draft HEP 2006)***

Non-Native Fish	SI
Common or abundant	0
Uncommon, rare or absent	1

V_{13} = Habitat isolation ***(adapted from Scheerer draft HEP 2006)***

Habitat Isolation	SI
Perennially connected with watercourses containing non-native fish	0
Intermittently connected with watercourses containing non-native fish (<5 year connection)	0.33
Perennial isolation over multiple years (>5 year connection)	1

Beaver HSI Model

The Habitat Suitability Index for beaver is described in the following equation. All variables are considered limiting and a score of zero would render the habitat unsuitable for winter cover and feeding, which is also the limiting life history stage for beaver.

$$HSI_{Beaver} = [(V_1 \text{ x } V_2)^{1/2} \text{ x } V_5]^{1/2} + [(V_3 \text{ x } V_4)^{1/2} \text{ x } V_5]^{1/2} \textit{ (within 100 m)} + 0.5[(V_1 \text{ x } V_2)^{1/2} \text{ x } V_5]^{1/2} + [(V_3 \text{ x } V_4)^{1/2} \text{ x } V_5]^{1/2} \textit{ (100-200 m)} / 1.5$$

V_1 = Percent tree canopy closure (the percent of the ground surface shaded by a vertical projection of the canopies of woody vegetation ≥5.0 m (16.5 ft) in height) *(Allen 1982)*

Percent canopy closure	SI
0	0
25	0.5
50	1.0

75	0.8
100	0.6

V_2 = Percent of trees in 2.5 to 15.2 cm (1 to 6 inches) dbh size class *(Allen 1982)*

Percent of trees	HSI
0	0.2
25	0.4
50	0.6
75	0.8
100	1.0

V_3 = Percent shrub crown cover (the percent of the ground surface shaded by a vertical projection of the canopies of woody vegetation < 5 m (16.5 ft) in height) *(Allen 1982)*

Percent cover	HSI
0	0
25	0.6
50	1.0
75	0.9
100	0.8

V_4 = Average height of shrub canopy *(Allen 1982)*

Average height (meters)	HSI
0	0
1	0.3
2	1.0
3	1.0
4	1.0

V_5 = Species composition of woody vegetation (trees and/or shrubs) *(Allen 1982)*

Vegetation Class	Description	HSI
A	Woody vegetation dominated (>50%) by one or more of the following species: aspen, willow, cottonwood, alder	1.0
B	Woody vegetation dominated by other deciduous species	0.6
C	Woody vegetation dominated by coniferous species	0.2

Wood Duck HSI

The Habitat Suitability Index for wood duck is described in the following equation and is applicable for winter cover for wood ducks. Wood ducks are year-round residents in Western Oregon, but may move between wintering and nesting areas. It is anticipated that the project area will be most suitable for winter habitat.

$$\mathbf{HSI_{Wood\ Duck} = V_1}$$

V_1 = Percent of the water surface covered by potential brood cover (shrub cover, overhanging tree crowns within 1 m (3.3 ft) of the water surface, woody downfall, and herbaceous) *(Sousa and Farmer 1983)*

Percent surface covered	HSI
0	0
25	0.4
40	0.8
50-75	1.0
85	0.6
100	0

Yellow Warbler HSI

The Habitat Suitability Index for yellow warbler is described in the following equation. None of the variables are considered to be so limiting that a score of zero would render the habitat totally unsuitable.

$$\mathbf{HSI_{Yellow\ Warbler} = (V_1 + V_2 + V_3 + V_4) / 4}$$

V_1 = Percent deciduous shrub cover *(Schroeder 1982)*

% Cover	SI
0	0
25	0.4
50	0.75
60	1.0
80	1.0
90	0.8
100	0.6

V_2 = Percent overall canopy cover (*Schroeder 1982*)

% Canopy Cover	SI
0-20	0
20-40	0.1
40-60	0.2
60-70	0.8
70-80	1.0
80-100	0.1

V_3 = Average height of deciduous shrub canopy height *(Schroeder 1982)*

Canopy Height (m)	SI
0	0
1	0.5
2+	1.0

V_4 = Percent canopy comprised of hydrophytic shrubs *(Schroeder 1982)*

% Hydrophytic Shrubs	SI
0	0.1
25	0.3
50	0.55
75	0.8
100	1.0

Native Amphibian HSI

The Suitability Index for native amphibians is described in the following equation. None of the variables are considered to be so limiting that a score of zero would render the habitat totally unsuitable. Both aquatic and riparian variables are included as both components provide habitat for key life history stages.

$$\mathbf{HSI_{\text{Native Amphibians}} = (V_1 + V_2 + V_3 + V_4 + V_5 + V_6 + V_7) / 7}$$

V_1 = % Area with permanent water *(modified from WDFW 1997)*

% Area of Permanent Water	SI
0	0
10	0.6
25-40	1.0
>50	0.2

V_2 = Water current in breeding areas during spring *(modified from WDFW 1997)*

Water Velocity (m/s)	SI
0	0.6
0.05	1.0
0.1	0.2
>0.25	0

V_3 = % Area with emergent or submergent wetland/aquatic vegetation *(WDFW 1997)*.

% Area Wetland Vegetation*	SI
0	0
25	0.5
>50	1.0

**Areas dominated by reed canary grass and/or purple loosestrife cause HSI = 0.2.*

V_4 = % Ground cover along the water's edge, including debris, overhanging vegetation, undercut banks, etc. ***(WDFW 1997)***

% Cover	SI
0	0
25	0.3
50	0.6
75	0.9
100	1.0

V_5 = Width of riparian zone ***(WDFW, 1997)***

Width (m)	SI
0	0
10	0.2
30	0.6
>60	1.0

V_6 = Maximum water temperature during low flows ***(Graves & Anderson 1987; USFWS 2002; Christensen 2004)***

Temperature (°C)	SI
0	0
5	0.5
10	1.0
15	1.0
20	0.5
25	0

V_7 = Land use within 200 meters of the wetland edge ***(WDFW 1997)***

Land Use	SI
Developed	0
Row Crops	0.1
Managed Pasture	0.5
Fallow Grass/herbs	0.7
Shrubs/trees	1.0

Native Salmonids HSI

The Suitability Index for anadromous salmon is described in the following equation:

$$SI_{fish} = (FV_1 + FV_2 + FV_3 + FV_4) / 4$$

V_1 = Maximum water temperature during low flow *(Raleigh, et al. 1984)*

Temperature (°C)	SI*
0	A = 0, B = 0**
5	A = 0.5, B = 0.3
10	A = 1.0, B = 0.9
15	A = 0.9, B = 1.0
20	A = 0.5, B = 0.9
25	A = 0, B = 0

***A** = prespawning adults, **B** = juveniles
**Average the adult and juvenile values for V_2

V_2 = Percent pools during low water period *(Raleigh, et al. 1986)*

Percent Pools	SI
0	0.2
25	0.6
50	1.0
75	0.9
100	0.2

V_3 = Instream cover (LWD) present *(modified from McMahon, 1983)*

Instream cover (% of surface area)	SI
0	0.1
10	0.2
20	0.4
30	0.8
40	1.0

V_4 = Predominant substrate size in riffle or run areas *(Raleigh, et al. 1984)*

Class	Description	SI
A	Rubble or small boulders predominant; limited amounts of gravel, large boulders, or bedrock	1.0
B	Rubble, gravel, boulders, and fines occur in approximately equal amounts or gravel is predominant	0.6
C	Fines, bedrock, or large boulders are predominant. Rubble and gravel are < 25%	0.3

American Kestrel HSI

The Suitability Index for the American kestrel is described in the following equations. If the site is currently a grassland or agricultural field, use the grasslands equation; if the site is a riparian zone use the riparian equation.

$$\mathbf{SI_{Riparian} = \text{the lower of } X_1 \text{ or } X_2;\ X_1 = (V_1 * V_2)^{1/2};\ X_2 = V_2}$$

V_1 = Distance to woodland (USFWS 1978)

Distance (miles)	SI
1	1.0
2	0.8
3	0.4
4	0.0

V_2 = Distance to suitable perching sites (USFWS 1978)

Distance (miles)	SI
1	1.0
2	0.8
3	0.4
4	0.0

V_3 = Distance to open land (USFWS 1978)

Distance (miles)	SI
1	1.0
2	0.8
3	0.4
4	0.0

V_4 = Average dbh of trees (USFWS 1978)

dbh (inches)	SI
6	0.0
12	0.8
18	1.0
24	1.0

4.8 Combined HSI Model

An HSI will result for each individual species or guild. To combine the individual species' HSIs into one HSI suitable to use in a cost effectiveness and incremental cost analysis, the following equation is recommended:

$$\mathbf{HSI_{Combined} = (HSI_{\mathit{turtle}} + HSI_{\mathit{chub}} + HSI_{\mathit{beaver}} + HSI_{\mathit{wood\ duck}} + HSI_{\mathit{yellow\ warbler}} + HSI_{\mathit{native\ amphibians}} + HSI_{\mathit{salmon}} + HSI_{\mathit{kestrel}}) / 8}$$

5. USE OF MODEL

The intended use of this model is to formulate site-specific restoration actions and collect data at each site for input into the model. Each HSI will be calculated separately and the results will be reported. Then, the results from each HSI will be combined to test the validity of the Floodplain Habitat Index.

Because of the potential limitations of HSI models in predicting improved conditions and hence, survival, of species or guilds, it is recommended that many of the key parameters included in these models be included in the monitoring and adaptive management plan to be developed for the project to provide further data that can be used to validate or modify these models.

Table 4. Coast Fork Data and Scores

Variable	Description	C1A Existing	C1A FWP	C1A MIN	C1A MAX	C1B Existing	C1B FWP	C1B MIN	C1B MAX	C1C Existing	C1C FWP	C1C MIN	C1C MAX	C1D Existing	C1D FWP	C1D MIN	C1D MAX	C1E Existing	C1E FWP	C1E Proposed	C1G Existing	C1G FWP
Turtle V1	% Area with water depth preferred by adults	25	25	25	25	50	50	50	50	25	25	25	50	10	10	10	20	50	50	50	50	50
	SI	0.60	0.60	0.60	0.60	1.00	1.00	1.00	1.00	1.00	0.60	0.60	1.00	0.25	0.25	0.25	0.50	1.00	1.00	1.00	1.00	1.00
Turtle V2	% Cover along water's edge	80	80	80	80	80	80	80	80	50	50	80	80	80	80	80	80	10	10	80	25	25
	SI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.10	1.00	0.20	0.20
Turtle V3	Water temperature during low flows	14	20	20	20	20	20	20	20	20	20	20	20	14	20	20	20	14	20	20	14	20
	SI	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.50	1.00	1.00	1.00	0.50	1.00	1.00	0.50	1.00
Turtle V4	% Area with water depth less than 0.3 meters	10	10	10	25	10	10	10	25	10	10	10	25	10	10	10	50	25	25	25	25	25
	SI	0.4	0.4	0.4	1	0.4	0.4	0.4	1	0.4	0.4	0.4	1	0.40	0.40	0.40	1.00	1	1	1	1	1
Turtle V5	Availability of nesting sites	0	0	2	2	0	0	3	3	0	0	3	3	1	1	1	1	0	0	0	3	3
	SI	0	0	0.2	0.2	0	0	0.5	0.5	0	0	0.5	0.5	0.20	0.20	0.20	0.20	0	0	0	0.5	0.5
	Turtle HSI	0.5	0.6	0.64	0.76	0.66	0.66	0.78	0.9	0.6	0.5	0.7	0.9	0.47	0.57	0.57	0.74	0.62	0.62	0.8	0.64	0.74
Chub V1	Waterbody type	N/C	N/C	N/C	N/C	B	B	B	A	B	B	B	A	N	N	N	C	N	N	C	N	N
	SI	0.4	0.4	0.4	0.4	1	1	1	1	1	1	1	1	0.00	0.00	0.00	0.60	0	0	0.8	0	0
Chub V2	Water velocity	20	20	25	25	100	100	100	75	100	100	100	75	0	0	0	50	0	0	0	2	2
	SI	0	0	0.5	0.5	1	1	1	1	1	1	1	1	0.00	0.00	0.00	0.50	0	0	0	0	0
Chub V3	% Submergent or emergent vegetation	20	20	30	60	30	30	30	60	30	20	30	60	60	60	60	60	0	0	25	20	20
	SI	0	0	0.5	1	0.5	0.5	0.5	1	0.5	0.5	0.5	1	1.00	1.00	1.00	1.00	0	0	0.5	0	0
Chub V4	Water depth	50	50	50	50	40	40	40	50	40	40	40	50	20	20	20	50	25	25	25	50	50
	SI	1	1	1	1	0.5	0.5	0.5	1	0.5	0.5	0.5	1	0.00	0.00	0.00	1.00	0.25	0.25	0.25	1	1
Chub V5	Substrate type	10	10	10	10	70	70	70	70	70	70	70	70	20	20	20	60	0	0	0	0	0
	SI	0	0	0	0	1	1	1	1	1	1	1	1	0.00	0.00	0.00	0.67	0	0	0	0	0
Chub V6	Shallow water base slope	3	7	3	5	2	2	2	3	1	1	1	5	2	2	2	5	2	2	3	2	2
	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chub V7	Large woody debris	S	S	C	C	S	S	C	C	S	S	C	C	S	S	C	C	0	0	C	0	0
	SI	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	0	0
Chub V8	Small woody debris	0	0	C	C	0	0	C	C	0	0	C	C	A	A	C	C	0	0	C	0	0
	SI	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	0	0
Chub V9	Riparian zone composition	1	1	1	1	3	3	1	1	3	3	1	1	3	3	1	1	3	3	1	2	2
	SI	1	1	1	1	0.33	0.33	1	1	0.33	0.33	1	1	0.33	0.33	1	1	0.33	0.33	1	0.67	0.67
Chub V10	Marsh habitat	N	N	N	Y	N	N	N	Y	N	N	N	Y	N	N	N	Y	N	N	N	N	N
	SI	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
Chub V11	Water temperature during low flows	14	20	20	20	20	20	20	20	20	20	20	20	14	20	20	20	14	20	20	14	20
	SI	0.5	1	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	0.5	1	1	0.5	1
Chub V12	Presence of non-native fish	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	SI	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chub V13	Habitat isolation	N	N	N	N	P	P	P	N	P	P	P	N	N/A	N/A	N/A	P	N	N	N	N	N
	SI	0	0	0	0	0.33	0.33	0.33	0	0.33	0.33	0.33	0	0	0	0	0.33	0	0	0	0	0
	Chub HSI	0.258	0.307	0.386	0.412	0.439	0.439	0.508	0.546	0.439	0.439	0.508	0.546	0	0	0	0.502	0	0	0.427	0	0
Beaver V1	% Tree canopy closure	40	40	75	75	25	25	75	75	20	30	75	75	40	50	75	75	15	90	50	20	30
	SI	0.7	0.7	0.8	0.8	0.5	0.5	1	1	0.4	0.6	0.8	0.8	0.7	1	1	1	0.3	0.6	1	0.4	0.6
Beaver V2	% Trees 1-6 inches	50	25	25	25	50	25	25	25	20	20	25	25	50	25	25	25	15	10	25	25	10
	SI	0.6	0.4	0.4	0.4	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.3
Beaver V3	% Shrub crown cover	75	50	50	50	75	50	50	50	70	75	50	50	75	75	75	75	30	30	50	30	30
	SI	0.9	1	1	1	0.9	1	1	1	0.9	0.9	1	1	0.9	0.9	0.9	0.9	0.6	0.6	1	0.6	0.6
Beaver V4	Avg height shrub canopy	2	3	3	3	1	3	3	3	1	2	3	3	2	3	3	3	3	3	3	3	3
	SI	1	1	1	1	0.3	1	1	1	0.3	1	1	1	1	1	1	1	1	1	1	1	1
Beaver V5	Species composition	A	B	A	A	B	B	A	A	B	B	A	A	A	B	A	A	B	B	A	B	B
	SI	1	0.6	1	1	0.6	0.6	1	1	0.6	0.6	1	1	1	0.6	1	1	0.6	0.6	1	0.6	0.6
	Beaver HSI	0.89	0.669	0.876	0.88	0.566	0.646	0.898	0.89	0.524	0.649	0.876	0.878	0.89	0.685	0.886	0.885	0.569	0.583	0.898	0.586	0.593
Duck V1	% Surface cover	10	10	30	50	10	10	30	50	10	10	40	50	10	10	25	25	0	0	10	10	10
	SI	0.2	0.2	0.5	1	0.2	0.2	0.5	1	0.2	0.2	0.8	1	0.2	0.2	0.4	0.4	0	0	0.2	0.2	0.2
	Wood Duck HSI	0.2	0.2	0.5	1	0.2	0.2	0.5	1	0.2	0.2	0.8	1	0.2	0.2	0.4	0.4	0	0	0.2	0.2	0.2
Warbler V1	% Deciduous shrub cover	75	60	60	60	75	60	60	60	70	75	50	50	75	75	75	75	30	30	50	30	30
	SI	1	0.75	0.75	0.75	1	0.75	0.75	0.75	1	1	0.75	0.75	1	1	1	1	0.45	0.45	0.80	0.45	0.45
Warbler V2	Percent canopy cover	40	40	75	75	25	25	75	75	20	30	75	75	40	50	75	75	15	30	50	20	30
	SI	0.7	0.7	1	1	0.1	0.1	1	1	0.1	0.1	1	1	0.1	0.2	1	1	0	0.1	0.2	0.1	0.1
Warbler V3	Avg height shrub canopy	2	3	3	3	1	3	3	3	1	2	3	3	3	3	3	3	2	3	3	3	3
	SI	1	1	1	1	0.5	1	1	1	0.5	1	1	1	1	1	1	1	1	1	1	1	1
Warbler V4	% Canopy hydrophytic shrubs	50	60	75	75	10	10	75	75	10	15	75	75	75	50	75	75	10	10	75	50	50
	SI	0.55	0.65	0.8	0.8	0.2	0.2	0.8	0.8	0.2	0.2	0.8	0.8	0.8	0.55	0.8	0.8	0.2	0.2	0.8	0.55	0.55
	Warbler HSI	0.663	0.6	0.888	0.888	0.46	0.513	0.888	0.888	0.45	0.575	0.888	0.888	0.726	0.688	0.95	0.95	0.413	0.438	0.7	0.53	0.626
Amphib V1	% Area permanent water	75	75	75	75	100	100	100	40	90	90	90	75	100	100	100	40	100	100	100	100	100
	SI	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1	0.2	0.2	0.2	0.2	0.2
Amphib V2	Water velocity	0.6	0.6	0.6	0.6	0	0	0	0.05	0	0	0	0.05	0.6	0.6	0.6	0.6	0.66	0.66	0.66	0.66	0.66
	SI	0	0	0	0	0.6	0.6	0.6	1	0.6	0.6	0.6	1	0	0	0	0	0	0	0	0	0
Amphib V3	% Area emergent or submergent vegetation	20	30	30	60	30	30	30	60	30	30	30	60	90	90	60	60	0	0	25	10	10
	SI	0.4	0.6	0.6	1	0.6	0.6	0.6	1	0.6	0.6	0.6	1	0.6	0.6	1	1	0	0	0.5	0.2	0.2
Amphib V4	% Ground cover along water's edge	80	90	90	90	80	90	90	90	50	50	90	90	90	90	90	90	10	10	20	25	25
	SI	0.95	1	1	1	0.95	1	1	1	0.6	0.6	1	1	0.94	0.9	1	1	0.1	0.1	0.25	0.3	0.3
Amphib V5	Width of riparian zone	30	30	30	30	30	30	30	30	10	10	60	60	60	60	60	60	5	5	20	10	10
	SI	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.2	0.2	1	1	1	1	1	1	0.1	0.1	0.4	0.2	0.2
Amphib V6	Water temperature during low flows	14	20	20	20	20	20	20	20	20	20	20	20	14	20	20	20	14	20	20	14	20
	SI	0.4	0	0	0	0	0	0	0	0	0	0	0	0.4	0	0	0	0.4	0	0	0.3	0
Amphib V7	Land use within 200 m	E	E	E	E	E	E	E	E	B	B	B/E	B/E	C/E	C/E	E	E	B	B	B	B/E	B/E
	SI	1	1	1	1	1	1	1	1	0.1	0.1	0.55	0.55	0.65	0.6	1	1	0.1	0.1	0.1	0.5	0.5
	Amphibian HSI	0.507	0.467	0.486	0.643	0.564	0.571	0.571	0.8	0.329	0.329	0.564	0.679	0.67	0.614	0.6	0.714	0.129	0.071	0.307	0.243	0.2
Salmon V1	Water temperature during low flows	14	20	20	20	N/A			20	N/A			20	14	20	20	20	14	20	20	14	20
	SI	0.85	0.7	0.7	0.7				0.7				0.7	1	0.7	0.7	0.7	0.95	0.7	0.7	0.95	0.7
Salmon V2	% Pools during low water	0	0	25	50				50				50	0	0	0	25	0	0	25	0	0
	SI	0.2	0.2	0.6	1				1				1	0.2	0.2	0.2	0.6	0.2	0.2	0.6	0.2	0.2
Salmon V3	Instream Cover	10	10	20	30				30				30	10	10	25	25	0	0	20	0	0
	SI	0.2	0.2	0.4	0.8				0.8				0.8	0.2	0.2	0.6	0.6	0.1	0.1	0.4	0.1	0.1
Salmon V4	Predominant substrate size in riffle/run areas	B	B	B	B				B				B	B	B	B	B	B	B	B	B	B
	SI	0.6	0.6	0.6	0.6				0.6				0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Salmon HSI	0.488	0.425	0.575	0.775	0	0	0	0.775	0	0	0	0.775	0.6	0.425	0.625	0.625	0.463	0.4	0.575	0.463	0.4
Kestrel V1	Distance to woodland	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	0	1	1
	SI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kestrel V2	Distance to perching sites	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	0	1	1
	SI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kestrel V3	Distance to open land	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1
	SI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kestrel V4	DBH of trees	12	18	24	24	12	18	24	24	6	12	24	24	12	24	24	24	12	18	24	18	18
	SI	0.8	1	1	1	0.8	1	1	1	0	0.8	1	1	0.8	1	1	1	0.8	1	1	1	1
	Kestrel HSI	0.894	1	1	1	0.894	1	1	1	0	0.894	1	1	0.894	1	1	1	0.894	1	1	1	1
	Combined HSI Score	0.55	0.532	0.669	0.792	0.474	0.506	0.643	0.851	0.306	0.446	0.667	0.833	0.631	0.51	0.616	0.727	0.373	0.39	0.613	0.457	0.457
	Acreage	52	52	52	52	86	86	86	86	114	114	114	114	99	99	99	99	12	12	12	50	50
	Total Habitat Units	28.6	27.68	34.78	40.65	40.78	43.52	55.31	73.17	34.79	51.08	76.04	94.95	62.68	50.52	61	71.98	4.48	4.683	7.361	22.85	22.86
	Score Years 1-10		0.535	0.609	0.722		0.515	0.572	0.78		0.447	0.59	0.756		0.511	0.486	0.626		0.375	0.54		0.457
	Score Years 11-25		0.535	0.651	0.774		0.515	0.626	0.832		0.447	0.644	0.81		0.511	0.526	0.656		0.39	0.626		0.457
	Score Years 26-50		0.532	0.669	0.792		0.506	0.643	0.851		0.446	0.667	0.833		0.51	0.616	0.727		0.39	0.613		0.457
	Calculated AAHUs		27.81	33.78	39.44		43.79	52.96	69.91		50.17	71.52	89.48		50.66	55.51	66.86		4.64	6.99		22.86
	Net Change in AAHUs		0	5.97	11.63		0	9.18	26.12		0	21.35	39.31		0	4.85	16.2		0	2.35		0

Variable	Description	C1G MIN	C1G MAX	C2A Existing	C2A FWP	C2A MIN	C2A MAX	C2C Existing	C2C FWP	C2C MIN	C2C MAX	C2D Existing	C2D FWP	C2D MIN	C2D MAX	C2E Existing	C2E FWP
Turtle V1	% Area with water depth preferred by adults	50	50	10	10	10	25	50	25	25	50	20	20	25	50	50	50
	SI	1.00	1.00	0.25	0.25	0.25	0.55	1.00	0.55	0.55	1.00	0.50	0.50	0.55	1.00	1.00	1.00
Turtle V2	% Cover along water's edge	40	40	10	10	50	80	80	80	80	90	40	50	80	50	25	35
	SI	0.40	0.40	0.10	0.10	0.50	1.00	1.00	1.00	1.00	1.00	0.40	0.50	1.00	1.00	0.20	0.30
Turtle V3	Water temperature during low flows	20	20	14	20	20	20	14	20	20	20	14	20	20	20	14	20
	SI	1.00	1.00	0.50	1.00	1.00	1.00	0.50	1.00	1.00	1.00	0.50	1.00	1.00	1.00	0.50	1.00
Turtle V4	% Area with water depth less than 0.3 meters	25	25	10	10	10	25	25	30	30	25	50	50	60	50	25	25
	SI	1	1	0.4	0.4	0.4	1	1	1	1	1	1	1	1	1	1	1
Turtle V5	Availability of nesting sites	0	0	0	0	2	2	0	0	2	2	3	1	0	3	3	2
	SI	0	0	0	0	0.2	0.2	0	0	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.2
	Turtle HSI	0.68	0.68	0.25	0.35	0.47	0.76	0.7	0.71	0.75	0.84	0.52	0.64	0.81	0.9	0.64	0.68
Chub V1	Waterbody type	N	N	N/C	N/C	N/C	C	A	A	A	A	N/A	N/A	N/A	N/A	A	A
	SI	0	0	0.4	0.4	0.4	0.8	1	1	1	1	0.5	0.5	0.5	0.5	1	1
Chub V2	Water velocity	2	2	3	3	2	2	0	0	0	50	25	25	25	25	25	25
	SI	0	0	0	0	0	0	1	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Chub V3	% Submergent or emergent vegetation	25	25	5	5	5	25	60	60	60	60	60	60	60	60	20	30
	SI	0.5	0.5	0	0	0	0.5	1	1	1	1	1	1	1	1	0	0
Chub V4	Water depth	50	50	25	25	25	25	50	60	50	60	50	50	50	50	50	50
	SI	1	1	0.5	0.5	0.5	0.5	1	1	1	1	1	1	1	1	1	1
Chub V5	Substrate type	0	0	0	0	0	25	50	50	60	60	20	20	20	25	50	50
	SI	0	0	0	0	0	0.67	0.67	0.67	0.67	0.67	0.00	0.00	0.67	0.67	0.67	0.67
Chub V6	Shallow water base slope	3	3	1	1	3	3	3	3	3	3	2	2	3	2	2	2
	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chub V7	Large woody debris	C	C	0	0	C	C	10	10	C	C	2	2	C	C	2	2
	SI	1	1	0	0	1	1	1	1	1	1	0	0	1	1	0	0
Chub V8	Small woody debris	C	C	0	0	C	C	20	20	C	C	2	2	C	C	0	0
	SI	1	1	0	0	1	1	1	1	1	1	0	0	1	1	0	0
Chub V9	Riparian zone composition	2	2	3	3	1	1	2	2	1	1	2	2	1	1	2	2
	SI	0.67	0.67	0.33	0.33	1.00	1.00	0.67	0.67	1.00	1.00	0.67	0.67	1.00	1.00	0.67	0.67
Chub V10	Marsh habitat	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	N	Y	N	N
	SI	0	0	0	0	0	1	1	1	1	1	0	0	0	1	0	0
Chub V11	Water temperature during low flows	20	20	14	20	20	20	14	20	20	20	14	20	20	20	14	20
	SI	1	1	0.5	1	1	1	0.5	1	1	1	0.5	1	1	1	0.5	1
Chub V12	Presence of non-native fish	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	SI	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chub V13	Habitat isolation	N	N	N	N	N	N	P	P	P	P	N	N	N	N	N	N
	SI	0	0	0	0	0	0	0.33	0.33	0.33	0.33	0	0	0	0	0	0
	Chub HSI	0	0	0.207	0.246	0.353	0.474	0.449	0.534	0.54	0.531	0.306	0.364	0.43	0.447	0.354	0.421
Beaver V1	% Tree canopy closure	75	75	75	75	75	75	30	40	75	75	20	30	75	75	20	30
	SI	0.8	0.8	0.8	0.8	0.8	0.8	0.6	0.7	0.8	0.8	0.4	0.6	0.8	0.8	0.4	0.6
Beaver V2	% Trees 1-6 inches	10	10	25	10	25	25	50	25	25	25	60	25	25	25	25	10
	SI	0.3	0.3	0.4	0.3	0.4	0.4	0.6	0.4	0.4	0.4	0.6	0.4	0.4	0.4	0.4	0.3
Beaver V3	% Shrub crown cover	50	50	100	100	50	50	75	50	50	50	30	30	50	90	75	50
	SI	1	1	0.3	0.3	1	1	0.9	1	1	1	0.6	0.6	1	1	0.9	1
Beaver V4	Avg height shrub canopy	3	3	1	2	3	3	2	3	3	3	3	3	3	3	3	3
	SI	1	1	0.3	1	1	1	1	1	1	1	1	1	1	1	1	1
Beaver V5	Species composition	A	A	B	B	A	A	A	B	A	A	A	A	A	A	A	A
	SI	1	1	0.6	0.6	1	1	1	0.6	1	1	1	1	1	1	1	1
	Beaver HSI	0.826	0.826	0.582	0.637	0.876	0.876	0.874	0.669	0.876	0.876	0.79	0.79	0.876	0.876	0.803	0.826
Duck V1	% Surface cover	25	30	5	5	25	50	30	30	40	50	30	30	40	50	10	10
	SI	0.4	0.6	0.1	0.1	0.4	1	0.5	0.5	0.8	1	0.5	0.6	0.8	1	0.2	0.2
	Wood Duck HSI	0.4	0.6	0.1	0.1	0.4	1	0.5	0.5	0.8	1	0.5	0.6	0.8	1	0.2	0.2
Warbler V1	% Deciduous shrub cover	50	50	100	100	50	50	75	50	50	50	30	30	60	60	75	50
	SI	0.8	0.8	0.6	0.6	0.8	0.8	1	0.75	0.8	0.8	0.45	0.45	0.8	0.8	1	0.8
Warbler V2	Percent canopy cover	30	30	75	75	75	75	30	50	75	75	20	40	75	75	20	30
	SI	0.1	0.1	1	1	1	1	0.1	0.1	1	1	0.1	0.1	1	1	0.1	0.1
Warbler V3	Avg height shrub canopy	3	3	1	2	3	3	3	3	3	3	3	3	3	3	3	3
	SI	1	1	0.5	1	1	1	1	1	1	1	1	1	1	1	1	1
Warbler V4	% Canopy hydrophytic shrubs	50	50	25	10	50	50	75	50	75	75	75	50	75	75	75	50
	SI	0.55	0.55	0.3	0.2	0.55	0.55	0.8	0.55	0.8	0.8	0.8	0.55	0.8	0.8	0.8	0.6
	Warbler HSI	0.613	0.613	0.6	0.7	0.838	0.838	0.725	0.6	0.9	0.8	0.688	0.625	0.9	0.9	0.725	0.625
Amphib V1	% Area permanent water	90	90	100	100	75	75	90	90	90	90	100	100	90	90	100	100
	SI	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Amphib V2	Water velocity	0.66	0.66	1	1	0.3	0.1	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.1	0.1	0.1
	SI	0	0	0	0	0.2	0.2	0.2	0.2	0.2	0.2	0	0	0	0.2	0.2	0.2
Amphib V3	% Area emergent or submergent vegetation	25	25	5	5	5	25	60	60	60	60	40	60	60	60	10	10
	SI	0.5	0.5	0.1	0.1	0.1	0.5	1	1	1	1	0.8	1	1	1	0.2	0.2
Amphib V4	% Ground cover along water's edge	40	40	10	10	50	80	80	80	80	90	40	50	80	80	25	35
	SI	0.5	0.5	0.1	0.1	0.6	0.95	0.95	0.95	1	1	0.5	0.6	0.95	0.95	0.3	0.3
Amphib V5	Width of riparian zone	10	10	100	100	100	100	10	10	30	30	10	10	30	30	10	10
	SI	0.2	0.2	1	1	1	1	0.2	0.2	0.6	0.6	0.2	0.2	0.6	0.6	0.2	0.2
Amphib V6	Water temperature during low flows	20	20	14	20	20	20	14	20	20	20	14	20	20	20	14	20
	SI	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0	0.4	0
Amphib V7	Land use within 200 m	B/E	B/E	B/E	B/E	B/E	B/E	C/E	C/E	C/E	C/E	C/E	C/E	E	E	C/E	C/E
	SI	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.7	0.7	0.7	0.7	1	1	0.7	0.7
	Amphibian HSI	0.271	0.271	0.314	0.271	0.371	0.479	0.507	0.464	0.529	0.529	0.4	0.386	0.579	0.607	0.3	0.257
Salmon V1	Water temperature during low flows	20	20	14	20	20	20	14	20	20	20	14	20	20	20	14	20
	SI	0.7	0.7	0.95	0.70	0.70	0.70	0.95	0.7	0.7	0.7	0.95	0.7	0.7	0.7	0.95	0.70
Salmon V2	% Pools during low water	40	50	10	10	10	40	100	100	100	50	10	10	30	40	10	10
	SI	0.9	1	0.3	0.3	0.3	0.9	0.3	0.2	0.3	1	0.3	0.3	0.7	0.9	0.3	0.3
Salmon V3	Instream Cover	30	40	0	0	10	30	30	30	40	40	30	20	40	40	10	10
	SI	0.6	1	0.1	0.1	0.2	0.6	0.8	0.8	1	1	0.8	0.6	1	1	0.2	0.2
Salmon V4	Predominant substrate size in riffle/run areas	B	B	B	B	B	B	C	C	C	B	B	B	B	B	B	B
	SI	0.6	0.6	0.6	0.6	0.6	0.6	0.3	0.3	0.3	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Salmon HSI	0.75	0.825	0.488	0.425	0.45	0.75	0.563	0.5	0.55	0.825	0.663	0.6	0.75	0.8	0.513	0.45
Kestrel V1	Distance to woodland	1	1	0	0	0	0	0	0	0	0	1	1	0	0	1	1
	SI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kestrel V2	Distance to perching sites	1	1	0	0	0	0	0	0	0	0	1	1	0	0	1	1
	SI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kestrel V3	Distance to open land	1	1	1	1	1	1	0	0	0	0	1	1	0	0	1	1
	SI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kestrel V4	DBH of trees	18	18	12	18	24	24	12	18	24	24	6	12	24	24	12	18
	SI	1	1	0.8	1	1	1	0.8	1	1	1	0	0.8	1	1	0.8	1
	Kestrel HSI	1	1	0.894	1	1	1	0.894	1	1	1	0	0.894	1	1	0.894	1
	Combined HSI Score	0.567	0.589	0.427	0.466	0.595	0.771	0.652	0.622	0.743	0.813	0.471	0.587	0.766	0.816	0.554	0.557
	Acreage	50	50	298	298	298	298	79	79	79	79	147	147	147	147	76	76
	Total Habitat Units	28.37	29.47	126.4	138	176.1	229.1	51.48	49.16	58.71	64.2	69.21	86.35	112.9	120	42.06	42.36
	Score Years 1-10	0.51	0.532		0.464	0.537	0.683		0.622	0.649	0.718		0.597	0.676	0.721		0.56
	Score Years 11-25	0.563	0.594		0.464	0.572	0.729		0.622	0.701	0.771		0.587	0.727	0.775		0.56
	Score Years 26-50	0.567	0.589		0.466	0.595	0.771		0.622	0.743	0.813		0.587	0.766	0.816		0.557
	Calculated AAHUs	27.49	28.53		137.1	167.8	214.2		49.27	55.91	61.13		85.48	106.2	112.9		42.44
	Net Change in AAHUs	4.63	5.67		0	30.69	77.07		0	6.64	11.86		0	20.72	27.44		0

Variable	Description	C2E MIN	C2E MAX	C3A Existing	C3A FWP	C3A MIN	C3A MAX	C3C Existing	C3C FWP	C3C MIN	C3C MAX	C3D Existing	C3D FWP	C3D MIN	C3D MAX	R1A Existing	R1A FWP	R1A MIN	R1A MAX	R1B Existing	R1B FWP	R1B MIN	R1B MAX
Turtle V1	% Area with water depth preferred by adults	50	50	60	60	60	50	50	50	50	50	25	25	25	50	25	25	30	50	0	0	0	25
	SI	1.00	1.00	0.80	0.80	0.80	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.60	1.00	0.60	0.60	0.70	1.00	0.00	0.00	0.00	0.60
Turtle V2	% Cover along water's edge	90	85	70	90	80	90	50	50	70	80	80	80	80	80	80	80	80	80	60	60	80	80
	SI	1.00	1.00	0.80	1.00	1.00	1.00	0.50	0.50	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	1.00	1.00
Turtle V3	Water temperature during low flows	20	20	14	14	14	20	14	20	20	20	14	20	20	20	14	20	20	20	14	20	20	20
	SI	1.00	1.00	0.50	0.50	0.50	1.00	0.50	1.00	1.00	1.00	0.50	1.00	1.00	1.00	0.50	1.00	1.00	1.00	0.50	1.00	1.00	1.00
Turtle V4	% Area with water depth less than 0.3 meters	25	25	10	10	10	25	10	10	10	25	25	25	25	25	25	25	25	25	75	100	100	25
	SI	1	1	0.4	0.4	0.4	1	0.4	0.4	0.4	1	1	1	1	1	1	1	1	1	0.3	0	0	1
Turtle V5	Availability of nesting sites	3	3	5	3	3	3	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	SI	0.5	0.5	0.8	0.8	0.8	0.5	0	0	0.2	0.2	0	0	0	0	0	0	0	0	0	0	0	0
	Turtle HSI	0.9	0.9	0.68	0.64	0.64	0.9	0.6	0.58	0.7	0.84	0.62	0.72	0.72	0.8	0.62	0.72	0.74	0.8	0.28	0.32	0.4	0.72
Chub V1	Waterbody type	A	A	B	B	B	A	C/B	C/B	C/B	A/C	N/A	N/A	N/A	N/A	N/B	N/B	N/A	N/A	N/A	N/A	N/A	N/A
	SI	1	1	1	1	1	1	0.9	0.9	0.9	0.9	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Chub V2	Water velocity	25	25	0	0	0	0	0	0	0	0	20	20	20	25	50	50	50	50	0	0	0	25
	SI	0.5	0.5	1	1	1	1	1	1	1	1	0	0	0	0.5	1	1	1	1	0	0	0	0.5
Chub V3	% Submergent or emergent vegetation	30	30	30	30	40	60	30	30	40	50	30	30	40	60	50	60	60	60	80	80	80	60
	SI	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5	1	0.5	0.5	0.5	1	1	1	1	1	1	1	1	1
Chub V4	Water depth	60	50	25	25	25	60	25	25	25	50	50	50	50	50	50	50	50	50	100	100	100	100
	SI	1	1	0.5	0.5	0.5	1	0.5	0.5	0.5	1	1	1	1	1	1	1	1	1	1	1	1	1
Chub V5	Substrate type	40	60	50	50	50	50	50	50	50	60	25	25	25	30	60	60	50	50	50	50	50	45
	SI	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.00	0.00	0.00	0.67	0.67	0.67	0.67	0.67	1.00	1.00	1.00	0.67
Chub V6	Shallow water base slope	3	3	1	1	1	3	1	1	1	3	3	3	3	3	10	10	15	15	3	3	3	3
	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Chub V7	Large woody debris	C	C	3	3	C	C	1	1	C	C	0	0	C	C	5	5	C	C	2	2	C	C
	SI	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
Chub V8	Small woody debris	C	C	3	3	C	C	2	2	C	C	1	0	C	C	5	3	C	C	2	2	C	C
	SI	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
Chub V9	Riparian zone composition	1	1	3	3	1	1	3	3	1	1	2	2	1	1	3	3	1	1	3	3	1	1
	SI	1.00	1.00	0.33	0.33	1.00	1.00	0.33	0.33	1.00	1.00	0.67	0.67	1.00	1.00	0.33	0.33	1.00	1.00	0.33	0.33	1.00	1.00
Chub V10	Marsh habitat	Y	Y	Y	Y	Y	Y	N	N	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	SI	1	1	1	1	1	1	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1
Chub V11	Water temperature during low flows	20	20	14	14	14	20	14	14	14	20	14	20	20	20	14	20	20	20	14	20	20	20
	SI	1	1	0.5	0.5	0.5	1	0.5	0.5	0.5	1	0.5	1	1	1	0.5	1	1	1	0.5	1	1	1
Chub V12	Presence of non-native fish	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y
	SI	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	1	1	0.1
Chub V13	Habitat isolation	N	N	Y	Y	Y	N	Y	Y	Y	N	N	N	N	N	P	P	P	N	P	P	P	P
	SI	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0.33	0.33	0.33	0	0.33	0.33	0.33	0.33
	Chub HSI	0.622	0.522	0.386	0.3881	0.439	0.54	0.35	0.35	0.41	0.526	0.279	0.331	0.418	0.447	0.343	0.406	0.458	0.468	0.569	0.7	0.79	0.447
Beaver V1	% Tree canopy closure	75	79	20	30	75	75	20	30	75	75	50	50	75	75	30	40	75	75	50	50	75	75
	SI	0.8	0.8	0.4	0.6	0.8	0.8	0.4	0.6	0.8	0.8	1	1	0.8	0.8	0.6	0.7	0.8	0.8	1	1	0.8	0.8
Beaver V2	% Trees 1-6 inches	25	25	0	25	25	25	30	20	25	25	20	10	25	25	20	50	25	25	10	5	25	25
	SI	0.4	0.4	0.2	0.4	0.4	0.4	0.45	0.35	0.4	0.4	0.35	0.3	0.4	0.4	0.35	0.6	0.4	0.4	0.3	0.2	0.4	0.4
Beaver V3	% Shrub crown cover	50	60	30	50	50	60	30	75	50	50	75	50	50	50	30	30	50	50	40	40	50	50
	SI	1	1	0.7	1	1	1	0.92	0.9	1	1	0.9	1	1	1	0.65	0.65	1	1	0.9	0.9	1	1
Beaver V4	Avg height shrub canopy	3	3	2	3	3	3	1	2	3	3	2	3	3	3	4	4	3	3	3	3	3	3
	SI	1	1	1	1	1	1	0.3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Beaver V5	Species composition	A	A	B	B	A	A	B	B	A	A	A	A	A	A	A	A	A	A	A	B	A	A
	SI	1	1	0.6	0.6	1	1	0.6	0.6	1	1	1	1	1	1	1	1	1	1	1	0.6	1	1
	Beaver HSI	0.876	0.876	0.66	0.65638	0.876	0.876	0.533	0.638	0.876	0.876	0.872	0.87	0.876	0.876	0.871	0.851	0.876	0.876	0.857	0.636	0.876	0.876
Duck V1	% Surface cover	30	40	20	20	30	40	10	10	20	50	5	10	20	50	40	40	50	50	20	20	30	50
	SI	0.5	0.8	0.35	0.4	0.5	0.8	0.2	0.2	0.4	1	0.1	0.2	0.4	1	0.8	0.8	1	1	0.3	0.3	0.5	1
	Wood Duck HSI	0.5	0.8	0.35	0.4	0.5	0.8	0.2	0.2	0.4	1	0.1	0.2	0.4	1	0.8	0.8	1	1	0.3	0.3	0.5	1
Warbler V1	% Deciduous shrub cover	50	50	30	50	50	50	70	75	60	60	75	50	50	50	30	30	50	50	40	40	50	50
	SI	0.8	0.8	0.45	0.8	0.8	0.8	1	1	0.8	0.9	1	0.8	0.8	0.9	0.45	0.45	0.8	0.8	0.7	0.7	0.8	0.8
Warbler V2	Percent canopy cover	75	75	20	30	75	75	20	30	75	75	50	50	75	75	30	40	75	75	50	50	75	75
	SI	1	1	0.1	0.1	1	1	0.1	0.1	1	1	0.2	0.2	1	1	0.1	0.1	1	1	0.2	0.2	1	1
Warbler V3	Avg height shrub canopy	3	3	2	3	3	3	1	2	3	3	2	3	3	3	4	4	3	3	3	3	3	3
	SI	1	1	1	1	1	1	0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Warbler V4	% Canopy hydrophytic shrubs	75	75	25	25	75	75	10	10	75	75	10	10	75	75	10	10	75	75	0	0	75	75
	SI	0.8	0.8	0.3	0.3	0.8	0.8	0.2	0.2	0.8	0.8	0.2	0.2	0.8	0.8	0.2	0.2	0.8	0.8	0.1	0.1	0.8	0.8
	Warbler HSI	0.8	0.8	0.463	0.65	0.9	0.9	0.45	0.575	0.9	0.9	0.6	0.56	0.9	0.9	0.438	0.438	0.9	0.9	0.5	0.5	0.9	0.9
Amphib V1	% Area permanent water	90	90	90	90	90	90	90	90	90	90	90	90	90	90	85	90	90	90	10	10	25	25
	SI	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.6	0.6	1	1
Amphib V2	Water velocity	0.1	0.1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0.1
	SI	0.2	0.2	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0	0	0	0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.2
Amphib V3	% Area emergent or submergent vegetation	30	30	30	30	40	60	30	30	40	50	30	30	40	50	80	60	60	60	80	80	80	80
	SI	0.6	0.6	0.6	0.6	0.8	1	0.6	0.6	0.8	1	0.6	0.6	0.8	1	1	1	1	1	1	1	1	1
Amphib V4	% Ground cover along water's edge	80	80	70	80	80	80	50	50	70	80	80	80	80	80	80	80	90	90	60	60	80	80
	SI	0.95	0.95	0.85	0.95	0.95	0.95	0.6	0.6	0.85	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.65	0.65	0.95	0.95
Amphib V5	Width of riparian zone	30	30	0	10	50	50	30	30	30	30	30	30	50	50	50	50	60	60	30	30	30	30
	SI	0.6	0.6	0	0.2	0.9	0.9	0.6	0.6	0.6	0.6	0.6	0.6	0.9	0.9	1	1	1	1	0.6	0.6	0.6	0.6
Amphib V6	Water temperature during low flows	20	20	14	14	14	20	14	14	14	20	14	20	20	20	14	20	20	20	14	20	20	20
	SI	0	0	0.4	0.4	0.4	0	0.4	0.4	0.4	0	0.4	0	0	0	0.4	0	0	0	0.4	0	0	0
Amphib V7	Land use within 200 m	C/E	C/E	D	D	E	E	A/D	A/D	C/E	C/E	A/E	A/E	C/E	C/E	A/E	A/E	A/E	A/E	A	A	A/E	A/E
	SI	0.7	0.7	0.7	0.7	1	1	0.35	0.35	0.75	0.75	0.5	0.5	0.75	0.75	0.5	0.5	0.5	0.5	0	0	0.5	0.5
	Amphibian HSI	0.464	0.464	0.479	0.52143	0.707	0.664	0.479	0.479	0.614	0.586	0.464	0.407	0.529	0.543	0.664	0.607	0.607	0.607	0.55	0.493	0.664	0.607
Salmon V1	Water temperature during low flows	20	20	N/A			20	14	20	20	20	14	20	20	20	14	20	20	20	14	20	20	20
	SI	0.70	0.70				0.70	0.95	0.70	0.70	0.70	0.95	0.70	0.70	0.70	0.95	0.70	0.70	0.70	0.95	0.70	0.70	0.70
Salmon V2	% Pools during low water	10	30				50	10	10	20	30	10	10	30	30	100	100	75	50	0	0	0	50
	SI	0.3	0.7				1	0.3	0.3	0.5	0.7	0.3	0.3	0.7	1	0.3	0.3	0.9	1	0.2	0.2	0.2	1
Salmon V3	Instream Cover	20	30				30	10	10	20	30	5	5	20	30	40	40	50	50	20	20	30	40
	SI	0.4	0.8				0.8	0.2	0.2	0.4	0.8	0.15	0.15	0.40	0.80	1	1	1	1	0.4	0.4	0.8	1
Salmon V4	Predominant substrate size in riffle/run areas	B	B				C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	SI	0.6	0.5				0.3	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6
	Salmon HSI	0.5	0.7	0	0	0	0.7	0.513	0.45	0.55	0.7	0.5	0.438	0.6	0.775	0.688	0.625	0.8	0.825	0.538	0.475	0.575	0.825
Kestrel V1	Distance to woodland	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
	SI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kestrel V2	Distance to perching sites	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
	SI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kestrel V3	Distance to open land	0	0	1	1	1	1	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0
	SI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kestrel V4	DBH of trees	24	24	6	12	24	24	6	12	24	24	12	18	24	24	6	12	24	24	18	24	24	24
	SI	1	1	0	0.8	1	1	0	0.8	1	1	0.8	1	1	1	0	0.8	1	1	1	1	1	1
	Kestrel HSI	1	1	0	0.89443	1	1	0	0.894	1	1	0.894	1	1	1	0	0.894	1	1	1	1	1	1
	Combined HSI Score	0.708	0.77	0.365	0.50629	0.633	0.798	0.378	0.521	0.681	0.804	0.541	0.565	0.68	0.793	0.553	0.668	0.799	0.81	0.577	0.553	0.713	0.797
	Acreage	76	76	70	70	70	70	83	83	83	83	51	51	51	51	97	97	97	97	15	15	15	15
	Total Habitat Units	53.79	58.54	25.53	35.4404	44.29	55.83	31.37	43.24	56.65	66.69	27.6	28.79	34.7	40.42	53.64	64.79	77.5	78.53	8.66	8.296	10.7	11.95
	Score Years 1-10	0.613	0.675		0.50332	0.552	0.717		0.521	0.606	0.722		0.565	0.613	0.725		0.668	0.724	0.735		0.556	0.642	0.729
	Score Years 11-25	0.667	0.729		0.50499	0.606	0.771		0.521	0.659	0.777		0.565	0.659	0.77		0.668	0.777	0.787		0.558	0.691	0.775
	Score Years 26-50	0.708	0.77		0.50629	0.633	0.798		0.521	0.681	0.804		0.565	0.68	0.793		0.668	0.799	0.81		0.553	0.713	0.797
	Calculated AAHUs	50.87	55.39		34.83	41.72	52.68		42.66	53.54	62.99		28.73	33.45	38.79		64.23	75.08	76.27		8.33	10.3	11.49
	Net Change in AAHUs	8.43	12.94		0	6.89	17.85		0	10.88	20.34		0	4.72	10.06		0	10.85	11.04		0	1.97	3.16

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APPENDIX C: Cost Appendix

November 2013

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Preliminary Costs Developed for Conceptual Alternatives

February 2011

Preliminary Detailed Cost Estimate Site C1A

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 248,400	$ 343,980	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		20	EA	$ 200	$ -	$ 4,000	Place 5 1-ton boulders at each ELJ
Place ELJ		4	EA	$ 80,000	$ -	$ 320,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	500	500	EA	$ 800	$ 400,000	$ 400,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	52	52	AC	$ 2,500	$ 130,000	$ 130,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	52	52	AC	$ 7,500	$ 390,000	$ 390,000	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		3,000	CY	$ 10	$ -	$ 30,000	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,168,400	$1,617,980	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 701,040	$ 764,400	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	52	52	AC	$ 5,000	$ 260,000	$ 260,000	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 576,710	$ 581,676	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 2,706,150	$3,224,056	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C1B

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 324,675	$ 376,304	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		5	EA	$ 200	$ -	$ 1,000	Place 5 1-ton boulders at each ELJ
Place ELJ		1	EA	$ 80,000	$ -	$ 80,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	500	500	EA	$ 800	$ 400,000	$ 400,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	60	60	AC	$ 2,500	$ 150,000	$ 150,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation	15	15	AC	$ 13,500	$ 202,500	$ 202,500	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	60	60	AC	$ 7,500	$ 450,000	$ 450,000	Supplement existing vegetation with riparian species
Regrade Onsite		11,000	CY	$ 8	$ -	$ 88,000	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		2,222	CY	$ 10	$ -	$ 22,220	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,527,175	$ 1,770,024	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 916,305	$ 836,232	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	86	86	AC	$ 5,000	$ 430,000	$ 430,000	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$953,790	$958,755	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 3,827,270	$ 3,995,012	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C1C

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 363,825	$ 599,069	Standard markups (see cost appendix)
Remove Debris		2,000	CY	$ 20	$ -	$ 40,000	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment		8,746	TN	$ 50	$ -	$ 437,276	Excavate, load, haul, and dispose rock revetment
Install Culvert		30	LF	$ 2,800	$ -	$ 84,000	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		10	EA	$ 200	$ -	$ 2,000	Place 5 1-ton boulders at each ELJ
Place ELJ		2	EA	$ 80,000	$ -	$ 160,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	200	200	EA	$ 800	$ 160,000	$ 160,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	70	70	AC	$ 2,500	$ 175,000	$ 175,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation	25	25	AC	$ 13,500	$ 337,500	$ 337,500	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	15	15	AC	$ 10,000	$ 150,000	$ 150,000	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	70	70	AC	$ 7,500	$ 525,000	$ 525,000	Supplement existing vegetation with riparian species
Regrade Onsite		6,000	CY	$ 8	$ -	$ 48,000	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		10,000	CY	$ 10	$ -	$ 100,000	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,711,325	$ 2,817,845	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,026,795	$ 1,690,707	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	114	114	AC	$ 20,000	$ 2,280,000	$ 2,280,000	Investigations, notification, coordination, acquistion costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$1,264,326	$ 1,274,366	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 6,282,446	$ 8,062,918	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C1D

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation		1	LS	27%	$ 326,727	$ 362,845	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment	7,291	7,291	TN	$ 50	$ 364,550	$ 364,550	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders			EA	$ 200	$ -	$ -	Place 5 1-ton boulders at each ELJ
Place ELJ		1	EA	$ 80,000	$ -	$ 80,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	50	50	AC	$ 2,500	$ 125,000	$ 125,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	46	46	AC	$ 10,000	$ 460,000	$ 460,000	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	30	30	AC	$ 7,500	$ 225,000	$ 225,000	Supplement existing vegetation with riparian species
Regrade Onsite		889	CY	$ 8	$ -	$ 7,112	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		4,666	CY	$ 10	$ -	$ 46,660	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment	1,422	1,422	TN	$ 25	$ 35,550	$ 35,550	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank		-	SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal		1	LS	NA	$1,536,827	$1,706,717	Subtotal of construction costs and standard site prep markups
General Markups		1	LS	60%	$ 922,096	$1,024,030	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000		$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	99	99	AC	$ 5,000	$ 495,000	$ 495,000	Investigations, notification, coordination, easement costs for public lands
O&M		1	LS	varies	$1,118,865	$1,123,963	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$4,072,788	$4,349,711	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C1E							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation		1	LS	27%		$ 1,027,744	Standard markups (see cost appendix)
Remove Debris			CY	$ 20		$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50		$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800		$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000		$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200		$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders			EA	$ 200		$ -	Place 5 1-ton boulders at each ELJ
Place ELJ			EA	$ 80,000		$ -	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800		$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants			AC	$ 2,500		$ -	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500		$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000		$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings			AC	$ 7,500		$ -	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8		$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10		$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment		139,188	TN	$ 25		$ 3,479,700	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank		8,169	SY	$ 40		$ 326,760	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25		$ -	Import and place clean spawning gravels
Construction Subtotal		1	LS	NA		$ 4,834,204	Subtotal of construction costs and standard site prep markups
General Markups		1	LS	60%		$ 2,900,523	Standard markups (see cost appendix)
Real Estate Acquisition (Private)		-	AC	$ 20,000		$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000		$ -	Investigations, notification, coordination, easement costs for public lands
O&M		1	LS	varies		$ 115,245	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost						$ 7,849,971	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C1F							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 618,300	$ 786,055	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert		60	LF	$ 2,800	$ -	$ 168,000	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders			EA	$ 200	$ -	$ -	Place 5 1-ton boulders at each ELJ
Place ELJ			EA	$ 80,000	$ -	$ -	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	229	229	AC	$ 2,500	$ 572,500	$ 572,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	229	229	AC	$ 7,500	$ 1,717,500	$ 1,717,500	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		39,543	CY	$ 10	$ -	$ 395,430	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment		2,117	TN	$ 25	$ -	$ 52,925	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank		124	SY	$ 40	$ -	$ 4,960	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 2,908,300	$ 3,697,370	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,744,980	$ 2,218,422	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	220	220	AC	$ 20,000	$ 4,400,000	$ 4,400,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 2,362,294	$ 2,466,561	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 11,415,574	$ 12,782,353	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C1G

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 174,960	$ 262,440	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders	40	60	EA	$ 200	$ 8,000	$ 12,000	Place 5 1-ton boulders at each ELJ
Place ELJ	8	12	EA	$ 80,000	$ 640,000	$ 960,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants			AC	$ 2,500	$ -	$ -	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings			AC	$ 7,500	$ -	$ -	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 822,960	$ 1,234,440	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 493,776	$ 740,664	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	-	-	AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies			Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 1,316,736	$ 1,975,104	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C2A							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 1,384,020	$ 1,754,600	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment		10,304	TN	$ 50	$ -	$ 515,190	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		20	EA	$ 200	$ -	$ 4,000	Place 5 1-ton boulders at each ELJ
Place ELJ		4	EA	$ 80,000	$ -	$ 320,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	2,970	2,970	EA	$ 800	$ 2,376,000	$ 2,376,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	175	175	AC	$ 2,500	$ 437,500	$ 437,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	100	100	AC	$ 10,000	$ 1,000,000	$ 1,000,000	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	175	175	AC	$ 7,500	$ 1,312,500	$ 1,312,500	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		53,333	CY	$ 10	$ -	$ 533,330	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 6,510,020	$ 8,253,120	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 3,906,012	$ 4,951,872	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	296	296	AC	$ 20,000	$ 5,920,000	$ 5,920,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 3,293,903	$ 3,298,868	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 19,629,935	$ 22,423,861	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C2B							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 324,000	$ 367,740	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		10	EA	$ 200	$ -	$ 2,000	Place 5 1-ton boulders at each ELJ
Place ELJ		2	EA	$ 80,000	$ -	$ 160,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	450	450	EA	$ 800	$ 360,000	$ 360,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	84	84	AC	$ 2,500	$ 210,000	$ 210,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	84	84	AC	$ 7,500	$ 630,000	$ 630,000	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,524,000	$ 1,729,740	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 914,400	$ 1,037,844	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	84	84	AC	$ 5,000	$ 420,000	$ 420,000	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$931,609	$931,609	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 3,790,009	$ 4,119,193	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C2C

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 222,018	$ 675,263	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		25	EA	$ 200	$ -	$ 5,000	Place 5 1-ton boulders at each ELJ
Place ELJ		5	EA	$ 80,000	$ -	$ 400,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	12	12	EA	$ 800	$ 9,600	$ 9,600	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	79	79	AC	$ 2,500	$ 197,500	$ 197,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation	10	10	AC	$ 13,500	$ 133,313	$ 133,313	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	4	4	AC	$ 10,000	$ 37,500	$ 37,500	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	59	59	AC	$ 7,500	$ 444,375	$ 444,375	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		5,349	CY	$ 10	$ -	$ 53,491	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment		44,618	TN	$ 25	$ -	$1,115,449	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank		2,619	SY	$ 40	$ -	$ 104,747	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,044,305	$3,176,238	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 626,583	$1,905,743	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	79	79	AC	$ 5,000	$ 395,000	$ 395,000	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 876,156	$ 925,453	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 2,942,044	$6,402,434	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C2D							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 446,513	$ 1,595,321	Standard markups (see cost appendix)
Remove Debris		24,200	CY	$ 20	$ -	$ 484,000	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		15	EA	$ 200	$ -	$ 3,000	Place 5 1-ton boulders at each ELJ
Place ELJ		3	EA	$ 80,000	$ -	$ 240,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	147	147	AC	$ 2,500	$ 367,500	$ 367,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	74	74	AC	$ 10,000	$ 735,000	$ 735,000	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	74	74	AC	$ 7,500	$ 551,250	$ 551,250	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment		141,114	TN	$ 25	$ -	$ 3,527,845	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 2,100,263	$ 7,503,915	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,260,158	$ 4,502,349	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	147	147	AC	$ 20,000	$ 2,940,000	$ 2,940,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 1,630,316	$ 1,770,523	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 7,930,736	$ 16,716,788	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C2E

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 205,200	$ 370,380	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		10	EA	$ 200	$ -	$ 2,000	Place 5 1-ton boulders at each ELJ
Place ELJ		2	EA	$ 80,000	$ -	$ 160,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	76	76	AC	$ 2,500	$ 190,000	$ 190,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	76	76	AC	$ 7,500	$ 570,000	$ 570,000	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment		17,991	TN	$ 25	$ -	$ 449,778	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 965,200	$1,742,158	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 579,120	$1,045,295	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	76	76	AC	$ 20,000	$ 1,520,000	$1,520,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 842,884	$ 860,760	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 3,907,204	$5,168,212	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C3A

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 368,550	$ 466,830	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		20	EA	$ 200	$ -	$ 4,000	Place 5 1-ton boulders at each ELJ
Place ELJ		4	EA	$ 80,000	$ -	$ 320,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	700	700	EA	$ 800	$ 560,000	$ 560,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	70	70	AC	$ 2,500	$ 175,000	$ 175,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation	18	18	AC	$ 13,500	$ 236,250	$ 236,250	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	53	53	AC	$ 7,500	$ 393,750	$ 393,750	Supplement existing vegetation with riparian species
Regrade Onsite		5,000	CY	$ 8	$ -	$ 40,000	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,733,550	$2,195,830	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,040,130	$1,317,498	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	70	70	AC	$ 5,000	$ 350,000	$ 350,000	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 776,341	$ 776,341	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 3,900,021	$4,639,669	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C3B							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 967,241	$ 1,114,391	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		25	EA	$ 200	$ -	$ 5,000	Place 5 1-ton boulders at each ELJ
Place ELJ		5	EA	$ 80,000	$ -	$ 400,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	1,990	1,990	EA	$ 800	$ 1,592,000	$ 1,592,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	199	199	AC	$ 2,500	$ 497,500	$ 497,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation	50	50	AC	$ 13,500	$ 671,625	$ 671,625	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	8	8	AC	$ 10,000	$ 75,000	$ 75,000	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	100	100	AC	$ 7,500	$ 746,250	$ 746,250	Supplement existing vegetation with riparian species
Regrade Onsite		10,000	CY	$ 8	$ -	$ 80,000	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		6,000	CY	$ 10	$ -	$ 60,000	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 4,549,616	$ 5,241,766	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 2,729,770	$ 3,145,060	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	199	199	AC	$ 20,000	$ 3,980,000	$ 3,980,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 2,207,026	$ 2,211,991	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 13,466,412	$14,578,817	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C3C

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 451,001	$ 698,462	Standard markups (see cost appendix)
Remove Debris		8,067	CY	$ 20	$ -	$ 161,333	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert		80	EA	$ 2,800	$ -	$ 224,000	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge		80	LF	$ 1,200	$ -	$ 96,000	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		25	EA	$ 200	$ -	$ 5,000	Place 5 1-ton boulders at each ELJ
Place ELJ		5	EA	$ 80,000	$ -	$ 400,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	830	830	EA	$ 800	$ 664,000	$ 664,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	83	83	AC	$ 2,500	$ 207,500	$ 207,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation	21	21	AC	$ 13,500	$ 280,125	$ 280,125	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	21	21	AC	$ 10,000	$ 207,500	$ 207,500	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	42	42	AC	$ 7,500	$ 311,250	$ 311,250	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		3,019	CY	$ 10	$ -	$ 30,188	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 2,121,376	$3,285,359	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,272,826	$1,971,215	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	83	83	AC	$ 20,000	$ 1,660,000	$1,660,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 920,518	$ 930,449	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 5,974,720	$7,847,023	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site C3D							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 245,633	$ 311,243	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		15	EA	$ 200	$ -	$ 3,000	Place 5 1-ton boulders at each ELJ
Place ELJ		3	EA	$ 80,000	$ -	$ 240,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	510	510	EA	$ 800	$ 408,000	$ 408,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	51	51	AC	$ 2,500	$ 127,500	$ 127,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	3	3	AC	$ 10,000	$ 30,000	$ 30,000	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	46	46	AC	$ 7,500	$ 344,250	$ 344,250	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,155,383	$1,463,993	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 693,230	$ 878,396	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	38	38	AC	$ 20,000	$ 765,000	$ 765,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	13	13	AC	$ 5,000	$ 63,750	$ 63,750	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 565,620	$ 565,620	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 3,242,982	$3,736,758	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M1A

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 401,325	$ 599,265	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment		7,000	TN	$ 50	$ -	$ 350,000	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders			EA	$ 200	$ -	$ -	Place 5 1-ton boulders at each ELJ
Place ELJ			EA	$ 80,000	$ -	$ -	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris		50	EA	$ 800	$ -	$ 40,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	30	30	AC	$ 2,500	$ 75,000	$ 75,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation	17	17	AC	$ 13,500	$ 229,500	$ 229,500	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	70	70	AC	$ 10,000	$ 700,000	$ 700,000	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	30	30	AC	$ 7,500	$ 225,000	$ 225,000	Supplement existing vegetation with riparian species
Regrade Onsite	25,000	50,000	CY	$ 8	$ 200,000	$ 400,000	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel	5,689	20,000	CY	$ 10	$ 56,890	$ 200,000	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,887,715	$ 2,818,765	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,132,629	$ 1,691,259	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	147	147	AC	$ 20,000	$ 2,944,000	$ 2,944,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 1,635,281	$ 1,635,281	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 7,599,625	$ 9,089,305	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M1B

Line Item	Min Quantity	Mod Quantity	Max Quantity	Units	Unit Cost	Min Cost	Mod Quantity	Max Cost	Notes/Assumptions
Site Preparation	1	1	1	LS	27%	$ 270,000	$ 435,262	$ 491,066	Standard markups (see cost appendix)
Remove Debris				CY	$ 20	$ -	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment		3,975	3,975	TN	$ 50	$ -	$ 198,750	$ 198,762	Excavate, load, haul, and dispose rock revetment
Install Culvert				EA	$ 2,800	$ -	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge				LF	$ 4,000	$ -	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge				LF	$ 1,200	$ -	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders				EA	$ 200	$ -	$ -	$ -	Place 5 1-ton boulders at each ELJ
Place ELJ				EA	$ 80,000	$ -	$ -	$ -	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris		50	50	EA	$ 800	$ -	$ 40,000	$ 40,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	20	20	20	AC	$ 2,500	$ 50,000	$ 50,000	$ 50,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation	20	20	20	AC	$ 13,500	$ 270,000	$ 270,000	$ 270,000	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	68	68	68	AC	$ 10,000	$ 680,000	$ 680,000	$ 680,000	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings				AC	$ 7,500	$ -	$ -	$ -	Supplement existing vegetation with riparian species
Regrade Onsite		45,000	65,000	CY	$ 8	$ -	$ 360,000	$ 520,000	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		1,333	6,000	CY	$ 10	$ -	$ 13,330	$ 60,000	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment				TN	$ 25	$ -	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank				SY	$ 40	$ -	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel				CY	$ 25	$ -	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	1	LS	NA	$ 1,270,000	$ 2,047,342	$2,309,827	Subtotal of construction costs and standard site prep markups
General Markups	1	1	1	LS	60%	$ 762,000	$ 1,228,405	$1,385,896	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	170	170	170	AC	$ 20,000	$ 3,400,000	$ 3,400,000	$3,400,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)				AC	$ 5,000	$ -	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	1	LS	varies	$ 1,885,399	$1,890,364	$1,890,364	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost						$ 7,317,399	$ 8,566,111	$ 8,986,088	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M1C

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 262,440	$ 437,400	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders	60	100	EA	$ 200	$ 12,000	$ 20,000	Place 5 1-ton boulders at each ELJ
Place ELJ	12	20	EA	$ 80,000	$ 960,000	$ 1,600,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris		-	EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants			AC	$ 2,500	$ -	$ -	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings			AC	$ 7,500	$ -	$ -	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,234,440	$ 2,057,400	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 740,664	$ 1,234,440	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	-	-	AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ -	$ -	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 1,975,104	$ 3,291,840	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M1D

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 341,729	$ 525,748	Standard markups (see cost appendix)
Remove Debris		8,467	CY	$ 20	$ -	$ 169,333	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		25	EA	$ 200	$ -	$ 5,000	Place 5 1-ton boulders at each ELJ
Place ELJ		5	EA	$ 80,000	$ -	$ 400,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	690	690	EA	$ 800	$ 552,000	$ 552,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	62	62	AC	$ 2,500	$ 155,000	$ 155,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation	7	7	AC	$ 13,500	$ 93,111	$ 93,111	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	62	62	AC	$ 7,500	$ 465,553	$ 465,553	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		10,722	CY	$ 10	$ -	$ 107,219	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,607,393	$2,472,965	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 964,436	$1,483,779	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	62	62	AC	$ 20,000	$ 1,240,000	$1,240,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$687,616	$692,581	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 4,499,445	$ 5,889,325	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M2A

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 199,946	$ 283,257	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		10	EA	$ 200	$ -	$ 2,000	Place 5 1-ton boulders at each ELJ
Place ELJ		2	EA	$ 80,000	$ -	$ 160,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris		50	EA	$ 800	$ -	$ 40,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	68	68	AC	$ 2,500	$ 170,000	$ 170,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	22	22	AC	$ 10,000	$ 224,400	$ 224,400	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	46	46	AC	$ 7,500	$ 341,700	$ 341,700	Supplement existing vegetation with riparian species
Regrade Onsite		12,000	CY	$ 8	$ -	$ 96,000	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel	444	1,500	CY	$ 10	$ 4,440	$ 15,000	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 940,486	$1,332,357	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 564,291	$ 799,414	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	68	68	AC	$ 20,000	$ 1,360,000	$1,360,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 759,125	$ 759,125	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 3,623,902	$4,250,896	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M2B							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 214,448	$ 360,666	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		30	EA	$ 200	$ -	$ 6,000	Place 5 1-ton boulders at each ELJ
Place ELJ		6	EA	$ 80,000	$ -	$ 480,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	435	435	EA	$ 800	$ 348,000	$ 348,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	42	42	AC	$ 2,500	$ 105,000	$ 105,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation	11	11	AC	$ 10,000	$ 105,000	$ 105,000	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	32	32	AC	$ 7,500	$ 236,250	$ 236,250	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		5,555	CY	$ 10	$ -	$ 55,550	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,008,698	$1,696,466	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 605,219	$1,017,880	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	42	42	AC	$ 20,000	$ 840,000	$ 840,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 465,804	$ 470,770	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 2,919,720	$4,025,115	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M2C							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 1,131,300	$ 1,347,905	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		35	EA	$ 200	$ -	$ 7,000	Place 5 1-ton boulders at each ELJ
Place ELJ		7	EA	$ 80,000	$ -	$ 560,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	2,000	2,000	EA	$ 800	$ 1,600,000	$ 1,600,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	259	259	AC	$ 2,500	$ 647,500	$ 647,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	259	259	AC	$ 7,500	$ 1,942,500	$ 1,942,500	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		23,524	CY	$ 10	$ -	$ 235,240	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 5,321,300	$ 6,340,145	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 3,192,780	$ 3,804,087	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	259	259	AC	$ 5,000	$ 1,295,000	$ 1,295,000	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 2,872,461	$ 2,877,426	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 12,681,541	$ 14,316,658	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M2D							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 291,600	$ 391,878	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		20	EA	$ 200	$ -	$ 4,000	Place 5 1-ton boulders at each ELJ
Place ELJ		4	EA	$ 80,000	$ -	$ 320,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	600	600	EA	$ 800	$ 480,000	$ 480,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	60	60	AC	$ 2,500	$ 150,000	$ 150,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	60	60	AC	$ 7,500	$ 450,000	$ 450,000	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		4,740	CY	$ 10	$ -	$ 47,400	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,371,600	$1,843,278	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 822,960	$1,105,967	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	60	60	AC	$ 20,000	$ 1,200,000	$1,200,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 665,435	$ 670,400	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 4,059,995	$4,819,645	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M2E

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 417,960	$ 531,841	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		20	EA	$ 200	$ -	$ 4,000	Place 5 1-ton boulders at each ELJ
Place ELJ		4	EA	$ 80,000	$ -	$ 320,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	860	860	EA	$ 800	$ 688,000	$ 688,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	86	86	AC	$ 2,500	$ 215,000	$ 215,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	86	86	AC	$ 7,500	$ 645,000	$ 645,000	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		9,778	CY	$ 10	$ -	$ 97,780	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,965,960	$ 2,501,621	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,179,576	$ 1,500,972	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	86	86	AC	$ 20,000	$ 1,720,000	$ 1,720,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$953,790	$958,755	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 5,819,326	$ 6,681,348	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M2F

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation		1	LS	27%		$ 555,068	Standard markups (see cost appendix)
Remove Debris			CY	$ 20		$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50		$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800		$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge		40	LF	$ 4,000		$ 160,000	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200		$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		10	EA	$ 200		$ 2,000	Place 5 1-ton boulders at each ELJ
Place ELJ		2	EA	$ 80,000		$ 160,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800		$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants		6	AC	$ 2,500		$ 15,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500		$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000		$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings		6	AC	$ 7,500		$ 45,000	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8		$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		167,381	CY	$ 10		$1,673,808	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25		$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40		$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25		$ -	Import and place clean spawning gravels
Construction Subtotal		1	LS	NA		$2,610,877	Subtotal of construction costs and standard site prep markups
General Markups		1	LS	60%		$1,566,526	Standard markups (see cost appendix)
Real Estate Acquisition (Private)		6	AC	$ 20,000		$ 120,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000		$ -	Investigations, notification, coordination, easement costs for public lands
O&M		1	LS	varies		$ 76,474	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost						$4,373,877	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M2G

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 174,960	$ 284,310	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders	40	65	EA	$ 200	$ 8,000	$ 13,000	Place 5 1-ton boulders at each ELJ
Place ELJ	8	13	EA	$ 80,000	$ 640,000	$1,040,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants			AC	$ 2,500	$ -	$ -	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings			AC	$ 7,500	$ -	$ -	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 822,960	$1,337,310	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 493,776	$ 802,386	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	-	-	AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ -	$ -	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 1,316,736	$2,139,696	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M3A							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 149,040	$ 264,395	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		25	EA	$ 200	$ -	$ 5,000	Place 5 1-ton boulders at each ELJ
Place ELJ		5	EA	$ 80,000	$ -	$ 400,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	315	315	EA	$ 800	$ 252,000	$ 252,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	30	30	AC	$ 2,500	$ 75,000	$ 75,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	30	30	AC	$ 7,500	$ 225,000	$ 225,000	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		2,224	CY	$ 10	$ -	$ 22,241	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 701,040	$1,243,637	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 420,624	$ 746,182	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	30	30	AC	$ 20,000	$ 600,000	$ 600,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 332,717	$ 337,683	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 2,054,381	$2,927,501	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M4A							
Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 354,780	$ 453,287	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment		2,437	TN	$ 50	$ -	$ 121,841	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		15	EA	$ 200	$ -	$ 3,000	Place 5 1-ton boulders at each ELJ
Place ELJ		3	EA	$ 80,000	$ -	$ 240,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	730	730	EA	$ 800	$ 584,000	$ 584,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	73	73	AC	$ 2,500	$ 182,500	$ 182,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	73	73	AC	$ 7,500	$ 547,500	$ 547,500	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,668,780	$2,132,128	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,001,268	$1,279,277	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	73	73	AC	$ 20,000	$ 1,460,000	$1,460,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 809,612	$ 809,612	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 4,939,660	$5,681,017	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M4B

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 32,189	$ 191,795	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment		5,526	TN	$ 50	$ -	$ 276,279	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge		160	LF	$ 1,200	$ -	$ 192,000	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		5	EA	$ 200	$ -	$ 1,000	Place 5 1-ton boulders at each ELJ
Place ELJ		1	EA	$ 80,000	$ -	$ 80,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	9	9	AC	$ 2,500	$ 22,500	$ 22,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	9	9	AC	$ 7,500	$ 67,500	$ 67,500	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel	2,922	7,107	CY	$ 10	$ 29,220	$ 71,072	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 151,409	$ 902,145	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 90,846	$ 541,287	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	9	9	AC	$ 20,000	$ 180,000	$ 180,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 104,781	$ 109,746	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 527,036	$1,733,178	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M4C

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 406,210	$ 532,991	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment	8,090	8,090	TN	$ 50	$ 404,480	$ 404,480	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		20	EA	$ 200	$ -	$ 4,000	Place 5 1-ton boulders at each ELJ
Place ELJ		4	EA	$ 80,000	$ -	$ 320,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris		50	EA	$ 800	$ -	$ 40,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	110	110	AC	$ 2,500	$ 275,000	$ 275,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	110	110	AC	$ 7,500	$ 825,000	$ 825,000	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		10,556	CY	$ 10	$ -	$ 105,560	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,910,689	$2,507,031	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,146,414	$1,504,218	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	110	110	AC	$ 20,000	$ 2,200,000	$2,200,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 1,219,964	$1,224,929	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 6,477,067	$7,436,178	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M4D

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 314,280	$ 371,226	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		10	EA	$ 200	$ -	$ 2,000	Place 5 1-ton boulders at each ELJ
Place ELJ		2	EA	$ 80,000	$ -	$ 160,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	655	655	EA	$ 800	$ 524,000	$ 524,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	64	64	AC	$ 2,500	$ 160,000	$ 160,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	64	64	AC	$ 7,500	$ 480,000	$ 480,000	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		4,891	CY	$ 10	$ -	$ 48,911	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,478,280	$1,746,137	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 886,968	$1,047,682	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	64	64	AC	$ 20,000	$ 1,280,000	$1,280,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 709,797	$ 714,763	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 4,355,045	$4,788,582	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M4E

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 311,040	$ 447,120	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		20	EA	$ 200	$ -	$ 4,000	Place 5 1-ton boulders at each ELJ
Place ELJ		4	EA	$ 80,000	$ -	$ 320,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	640	640	EA	$ 800	$ 512,000	$ 512,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	64	64	AC	$ 2,500	$ 160,000	$ 160,000	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	64	64	AC	$ 7,500	$ 480,000	$ 480,000	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		18,000	CY	$ 10	$ -	$ 180,000	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 1,463,040	$2,103,120	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 877,824	$1,261,872	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	64	64	AC	$ 20,000	$ 1,280,000	$1,280,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 709,797	$ 714,763	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 4,330,661	$5,359,755	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M4F

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation		1	LS	27%		$ 336,579	Standard markups (see cost appendix)
Remove Debris			CY	$ 20		$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50		$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800		$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge		80	LF	$ 4,000		$ 320,000	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200		$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders			EA	$ 200		$ -	Place 5 1-ton boulders at each ELJ
Place ELJ			EA	$ 80,000		$ -	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800		$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants		31	AC	$ 2,500		$ 77,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500		$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000		$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings		31	AC	$ 7,500		$ 232,500	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8		$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		61,659	CY	$ 10		$ 616,588	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25		$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40		$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25		$ -	Import and place clean spawning gravels
Construction Subtotal		1	LS	NA		$1,583,166	Subtotal of construction costs and standard site prep markups
General Markups		1	LS	60%		$ 949,900	Standard markups (see cost appendix)
Real Estate Acquisition (Private)		31	AC	$ 20,000		$ 620,000	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000		$ -	Investigations, notification, coordination, easement costs for public lands
O&M		1	LS	varies		$ 353,739	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost						$3,506,805	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M4G

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 174,960	$ 262,440	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders	40	60	EA	$ 200	$ 8,000	$ 12,000	Place 5 1-ton boulders at each ELJ
Place ELJ	8	12	EA	$ 80,000	$ 640,000	$ 960,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants			AC	$ 2,500	$ -	$ -	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings			AC	$ 7,500	$ -	$ -	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 822,960	$1,234,440	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 493,776	$ 740,664	Standard markups (see cost appendix)
Real Estate Acquisition (Private)	-	-	AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)			AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ -	$ -	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 1,316,736	$1,975,104	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M5B

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 610,740	$ 632,610	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge	120	120	LF	$ 1,200	$ 144,000	$ 144,000	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		5	EA	$ 200	$ -	$ 1,000	Place 5 1-ton boulders at each ELJ
Place ELJ		1	EA	$ 80,000	$ -	$ 80,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	1,185	1,185	EA	$ 800	$ 948,000	$ 948,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	117	117	AC	$ 2,500	$ 292,500	$ 292,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	117	117	AC	$ 7,500	$ 877,500	$ 877,500	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 2,872,740	$2,975,610	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,723,644	$1,785,366	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	117	117	AC	$ 5,000	$ 585,000	$ 585,000	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 1,297,598	$1,302,563	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 6,478,982	$6,648,539	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M5D

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 11,100	$ 40,284	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		5	EA	$ 200	$ -	$ 1,000	Place 5 1-ton boulders at each ELJ
Place ELJ		1	EA	$ 80,000	$ -	$ 80,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants			AC	$ 2,500	$ -	$ -	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings			AC	$ 7,500	$ -	$ -	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		598	CY	$ 10	$ -	$ 5,977	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel	1,644	2,489	CY	$ 25	$ 41,111	$ 62,222	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 52,211	$ 189,484	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 31,327	$ 113,690	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	-	-	AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 83,267	$ 88,232	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 166,805	$ 391,406	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site M5E

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 174,960	$ 262,440	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders	40	60	EA	$ 200	$ 8,000	$ 12,000	Place 5 1-ton boulders at each ELJ
Place ELJ	8	12	EA	$ 80,000	$ 640,000	$ 960,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris			EA	$ 800	$ -	$ -	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants			AC	$ 2,500	$ -	$ -	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings			AC	$ 7,500	$ -	$ -	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel			CY	$ 10	$ -	$ -	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 822,960	$1,234,440	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 493,776	$ 583,200	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	-	-	AC	$ 5,000	$ -	$ -	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ -	$ -	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 1,316,736	$1,817,640	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site R1A

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 487,134	$ 591,476	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		20	EA	$ 200	$ -	$ 4,000	Place 5 1-ton boulders at each ELJ
Place ELJ		4	EA	$ 80,000	$ -	$ 320,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	970	970	EA	$ 800	$ 776,000	$ 776,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	97	97	AC	$ 2,500	$ 242,500	$ 242,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation	10	10	AC	$ 13,500	$ 130,950	$ 130,950	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	87	87	AC	$ 7,500	$ 654,750	$ 654,750	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		6,245	CY	$ 10	$ -	$ 62,450	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 2,291,334	$2,782,126	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 1,374,800	$1,669,276	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	97	97	AC	$ 5,000	$ 485,000	$ 485,000	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 1,075,786	$1,080,752	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 5,226,921	$6,017,153	Total cost of design, construction and maintenance

Preliminary Detailed Cost Estimate Site R1B

Line Item	Min Quantity	Max Quantity	Units	Unit Cost	Min Cost	Max Cost	Notes/Assumptions
Site Preparation	1	1	LS	27%	$ 72,900	$ 127,193	Standard markups (see cost appendix)
Remove Debris			CY	$ 20	$ -	$ -	Excavate, haul, and dispose wood chips or organic debris
Remove Revetment			TN	$ 50	$ -	$ -	Excavate, load, haul, and dispose rock revetment
Install Culvert			EA	$ 2,800	$ -	$ -	Furnish, deliver, and install culvert, restore access
Install Vehicle Bridge			LF	$ 4,000	$ -	$ -	Construct 1-lane vehicle bridge
Install Footbridge			LF	$ 1,200	$ -	$ -	Furnish, deliver, and install pedestrian bridge, 40-foot span
Place Boulders		10	EA	$ 200	$ -	$ 2,000	Place 5 1-ton boulders at each ELJ
Place ELJ		2	EA	$ 80,000	$ -	$ 160,000	Install engineered LWD jam, minimum 20 logs with rootwads
Place Woody Debris	150	150	EA	$ 800	$ 120,000	$ 120,000	Place buried, non-anchored logs with attached rootballs
Remove Invasive Plants	15	15	AC	$ 2,500	$ 37,500	$ 37,500	Remove blackberries and other invasives with mowers and hand operated equipment
Plant Wetland Vegetation			AC	$ 13,500	$ -	$ -	Plant wetland (emergent) species on islands and benches
Plant Riparian Vegetation			AC	$ 10,000	$ -	$ -	Plant riparian species surrounding ponds and along riverbank
Plant Underplantings	15	15	AC	$ 7,500	$ 112,500	$ 112,500	Supplement existing vegetation with riparian species
Regrade Onsite			CY	$ 8	$ -	$ -	Excavation and regrading within 100 feet with no net haul
Excavate Connector Channel		3,909	CY	$ 10	$ -	$ 39,087	Excavation connector channels, haul and dispose, assume 5-mile haul
Construct Rock Revetment			TN	$ 25	$ -	$ -	Import rock and place for buried rock revetment and rock toe for bioengineered revetment
Construct Bioengineered Bank			SY	$ 40	$ -	$ -	Place coir soil lifts, willow cuttings
Place Gravel			CY	$ 25	$ -	$ -	Import and place clean spawning gravels
Construction Subtotal	1	1	LS	NA	$ 342,900	$ 598,280	Subtotal of construction costs and standard site prep markups
General Markups	1	1	LS	60%	$ 205,740	$ 358,968	Standard markups (see cost appendix)
Real Estate Acquisition (Private)			AC	$ 20,000	$ -	$ -	Investigations, notification, coordination, acquisition costs for adjacent private parcels
Real Estate Acquisition (Public)	15	15	AC	$ 5,000	$ 75,000	$ 75,000	Investigations, notification, coordination, easement costs for public lands
O&M	1	1	LS	varies	$ 166,359	$ 171,324	Operation, monitoring, maintenance, rehabilitation, replacement, and repair (contingency included)
Total Cost					$ 789,999	$1,203,572	Total cost of design, construction and maintenance

U.S. Army Corps
of Engineers
Portland District

Cost Estimate Report

June 2013

Willamette River Floodplain Restoration Study
Lane County, Oregon

For Official Use Only

Prepared by:

TETRA TECH, INC.
1020 SW Taylor Street, Suite 530
Portland, Oregon 97205

BASELINE COST ESTIMATE NARRATIVE

1. Project Description:

1.1 General. Feasibility level design and cost estimates for restoration at five sites with the purpose of restoring natural floodplain functions and improving flood storage along the Willamette River and its tributaries.

1.2 Design Features. Features include clearing; removing invasive vegetation; excavation; construction of side channels and pond connections; concrete and debris removal; Engineered Log Jam construction; placement of large woody debris; riprap installation; 3-sided culvert installation; reshaping pond banks; constructing footpath bridges; gravel road obliteration; and various vegetation plantings.

2. Basis of Design: Final Feasibility Report, June 2013.

3. Design and Construction Schedule:

Major Milestones	Date Complete
Design	March 2015
Contract 1 Construction	January 2016
Contract 2 Construction	January 2017
Contract 3 Construction	June 2017
Contract 4 Construction	June 2018
Contract 5 Construction	December 2015

a. Overtime. None is anticipated.

b. Construction Windows. Construction duration for each project site varies from 6 months to 1 year. All in-water construction will occur during the designated in-water work windows from July 1 through August 31 (for Middle Fork) or June 1 through October 31 (Coast Fork). Plantings would occur in the fall/winter following other major construction activities. The only major work features that are considered in-water are the installation of the ELJs and the connection points of the channels with the river. Other work within the ponds, excavation in uplands, and plantings can occur outside of the designated in-water work windows, with appropriate erosion and sediment control BMPs.

c. Acquisition Plan. Project will be constructed using separate construction contracts (contract for each site) during each phase.

4. Subcontracting Plan. Anticipated subcontractors include:

- Paving
- Landscaping
- Pile Driving
- Concrete Culverts and Bridges

5. Project Construction.

a. Site Access. Access will be local public roadways and gravel access roads. Several temporary access roads will be constructed and then removed and restored following the completion of construction.

b. Borrow Areas. Riprap and other stone materials will be obtained from a local quarry, to be approved by the Contracting Officer's Representative.

c. Construction Methodology.

1) Clearing. Clearing will be accomplished by hydraulic excavators, dozers, front end loaders and dump trucks. Debris will be removed to an off-site landfill.

2) Excavations. This work will be accomplished by hydraulic excavators, dozers, front end loaders and dump trucks. Excavated materials will be placed at both on-site and off-site disposal locations. Care and diversion of water will be needed for a portion of the excavations. This will be comprised of temporary coffer dams and pumps. Silt fencing will be required around the excavations, to avoid excessive turbidity in adjacent waterways.

3) Demolition. Demolition will be accomplished by hydraulic excavators with breaker attachments, torch cutting, front end loaders and dump trucks. Debris will be removed to an off-site landfill.

4) Culverts and Bridges. Culverts or pedestrian bridges will be installed where new channels are excavated through existing roads/trails to maintain existing access. Culverts and bridges will be pre-fabricated and will be obtained from a local source. Trenching will be done using a hydraulic excavator. Placement of the pipe will be by hydraulic excavator. Backfilling will be by front-end loader. Compaction will be by whackers and rollers. Bridges would be installed by crane. Concrete or piling abutments would be constructed with pile driving equipment or poured in place.

5) Riprap. Riprap will be removed and/or placed using a hydraulic excavator.

6) Paving. Asphalt paving, if necessary for localized repairs, will be performed by a paving subcontractor.

7) Plantings, Rootwads, Weed Removal. A variety of plantings will be done. Plantings will be accomplished using hand labor. Rootwads (logs) will be placed in the floodplain using excavators. Weeds and invasive species will be removed using hand labor and small equipment. Costs for plantings are based on material prices provided by the Doak Creek Wholesale Nursery catalog.

8) Engineered Log Jams. Engineered Log Jams will be installed using land-based excavators.

9) Adaptive Management. An estimated $100,000 has been added to four of the five sites within the TPCS to account for adaptive management practices that may be required. This cost has only been added to the TPCS spreadsheet, but not the MII estimate, and it is included under the 06 – Fish and Wildlife Facilities feature account. Site M1B is not likely to require adaptive management costs.

10) Post-construction monitoring. This line item is set at 1% of the construction cost.

d. Unusual Conditions (Soil, Water, Weather). Possible unusual conditions include: construction activity in water using in-river cofferdams with the possibility of flooding at the construction site for the in-water work; soil conditions that can vary from mucky pond sediments to riverine gravel and cobbles with both extremes possible at any site.

e. Unique Construction Techniques. Access to islands in the river will be required using temporary access bridges. Engineered log jams and large woody debris require installation and handling of large logs (>20 ft.) with rootballs attached both in the river and along the river bank. Clearing and grubbing of large trees will require pushing trees over in order to keep the rootballs attached for reuse on site.

f. Equipment/Labor Availability and Distance Traveled. All equipment and labor should be available in the Eugene-Springfield area.

6. Environmental Concerns. No contaminated materials are anticipated to be encountered during the excavations. Construction activities would possibly increase turbidity in the river and ponds. There is also a potential for construction equipment to leak or spill contaminates into the river and ponds.

7. Contingencies by Feature or Sub-Feature.

Contingency

An overall contingency of 33.8% has been used for construction to cover design changes and uncertainties in quantities and unit prices.

30 Account – Planning, Engineering, and Design

This account covers the preparation of Plans Specifications and Estimate for construction. Costs for this account were approximated to be 10.5% of the construction cost.

31 Account – Construction Management

This account covers Construction Management, Project Operations, and Project Management during the construction contract as well as post-construction monitoring. Costs for this account were approximated as a percent of the construction cost as follows: 6% for Construction Management; 2% for Project Operations; 2.5% for Project Management and 1% for Monitoring for a total of 11.5% of the construction cost.

8. Effective Dates for Labor, Equipment, Material Pricing.

The labor, equipment, and material pricing were developed using the MCACES 2012 English Unit Cost Library, 2009 National Labor Library, and the 2011 Equipment Library (Region VIII) for the base estimate. The effective pricing data has been prepared in October 2012 dollars.

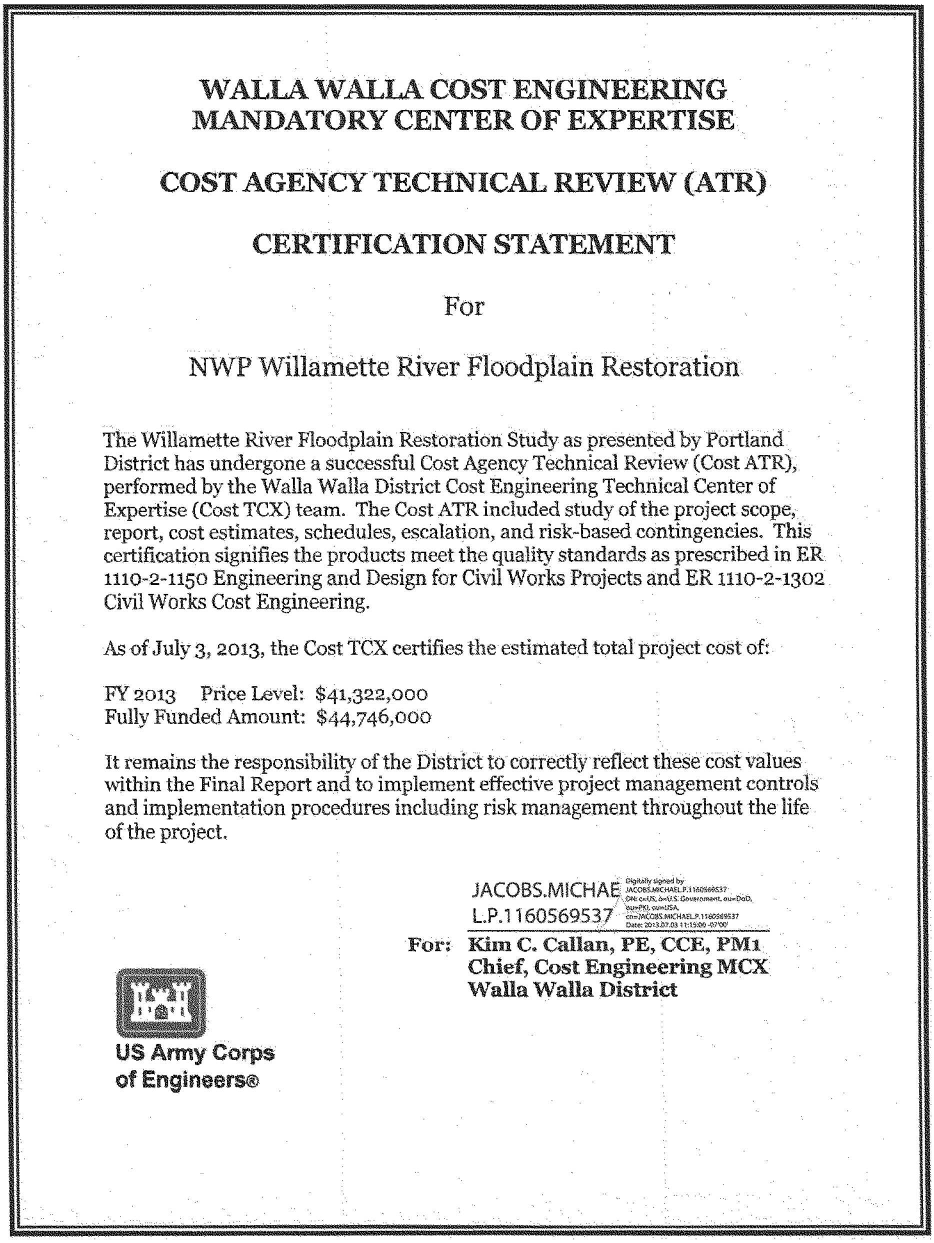
The labor rates from the MCACES 2009 National Labor Library were compared with current Davis-Bacon Wage rates Lane County Oregon Library Index OR120057, updated in 2012. The Davis Bacon wage rates and fringes were used in the estimate for each labor category.

9. Functional Costs: Functional costs associated with this work were provided by the Project Manager, as follows:

01 Account - Lands and Damages: Costs for this account are based on the real estate costs for procuring the lands required to construct and maintain the project. The estimated value for fee simple and restoration easement crediting is $314,000. Additional incidental costs estimated with acquisition would include, but are not limited to, administration, title, closing, appraisals, survey, attorney's fees, and mapping. A contingency of 33.8% has been applied to these values for an estimated fully funded acquisition/crediting of $420,000 for lands and damages.

30 Account - Planning, Engineering and Design: This account covers the preparation of Plans Specifications and Estimate for construction. Costs for this account were approximated to be 10.5% of the construction cost.

31 Account - Construction Management: This account covers Construction Management, Project Operations, and Project Management during the construction contract. Costs for this account were approximated as a percent of the construction cost as follows: 6% for Construction Management; 2% for Project Operations; 2.5% for Project Management and 1% for Monitoring for a total of 11.5% of the construction cost.



WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE

COST AGENCY TECHNICAL REVIEW (ATR)

CERTIFICATION STATEMENT

For

NWP Willamette River Floodplain Restoration

The Willamette River Floodplain Restoration Study as presented by Portland District has undergone a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Technical Center of Expertise (Cost TCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of July 3, 2013, the Cost TCX certifies the estimated total project cost of:

FY 2013 Price Level: $41,322,000
Fully Funded Amount: $44,746,000

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management throughout the life of the project.

JACOBS.MICHAEL.P.1160569537
Digitally signed by JACOBS.MICHAEL.P.1160569537
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=JACOBS.MICHAEL.P.1160569537
Date: 2013.07.03 11:15:00 -07'00'

For: **Kim C. Callan, PE, CCE, PM1**
Chief, Cost Engineering MCX
Walla Walla District

US Army Corps of Engineers®

Total Project Cost Summary Sheet

November 2013

Printed:10/24/2013
Page 1 of 6

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Willamette River Floodplain Restoration, Oregon (P2 110231)
LOCATION: Eugene, OR

DISTRICT: Portland District
POC: CHIEF, COST ENGINEERING, Eileen Horiuchi
PREPARED: 9/25/2013

This Estimate reflects the scope and schedule in report; Willamette River Floodplain Restoration Study

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
						Program Year (Budget EC): 2014 Effective Price Level Date: 1 OCT 13								
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST ($K) C	CNTG ($K) D	CNTG (%) E	TOTAL ($K) F	ESC (%) G	COST ($K) H	CNTG ($K) I	TOTAL ($K) J	Spent Thru: 1-Oct-12 ($K) K	L	COST ($K) M	CNTG ($K) N	FULL ($K) O
06	FISH & WILDLIFE FACILITIES	$16,620	$5,618	33.80%	$22,238	2.1%	$16,962	$5,733	$22,696	$0		$17,734	$5,994	$23,728
08	ROADS, RAILROADS & BRIDGES	$1,756	$593	33.80%	$2,349	2.1%	$1,792	$606	$2,397	$0		$1,857	$628	$2,484
09	CHANNELS & CANALS	$804	$272	33.80%	$1,075	2.1%	$820	$277	$1,097	$0		$855	$289	$1,144
11	LEVEES & FLOODWALLS	$5,629	$1,902	33.80%	$7,531	2.1%	$5,744	$1,942	$7,686	$0		$6,074	$2,053	$8,127
18	CULTURAL RESOURCE PRESERVATION	$250	$85	33.80%	$335	2.1%	$255	$86	$341	$0		$255	$86	$341
	CONSTRUCTION ESTIMATE TOTALS:	$25,058	$8,470		$33,528	2.1%	$25,574	$8,644	$34,218	$0		$26,775	$9,050	$35,824
01	LANDS AND DAMAGES	$314	$106	33.80%	$420	2.1%	$320	$108	$428	$0		$319	$108	$427
30	PLANNING, ENGINEERING & DESIGN	$2,630	$889	33.80%	$3,519	1.8%	$2,676	$905	$3,581	$730		$2,727	$922	$4,378
31	CONSTRUCTION MANAGEMENT	$2,881	$974	33.80%	$3,855	1.9%	$2,936	$992	$3,928	$0		$3,077	$1,040	$4,117
	PROJECT COST TOTALS:	$30,883	$10,439	33.80%	$41,322		$31,506	$10,649	**$42,155**	$730		$32,897	$11,119	$44,746

Eileen R Horiuchi CHIEF, COST ENGINEERING, Eileen Horiuchi
Christine M Budai PROJECT MANAGER, Christine M. Budai
10-24-13 CHIEF, REAL ESTATE, Enrique Godinez
Laura Hicks CHIEF, PLANNING, Laura Hicks
10-24-13 CHIEF, ENGINEERING AND CONSTRUCTION, Lance L. Helwig

ESTIMATED FEDERAL COST:	**65%**	**$29,085**
ESTIMATED NON-FEDERAL COST:	**35%**	**$15,661**
ESTIMATED TOTAL PROJECT COST:		**$44,746**

Filename: Willamette Floodplain_TPCS_20130725_FINAL_FY14Numbers.xlsx
TPCS

**** TOTAL PROJECT COST SUMMARY ****

SITE C1B

**** CONTRACT COST SUMMARY ****

PROJECT: Willamette River Floodplain Restoration, Oregon (P2 110231)
LOCATION: Eugene, OR
This Estimate reflects the scope and schedule in report; Willamette River Floodplain Restoration Study

DISTRICT: Portland District PREPARED: 9/25/2013
POC: CHIEF, COST ENGINEERING, Eileen Horiuchi

Civil Works Work Breakdown Structure		**ESTIMATED COST**				**PROJECT FIRST COST (Constant Dollar Basis)**				**TOTAL PROJECT COST (FULLY FUNDED)**				
		Estimate Prepared:			26-Feb-13	Program Year (Budget EC):			2014					
		Effective Price Level:			1-Oct-12	Effective Price Level Date:			1 OCT 13					
				RISK BASED										
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	CONTRACT 1													
06	FISH & WILDLIFE FACILITIES	$2,949	$997	33.80%	$3,946	2.1%	$3,010	$1,017	$4,027	2014Q4	1.3%	$3,050	$1,031	$4,081
08	ROADS, RAILROADS & BRIDGES	$385	$130	33.80%	$515	2.1%	$392	$133	$525	2014Q4	1.3%	$398	$134	$532
09	CHANNELS & CANALS	$121	$41	33.80%	$162	2.1%	$124	$42	$165	2014Q4	1.3%	$125	$42	$168
11	LEVEES & FLOODWALLS	$0	$0	33.80%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
18	CULTURAL RESOURCE PRESERVATION	$50	$17	33.80%	$67	2.1%	$51	$17	$68	2013Q4	-0.5%	$51	$17	$68
	CONSTRUCTION ESTIMATE TOTALS:	$3,505	$1,185	33.80%	**$4,689**		$3,577	$1,209	$4,786			$3,624	$1,225	$4,849
01	LANDS AND DAMAGES	$261	$88	33.80%	$349	2.1%	$266	$90	$356	2013Q4	-0.5%	$265	$90	$355
30	PLANNING, ENGINEERING & DESIGN													
1.5%	Project Management	$53	$18	33.80%	$71	1.8%	$54	$18	$72	2014Q4	2.6%	$55	$19	$74
1.0%	Planning & Environmental Compliance	$35	$12	33.80%	$47	1.8%	$36	$12	$48	2014Q4	2.6%	$37	$12	$49
3.0%	Engineering & Design	$105	$35	33.80%	$140	1.8%	$107	$36	$143	2014Q4	2.6%	$110	$37	$147
1.0%	Reviews, ATRs, IEPRs, VE	$35	$12	33.80%	$47	1.8%	$36	$12	$48	2014Q4	2.6%	$37	$12	$49
1.0%	Life Cycle Updates (cost, schedule, risks)	$35	$12	33.80%	$47	1.8%	$36	$12	$48	2014Q4	2.6%	$37	$12	$49
1.0%	Contracting & Reprographics	$35	$12	33.80%	$47	1.8%	$36	$12	$48	2014Q4	2.6%	$37	$12	$49
0.5%	Engineering During Construction	$18	$6	33.80%	$24	1.8%	$18	$6	$25	2014Q4	2.6%	$19	$6	$25
0.5%	Planning During Construction	$18	$6	33.80%	$24	1.8%	$18	$6	$25	2014Q4	2.6%	$19	$6	$25
1.0%	Project Operations	$35	$12	33.80%	$47	1.8%	$36	$12	$48	2014Q4	2.6%	$37	$12	$49
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	$210	$71	33.80%	$281	1.9%	$214	$72	$286	2014Q4	1.4%	$217	$73	$290
2.0%	Project Operation:	$70	$24	33.80%	$94	1.9%	$71	$24	$95	2014Q4	1.4%	$72	$24	$97
2.5%	Project Management	$88	$30	33.80%	$118	1.9%	$90	$30	$120	2014Q4	1.4%	$91	$31	$122
1.0%	Post Construction Monitoring	$35	$12	33.80%	$47	1.9%	$36	$12	$48	2014Q4	1.4%	$36	$12	$48
	CONTRACT COST TOTALS:	$4,538	$1,534		**$6,072**		$4,629	$1,565	$6,194			$4,691	$1,586	**$6,277**

****** TOTAL PROJECT COST SUMMARY ******

SITE C1C

****** CONTRACT COST SUMMARY ******

PROJECT: Willamette River Floodplain Restoration, Oregon (P2 110231)
LOCATION: Eugene, OR
This Estimate reflects the scope and schedule in report; Willamette River Floodplain Restoration Study

DISTRICT: Portland District PREPARED: 9/25/2013
POC: CHIEF, COST ENGINEERING, Eileen Horiuchi

Civil Works Work Breakdown Structure		**ESTIMATED COST**				**PROJECT FIRST COST (Constant Dollar Basis)**				**TOTAL PROJECT COST (FULLY FUNDED)**				
		Estimate Prepared:			26-Feb-13	Program Year (Budget EC):			2014					
		Effective Price Level:			1-Oct-12	Effective Price Level Date:			1 OCT 13					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	CONTRACT 2													
06	FISH & WILDLIFE FACILITIES	$3,379	$1,142	33.80%	$4,521	2.1%	$3,449	$1,166	$4,614	2015Q4	3.3%	$3,562	$1,204	$4,766
08	ROADS, RAILROADS & BRIDGES	$964	$326	33.80%	$1,290	2.1%	$984	$333	$1,317	2015Q4	3.3%	$1,016	$344	$1,360
09	CHANNELS & CANALS	$376	$127	33.80%	$504	2.1%	$384	$130	$514	2015Q4	3.3%	$397	$134	$531
11	LEVEES & FLOODWALLS	$0	$0	33.80%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
18	CULTURAL RESOURCE PRESERVATION	$50	$17	33.80%	$67	2.1%	$51	$17	$68	2013Q4	-0.5%	$51	$17	$68
	CONSTRUCTION ESTIMATE TOTALS:	$4,770	$1,612	33.80%	**$6,382**		$4,868	$1,645	$6,513			$5,027	$1,699	$6,725
01	LANDS AND DAMAGES	$6	$2	33.80%	$8	2.1%	$6	$2	$8	2013Q4	-0.5%	$6	$2	$8
30	PLANNING, ENGINEERING & DESIGN													
1.5%	Project Management	$72	$24	33.80%	$96	1.8%	$73	$25	$98	2014Q4	2.6%	$75	$25	$101
1.0%	Planning & Environmental Compliance	$48	$16	33.80%	$64	1.8%	$49	$17	$65	2014Q4	2.6%	$50	$17	$67
3.0%	Engineering & Design	$143	$48	33.80%	$191	1.8%	$146	$49	$195	2014Q4	2.6%	$149	$50	$200
1.0%	Reviews, ATRs, IEPRs, VE	$48	$16	33.80%	$64	1.8%	$49	$17	$65	2014Q4	2.6%	$50	$17	$67
1.0%	Life Cycle Updates (cost, schedule, risks)	$48	$16	33.80%	$64	1.8%	$49	$17	$65	2014Q4	2.6%	$50	$17	$67
1.0%	Contracting & Reprographics	$48	$16	33.80%	$64	1.8%	$49	$17	$65	2014Q4	2.6%	$50	$17	$67
0.5%	Engineering During Construction	$24	$8	33.80%	$32	1.8%	$24	$8	$33	2015Q4	6.9%	$26	$9	$35
0.5%	Planning During Construction	$24	$8	33.80%	$32	1.8%	$24	$8	$33	2015Q4	6.9%	$26	$9	$35
1.0%	Project Operations	$48	$16	33.80%	$64	1.8%	$49	$17	$65	2014Q4	2.6%	$50	$17	$67
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	$286	$97	33.80%	$383	1.9%	$291	$99	$390	2015Q4	3.4%	$301	$102	$403
2.0%	Project Operation:	$95	$32	33.80%	$127	1.9%	$97	$33	$130	2015Q4	3.4%	$100	$34	$134
2.5%	Project Management	$119	$40	33.80%	$159	1.9%	$121	$41	$162	2015Q4	3.4%	$125	$42	$168
1.0%	Post Construction Monitoring	$48	$16	33.80%	$64	1.9%	$49	$17	$65	2015Q4	3.4%	$51	$17	$68
	CONTRACT COST TOTALS:	$5,827	$1,969		**$7,796**		$5,944	$2,009	$7,953			$6,137	$2,074	**$8,211**

**** TOTAL PROJECT COST SUMMARY ****

SITE M1A

**** CONTRACT COST SUMMARY ****

PROJECT: Willamette River Floodplain Restoration, Oregon (P2 110231)
LOCATION: Eugene, OR
This Estimate reflects the scope and schedule in report; Willamette River Floodplain Restoration Study

DISTRICT: Portland District
POC: CHIEF, COST ENGINEERING, Eileen Horiuchi
PREPARED: 9/25/2013

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared:			26-Feb-13	Program Year (Budget EC):			2014					
		Effective Price Level:			1-Oct-12	Effective Price Level Date:			1 OCT 13					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	CONTRACT 3													
06	FISH & WILDLIFE FACILITIES	$4,594	$1,553	33.80%	$6,147	2.1%	$4,688	$1,585	$6,273	2018Q1	7.8%	$5,052	$1,708	$6,759
08	ROADS, RAILROADS & BRIDGES	$158	$53	33.80%	$211	2.1%	$161	$54	$216	2018Q1	7.8%	$174	$59	$232
09	CHANNELS & CANALS	$127	$43	33.80%	$170	2.1%	$130	$44	$174	2018Q1	7.8%	$140	$47	$187
11	LEVEES & FLOODWALLS	$0	$0	33.80%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
18	CULTURAL RESOURCE PRESERVATION	$50	$17	33.80%	$67	2.1%	$51	$17	$68	2014Q2	0.4%	$51	$17	$69
	CONSTRUCTION ESTIMATE TOTALS:	$4,929	$1,666	33.80%	**$6,595**		$5,030	$1,700	$6,731			$5,417	$1,831	$7,247
01	LANDS AND DAMAGES	$24	$8	33.80%	$32	2.1%	$24	$8	$32	2014Q2	0.4%	$24	$8	$32
30	PLANNING, ENGINEERING & DESIGN													
1.5%	Project Management	$74	$25	33.80%	$99	1.8%	$75	$25	$101	2014Q2	0.5%	$76	$26	$101
1.0%	Planning & Environmental Compliance	$49	$17	33.80%	$66	1.8%	$50	$17	$67	2014Q2	0.5%	$50	$17	$67
3.0%	Engineering & Design	$148	$50	33.80%	$198	1.8%	$151	$51	$201	2014Q2	0.5%	$151	$51	$202
1.0%	Reviews, ATRs, IEPRs, VE	$49	$17	33.80%	$66	1.8%	$50	$17	$67	2014Q2	0.5%	$50	$17	$67
1.0%	Life Cycle Updates (cost, schedule, risks)	$49	$17	33.80%	$66	1.8%	$50	$17	$67	2014Q2	0.5%	$50	$17	$67
1.0%	Contracting & Reprographics	$49	$17	33.80%	$66	1.8%	$50	$17	$67	2014Q2	0.5%	$50	$17	$67
0.5%	Engineering During Construction	$25	$8	33.80%	$33	1.8%	$25	$9	$34	2018Q1	17.5%	$30	$10	$40
0.5%	Planning During Construction	$25	$8	33.80%	$33	1.8%	$25	$9	$34	2018Q1	17.5%	$30	$10	$40
1.0%	Project Operations	$49	$17	33.80%	$66	1.8%	$50	$17	$67	2014Q2	0.5%	$50	$17	$67
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	$296	$100	33.80%	$396	1.9%	$302	$102	$404	2018Q1	7.8%	$325	$110	$435
2.0%	Project Operation:	$99	$33	33.80%	$132	1.9%	$101	$34	$135	2018Q1	7.8%	$109	$37	$146
2.5%	Project Management	$123	$42	33.80%	$165	1.9%	$125	$42	$168	2018Q1	7.8%	$135	$46	$181
1.0%	Post Construction Monitoring	$49	$17	33.80%	$66	1.9%	$50	$17	$67	2018Q1	7.8%	$54	$18	$72
	CONTRACT COST TOTALS:	$6,037	$2,040		**$8,077**		$6,158	$2,082	$8,240			$6,601	$2,231	**$8,832**

Filename: Willamette Floodplain_TPCS_20130725_FINAL_FY14Numbers.xlsx
TPCS

**** TOTAL PROJECT COST SUMMARY ****

SITE M1B

**** CONTRACT COST SUMMARY ****

PROJECT: Willamette River Floodplain Restoration, Oregon (P2 110231)
LOCATION: Eugene, OR
This Estimate reflects the scope and schedule in report; Willamette River Floodplain Restoration Study

DISTRICT: Portland District
POC: CHIEF, COST ENGINEERING, Eileen Horiuchi
PREPARED: 9/25/2013

Civil Works Work Breakdown Structure		**ESTIMATED COST**				**PROJECT FIRST COST (Constant Dollar Basis)**				**TOTAL PROJECT COST (FULLY FUNDED)**				
		Estimate Prepared: 26-Feb-13 Effective Price Level: 1-Oct-12				Program Year (Budget EC): 2014 Effective Price Level Date: 1 OCT 13				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER *A*	Civil Works Feature & Sub-Feature Description *B*	COST ($K) *C*	CNTG ($K) *D*	CNTG (%) *E*	TOTAL ($K) *F*	ESC (%) *G*	COST ($K) *H*	CNTG ($K) *I*	TOTAL ($K) *J*	Mid-Point Date *P*	INFLATED (%) *L*	COST ($K) *M*	CNTG ($K) *N*	FULL ($K) *O*
	CONTRACT 4													
06	FISH & WILDLIFE FACILITIES	$3,916	$1,324	33.80%	$5,239	2.1%	$3,996	$1,351	$5,347	2017Q1	5.7%	$4,226	$1,428	$5,654
08	ROADS, RAILROADS & BRIDGES	$249	$84	33.80%	$333	2.1%	$254	$86	$340	2017Q1	5.7%	$269	$91	$360
09	CHANNELS & CANALS	$179	$60	33.80%	$239	2.1%	$183	$62	$244	2017Q1	5.7%	$193	$65	$258
11	LEVEES & FLOODWALLS	$5,629	$1,902	33.80%	$7,531	2.1%	$5,744	$1,942	$7,686	2017Q1	5.7%	$6,074	$2,053	$8,127
18	CULTURAL RESOURCE PRESERVATION	$50	$17	33.80%	$67	2.1%	$51	$17	$68	2014Q1	0.0%	$51	$17	$68
	CONSTRUCTION ESTIMATE TOTALS:	$10,022	$3,388	33.80%	**$13,410**		$10,229	$3,457	$13,686			$10,813	$3,655	$14,468
01	LANDS AND DAMAGES	$18	$6	33.80%	$24	2.1%	$18	$6	$24	2014Q1	0.0%	$18	$6	$24
30	PLANNING, ENGINEERING & DESIGN													
1.5%	Project Management	$150	$51	33.80%	$201	1.8%	$153	$52	$204	2014Q1	0.0%	$153	$52	$204
1.0%	Planning & Environmental Compliance	$100	$34	33.80%	$134	1.8%	$102	$34	$136	2014Q1	0.0%	$102	$34	$136
3.0%	Engineering & Design	$301	$102	33.80%	$403	1.8%	$306	$104	$410	2014Q1	0.0%	$306	$104	$410
1.0%	Reviews, ATRs, IEPRs, VE	$100	$34	33.80%	$134	1.8%	$102	$34	$136	2014Q1	0.0%	$102	$34	$136
1.0%	Life Cycle Updates (cost, schedule, risks)	$100	$34	33.80%	$134	1.8%	$102	$34	$136	2014Q1	0.0%	$102	$34	$136
1.0%	Contracting & Reprographics	$100	$34	33.80%	$134	1.8%	$102	$34	$136	2014Q1	0.0%	$102	$34	$136
0.5%	Engineering During Construction	$50	$17	33.80%	$67	1.8%	$51	$17	$68	2017Q1	12.6%	$57	$19	$77
0.5%	Planning During Construction	$50	$17	33.80%	$67	1.8%	$51	$17	$68	2017Q1	12.6%	$57	$19	$77
1.0%	Project Operations	$100	$34	33.80%	$134	1.8%	$102	$34	$136	2014Q1	0.0%	$102	$34	$136
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	$601	$203	33.80%	$804	1.9%	$612	$207	$819	2017Q1	5.8%	$648	$219	$867
2.0%	Project Operation:	$200	$68	33.80%	$268	1.9%	$204	$69	$273	2017Q1	5.8%	$216	$73	$289
2.5%	Project Management	$251	$85	33.80%	$336	1.9%	$256	$86	$342	2017Q1	5.8%	$271	$91	$362
1.0%	Post Construction Monitoring	$100	$34	33.80%	$134	1.9%	$102	$34	$136	2017Q1	5.8%	$108	$36	$144
	CONTRACT COST TOTALS:	$12,243	$4,138		**$16,381**		$12,490	$4,222	$16,712			$13,155	$4,447	**$17,602**

**** TOTAL PROJECT COST SUMMARY ****

Printed:9/25/2013
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SITE M2A

**** CONTRACT COST SUMMARY ****

PROJECT: Willamette River Floodplain Restoration, Oregon (P2 110231)
LOCATION: Eugene, OR
This Estimate reflects the scope and schedule in report; Willamette River Floodplain Restoration Study

DISTRICT: Portland District PREPARED: 9/25/2013
POC: CHIEF, COST ENGINEERING, Eileen Horiuchi

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 26-Feb-13 Effective Price Level: 1-Oct-12				Program Year (Budget EC): 2014 Effective Price Level Date: 1 OCT 13				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	CONTRACT 5													
06	FISH & WILDLIFE FACILITIES	$1,782	$602	33.80%	$2,385	2.1%	$1,819	$615	$2,434	2014Q4	1.3%	$1,844	$623	$2,467
08	ROADS, RAILROADS & BRIDGES	$0	$0	33.80%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
09	CHANNELS & CANALS	$0	$0	33.80%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
11	LEVEES & FLOODWALLS	$0	$0	33.80%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
18	CULTURAL RESOURCE PRESERVATION	$50	$17	33.80%	$67	2.1%	$51	$17	$68	2013Q4	-0.5%	$51	$17	$68
	CONSTRUCTION ESTIMATE TOTALS:	$1,832	$619	33.80%	**$2,452**		$1,870	$632	$2,502			$1,894	$640	$2,535
01	LANDS AND DAMAGES	$5	$2	33.80%	$7	2.1%	$6	$2	$7	2013Q4	-0.5%	$6	$2	$7
30	PLANNING, ENGINEERING & DESIGN													
1.5%	Project Management	$27	$9	33.80%	$36	1.8%	$27	$9	$37	2014Q2	0.5%	$28	$9	$37
1.0%	Planning & Environmental Compliance	$18	$6	33.80%	$24	1.8%	$18	$6	$25	2014Q2	0.5%	$18	$6	$25
3.0%	Engineering & Design	$55	$19	33.80%	$74	1.8%	$56	$19	$75	2014Q2	0.5%	$56	$19	$75
1.0%	Reviews, ATRs, IEPRs, VE	$18	$6	33.80%	$24	1.8%	$18	$6	$25	2014Q2	0.5%	$18	$6	$25
1.0%	Life Cycle Updates (cost, schedule, risks)	$18	$6	33.80%	$24	1.8%	$18	$6	$25	2014Q2	0.5%	$18	$6	$25
1.0%	Contracting & Reprographics	$18	$6	33.80%	$24	1.8%	$18	$6	$25	2014Q2	0.5%	$18	$6	$25
0.5%	Engineering During Construction	$9	$3	33.80%	$12	1.8%	$9	$3	$12	2014Q4	2.6%	$9	$3	$13
0.5%	Planning During Construction	$9	$3	33.80%	$12	1.8%	$9	$3	$12	2014Q4	2.6%	$9	$3	$13
1.0%	Project Operations	$18	$6	33.80%	$24	1.8%	$18	$6	$25	2014Q2	0.5%	$18	$6	$25
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	$110	$37	33.80%	$147	1.9%	$112	$38	$150	2014Q4	1.4%	$114	$38	$152
2.0%	Project Operation:	$37	$13	33.80%	$50	1.9%	$38	$13	$50	2014Q4	1.4%	$38	$13	$51
2.5%	Project Management	$46	$16	33.80%	$62	1.9%	$47	$16	$63	2014Q4	1.4%	$48	$16	$64
1.0%	Post Construction Monitoring	$18	$6	33.80%	$24	1.9%	$18	$6	$25	2014Q4	1.4%	$19	$6	$25
	CONTRACT COST TOTALS:	$2,239	$757		**$2,996**		$2,284	$772	$3,056			$2,313	$782	**$3,094**

Filename: Willamette Floodplain_TPCS_20130725_FINAL_FY14Numbers.xlsx
TPCS

Construction Cost Estimate Summary

June 2013

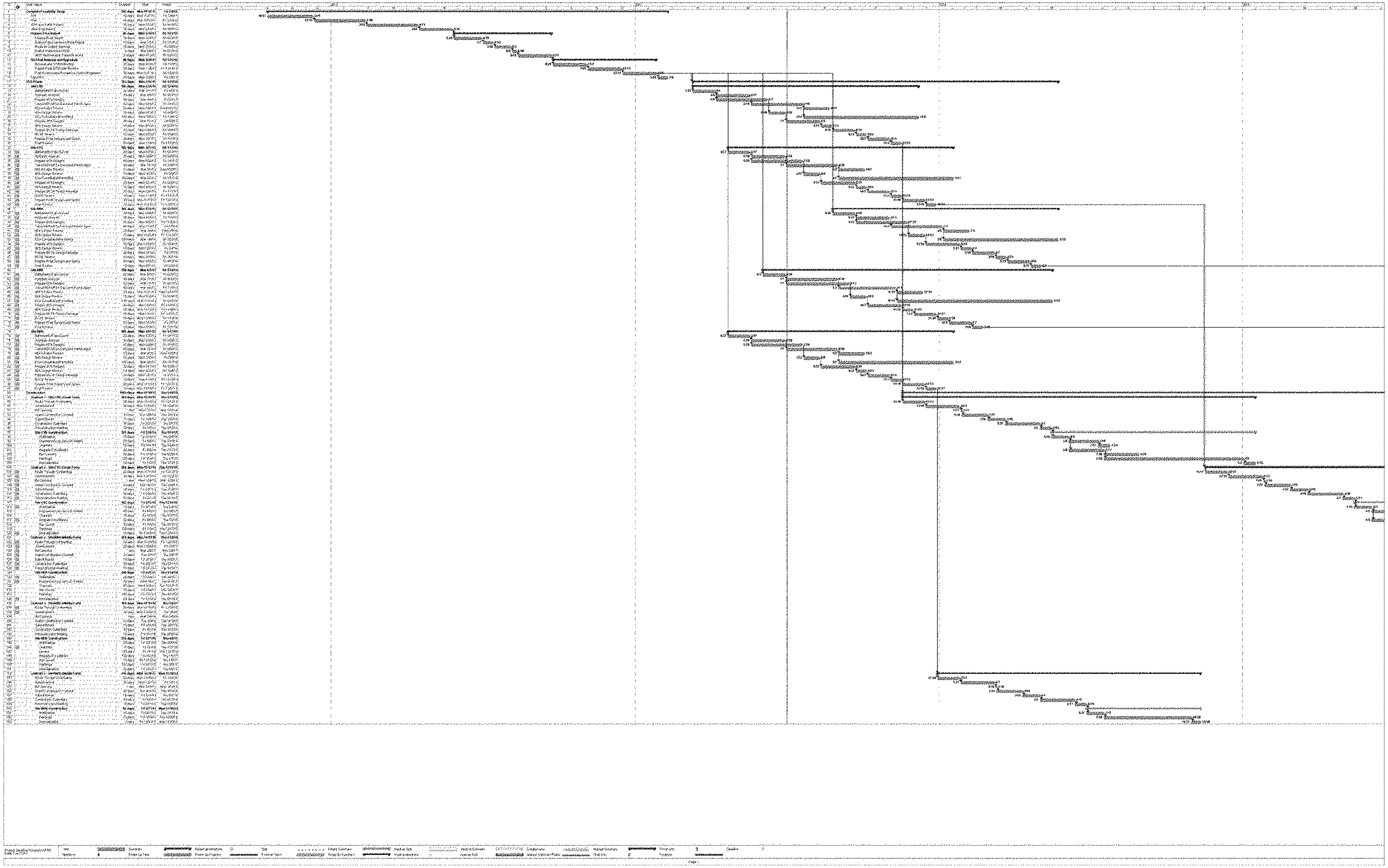
U.S. Army Corps of Engineers
Project : Willamette Floodplain Cost Estimate
COE Standard Report Selections

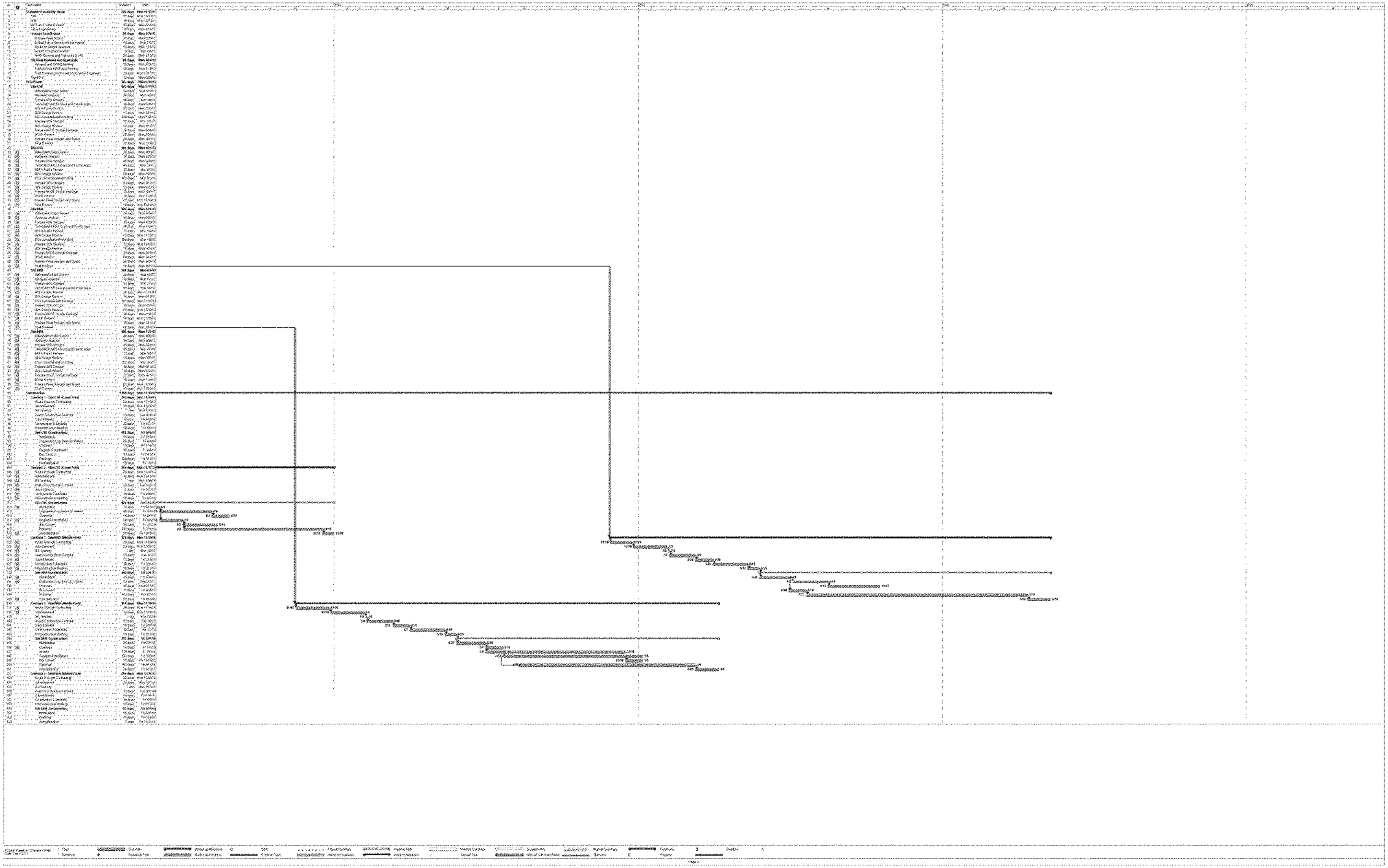
Estimated by	Tetra Tech, Inc
Designed by	Tetra Tech, Inc
Prepared by	Tetra Tech, Inc
Preparation Date	2/26/2013
Effective Date of Pricing	10/1/2012
Estimated Construction Time	1,636 Days

Description	Quantity	UOM	ContractCost	ProjectCost	C/O
Project Cost Summary Report			24,722,175	24,722,175	
CONTRACT NO. 1 - SITE C1B	1.00	LS	3,615,775	3,615,775	
01 LANDS AND DAMAGES	1.00	LS	260,965	260,965	
06 WILDLIFE FACILITIES	1.00	LS	2,849,084	2,849,084	
08 ROADS, BRIDGE	1.00	LS	384,532	384,532	
09 CHANNELS	1.00	LS	121,194	121,194	
CONTRACT NO. 2 - SITE C1C	1.00	LS	4,625,762	4,625,762	
01 LANDS AND DAMAGES	1.00	LS	5,923	5,923	
06 WILDLIFE FACILITIES	1.00	LS	3,279,173	3,279,173	
08 ROADS, BRIDGE	1.00	LS	964,196	964,196	
09 CHANNELS	1.00	LS	376,469	376,469	
CONTRACT NO. 3 - SITE M1A	1.00	LS	4,802,671	4,802,671	
01 LANDS AND DAMAGES	1.00	LS	23,629	23,629	
06 WILDLIFE FACILITIES	1.00	LS	4,493,951	4,493,951	
08 ROADS, BRIDGE	1.00	LS	157,950	157,950	
09 CHANNELS	1.00	LS	127,141	127,141	
CONTRACT NO. 4 - SITE M1B	1.00	LS	9,990,159	9,990,159	
01 LANDS AND DAMAGES	1.00	LS	17,780	17,780	
06 WILDLIFE FACILITIES	1.00	LS	3,915,856	3,915,856	
08 ROADS, BRIDGE	1.00	LS	249,046	249,046	
09 CHANNELS	1.00	LS	178,833	178,833	
11 LEVEES	1.00	LS	5,628,643	5,628,643	
CONTRACT NO. 5 - SITE M2A	1.00	LS	1,687,808	1,687,808	
01 LANDS AND DAMAGES	1.00	LS	5,479	5,479	
06 WILDLIFE FACILITIES	1.00	LS	1,682,329	1,682,329	

Baseline Schedule

November 2013





US Army Corps
of Engineers®

Willamette River Flood Plain Restoration Alternative Study

Project Cost and Schedule Risk Analysis Report

Prepared by:
U.S. Army Corps of Engineers,
Portland District
Cost Estimating and Construction Services Section
CENWP-EC-CC

Revision 6a July 3, 2013

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APPENDIX A

EXECUTIVE SUMMARY

This report presents a recommendation for the total project cost and schedule contingencies for the Willamette River Flood Plain Restoration Alternative Study. In compliance with Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated September 15, 2008, a formal risk analysis study was conducted for the development of contingency on the total project cost. The purpose of this risk analysis study was to establish project contingencies by identifying and measuring the cost and schedule impact of project uncertainties with respect to the estimated total project cost. After reviews of the draft risk analysis, the analysis and risk report was revised to address comments and updated with the information as of February 2013. (Minor changes through July 2, 2013 were made to the final cost estimate for an estimate approximating $25 million, excluding PED and Construction Management. The minor changes to the final cost estimate do not change the overall risk findings and resulting 33.8% contingency of base costs at the 80% confidence level developed using the $25.9 million figure in the Cost Schedule Risk Analysis.)

Specific to the Willamette River Flood Plain Restoration Alternative Study, the most likely total project cost (at price level) is estimated at approximately $25.9 Million. Based on the results of the analysis, **CENWP-EC-CC recommends a contingency value of $8.7 Million, or 33.8%**. This contingency includes $6.3 Million (24.5%) for cost growth potential due to risk analyzed in the base cost estimate and $2.4 Million (9.3%) for cost growth potential due to risk analyzed in the baseline schedule.

The risk analysis uses the *Monte Carlo* technique, producing the aforementioned contingencies and identifying key risk drivers.

The following Table ES-1 portrays the development of contingencies for the project. The contingency is based on an 80% confidence level, as per USACE Civil Works guidance.

Table ES-1. Contingency Analysis Table

Most Likely Cost Estimate	**$25,881,344**	
Confidence Level	**Value ($)**	**Contingency (%)**
5%	$24,322,110	-6.02%
50%	$31,125,846	20.26%
80%	**$34,626,706**	**33.79%**
95%	$37,558,047	45.12%

KEY FINDINGS/OBSERVATIONS RECOMMENDATIONS

The key cost risk drivers identified through sensitivity analysis are:

a) Risk 4, Numerous Separate Contracts which contributes 44% of the statistical cost variance, and

b) Risk 19, Estimated Quality at Feasibility Level which contributes 44% of the statistical cost variance.

c) Risk 23, Political factors change at state, Local, or federal Level which contributes 5% of the statistical cost variance.

d) Risk 2, Political Project competing with other projects for funding and resources which contributes 5% of the statistical cost variance.

e) Risk 17, In Water Work which contributes 2% of the statistical cost variance.

The main schedule risk drivers identified through sensitivity analysis are:

a) Risk 4, Numerous Separate Contracts which contributes 54%, of the statistical Schedule variance.

b) Risk 2, Project Competing with Other Projects for Funding and Resources, which contributes 14% of the statistical Schedule variance.

c) Risk 9, Status of Real estate / easement acquisition which contributes 12% of the statistical cost variance.

d) Risk 8, Political During design need to complete detailed reach-scale evaluation to refine design which contributes 12% of the statistical cost variance.

e) Risk 23, Political factors change at state, Local, or federal Level which contributes 5% of the statistical cost variance.

f) Risk 17, In Water Work which contributes 4% of the statistical cost variance.

Recommendations, as detailed within the main report, include the implementation of cost and schedule contingencies, further iterative study of risks throughout the project life-cycle, potential mitigation throughout the PED phase, and proactive monitoring and control of risk identified in this study.

CONTINGENCY AMOUNT

The recommended contingency amount is 33.8% which is based on this formal cost schedule risk analysis. The Risk Register, attached in Appendix A, discusses and details the risk elements. The Risk Analysis highlights the impact of these risk elements showing the contingency amount to be appropriate at this stage. Also as an environmental restoration project (as opposed to life safety project), there can be greater flexibility in the scope of work in reaction to funding. This increases possible cost variance which is also reflected in the contingency amount.

MAIN REPORT

1.0 PURPOSE

This report presents a recommendation for the total project cost and schedule contingencies for the Willamette River Flood Plain Restoration Alternative Study.

2.0 BACKGROUND

The Study is to identify alternatives for restoring natural floodplain functions along the Willamette River. The Willamette River Basin is located in Western Oregon. The alternatives are for areas in the lower Coast and Middle Forks of the Willamette River. Tetra Tech, Inc has provided prepared the report, " Willamette River Floodplain Restoration Study, DRAFT, Integrated Feasibility Report/ Environmental Assessment, dated June 2012, and developed an MII cost estimate for the alternatives. The construction being considered involves 5 different sites with clearing; removing invasive vegetation; excavation; construction of side channels and pond connections; concrete and debris removal; Engineered Log Jam construction; placement of large woody debris; riprap installation; 3-sided culvert installation; reshaping pond banks; constructing footpath bridges; gravel road obliteration; and various vegetation plantings. The latest MII estimate is dated 02/26/2013.

3.0 REPORT SCOPE

The scope of the risk analysis report is to calculate and present the cost and schedule contingencies at the 80 percent confidence level using the risk analysis processes, as mandated by U.S. Army Corps of Engineers (USACE) Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works. The report presents the contingency results for cost risks for all project features. The study and presentation does not include consideration for life cycle costs.

3.1 Project Scope

The formal process included extensive involvement of the PDT for risk identification and the development of the risk register. The analysis process evaluated the most likely Micro Computer Aided Cost Estimating System (MCACES) cost estimate, schedule, and funding profiles using Crystal Ball software to conduct a *Monte Carlo* simulation and statistical sensitivity analysis, per the guidance in Engineer Technical Letter (ETL) CONSTRUCTION COST ESTIMATING GUIDE FOR CIVIL WORKS, dated September 30, 2008.

The project technical scope, estimates and schedules were developed and presented by Tetra Tech, Inc. Consequently, these documents serve as the basis for the risk analysis. The scope of this study addresses the identification of problems, needs, opportunities and potential solutions that are viable from an economic, environmental, and engineering viewpoint.

3.2 USACE Risk Analysis Process

The risk analysis process for this study follows the USACE Headquarters requirements as well as the guidance provided by the Cost Engineering DX, in Walla Walla, Washington. The risk analysis process reflected within this report uses probabilistic cost and schedule risk analysis methods within the framework of the Crystal Ball software. The scope of the report includes the identification and communication of important steps, logic, key assumptions, limitations, and decisions to help ensure that risk analysis results can be appropriately interpreted.

Risk analysis results are also intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as to provide tools to support decision making and risk management as the project progresses through planning and implementation. To fully recognize its benefits, cost and schedule risk analysis should be considered as an ongoing process conducted concurrent to, and iteratively with, other important project processes such as scope and execution plan development, resource planning, procurement planning, cost estimating, budgeting and scheduling.

In addition to broadly defined risk analysis standards and recommended practices, this risk analysis was performed to meet the requirements and recommendations of the following documents and sources:

- Cost and Schedule Risk Analysis Process guidance prepared by the USACE Cost Engineering DX.
- Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated September 15, 2008.
- Engineer Technical Letter (ETL) CONSTRUCTION COST ESTIMATING GUIDE FOR CIVIL WORKS, dated September 30, 2008.

4.0 METHODOLOGY / PROCESS

4.1 Developing the Risk Register.

Tetra Tech Inc project team assembled a risk register for the alternatives which included 23 risk elements. On October 5, 2011, Tetra Tech's Project Engineer met with the Corps of Engineers Project Manager and Cost Engineer for a risk identification and qualitative analysis meeting to finalize the risk register that served as the framework for the risk analysis. A total of 24 risk elements were identified and documented. Tetra Tech's Project Engineer, the Corps of Engineers Project Manager and Cost Engineer, met again January 13, 2012 to review and refine the moderate and high risk elements used in the risk model.

Formal PDT meetings were held for the purposes of identifying and assessing risk factors. Additional meetings were held to develop the risk register and to update the risk model with the current information. Meetings and coordination included the following PDT members:

Name	Position
Christine Budai	Project Manager COE:
Merri Martz	Project Manger Tetra Tech AE:
Leslie Bach	Project Manager Local Sponsor
Julie Amman	Technical Lead COE:
Ike Pace	Civil Design/Cost Tetra Tech:
Ric McCallan	Cost Engineering Tetra Tech
Rick Russell	Cost Engineering COE:
Rick Russell	Construction Services COE:

After review, the group met again on 3/2/2012 to update the risk analysis. The risk analysis was again revised on May 23, 2012 after additional discussions and coordination among the PDT and the ATR Reviewers. The focus was to incorporate the latest information concerning the project and review comments. The risk analysis was again revised on 15 January 2013 due to changes to the scope of work deleting 2 of the 7 construction sites. The risk elements did not change, but the cost and schedule amounts did, which requires running the risk model to update. The risk analysis was again revised on 25 February 2013 due to comments received in the cost ATR review. On 2 July 2013, minor changes were made to the construction cost estimate changing the estimate from about $25.9 million to about $24.7 million. These minor changes do not change the overall risk findings and resulting 33.8% contingency of base costs at the 80% confidence level developed using the $25.9 million figure in the Cost Schedule Risk Analysis.

Significant meetings included:

Date	Purpose
October 3, 2011	Draft Risk Register
October 5, 2011	Develop Risk Register
January 13, 2012	Revise Risk Register
March 2, 2012	Revise 2 Risk Register
March 14, 2012	Revise 3 Risk Model
January 24, 2013	Revise 4 Risk Model
February 26, 2013	Revise 5, Cost Estimate Revised

The risk analysis process for this study is intended to determine the probability of various cost outcomes and quantify the required contingency needed in the cost estimate to achieve any desired level of cost confidence.

Contingency is an amount added to an estimate to allow for items, conditions or events for which the occurrence or impact is uncertain and that experience suggests will likely result in additional costs being incurred or additional time being required. The amount of contingency included in project control plans depends, at least in part, on the project leadership's willingness to accept risk of project overruns. The less risk that project leadership is willing to accept the more contingency should be applied in the project control plans. The risk of overrun is expressed, in a probabilistic context, using confidence levels.

The Cost DX guidance for cost and schedule risk analysis generally focuses on the 80-percent level of confidence (P80) for cost contingency calculation. It should be noted that use of P80 as a decision criteria is a risk averse approach (whereas the use of P50 would be a risk neutral approach, and use of levels less than 50 percent would be risk seeking). Thus, a P80 confidence level results in greater contingency as compared to a P50 confidence level. The selection of contingency at a particular confidence level is ultimately the decision and responsibility of the project's District and/or Division management.

The risk analysis process uses *Monte Carlo* techniques to determine probabilities and contingency. The *Monte Carlo* techniques are facilitated computationally by a commercially available risk analysis software package (Crystal Ball) that is an add-in to Microsoft Excel. Cost estimates are packaged into an Excel format and used directly for cost risk analysis purposes. The level of detail recreated in the Excel-format schedule is sufficient for risk analysis purposes that reflect the established risk register, but generally less than that of the native format.

The primary steps, in functional terms, of the risk analysis process are described in the following subsections. Risk analysis results are provided in Section 6.

The Risk Register, attached in Appendix A, discusses and details the risk elements. See Appendix A for the specifics of the risk elements, concerns and reasoning for each.

4.2 Identify and Assess Risk Factors

Identifying the risk factors via the PDT is considered a qualitative process that results in establishing a risk register that serves as the document for the quantitative study using the Crystal Ball risk software. Risk factors are events and conditions that may influence or drive uncertainty in project performance. They may be inherent characteristics or conditions of the project or external influences, events, or conditions such as weather or economic conditions. Risk factors may have either favorable or unfavorable impacts on project cost and schedule.

The initial formal meetings should focus primarily on risk factor identification using brainstorming techniques, but also include some facilitated discussions based on risk factors common to projects of similar scope and geographic location. Subsequent meetings should focus primarily on risk factor assessment and quantification.

Numerous conference calls and informal meetings are conducted throughout the risk analysis process on an as-needed basis to further facilitate risk factor identification, market analysis, and risk assessment.

4.3 Quantify Risk Factor Impacts

The quantitative impacts of risk factors on project plans were analyzed using a combination of professional judgment, empirical data and analytical techniques. Risk factor impacts were quantified using probability distributions (density functions) because risk factors are entered into the Crystal Ball software in the form of probability density functions.

Similar to the identification and assessment process, risk factor quantification involved multiple project team disciplines and functions. However, the quantification process relied more extensively on collaboration between cost engineering and risk analysis team members with lesser inputs from other functions and disciplines. This process used an iterative approach to estimate the following elements of each risk factor:

- Maximum possible value for the risk factor
- Minimum possible value for the risk factor
- Most likely value (the statistical mode), if applicable
- Nature of the probability density function used to approximate risk factor uncertainty
- Mathematical correlations between risk factors
- Affected cost estimate and schedule elements

The resulting product from the PDT discussions is captured within a risk register as presented in section 6 for both cost and schedule risk concerns. Note that the risk register records the PDT's risk concerns, discussions related to those concerns, and potential impacts to the current cost and schedule estimates. The concerns and discussions are meant to support the team's decisions related to event likelihood, impact, and the resulting risk levels for each risk event.

4.4 Revision of the Risk Analysis

From 3/2/2012 to 5/31/2012, the risk analysis and report was revised to update with the latest information. Revision 2 occurred until 3/2/2012, when the report was updated. Revision 3 occurred until 3/23/12, when the report was revised again and dated 5/31/2012. Revision 4 occurred on 1/24/2013. Revision 5 occurred on 2/26/2013.

4.5 Analyze Cost Estimate and Schedule Contingency

Contingency is analyzed using the Crystal Ball software, an add-in to the Microsoft Excel format of the cost estimate and schedule. *Monte Carlo* simulations are performed by applying the risk factors (quantified as probability density functions) to the appropriate estimated cost and schedule elements identified by the PDT. Contingencies are calculated by applying only the moderate and high level risks identified for each option (i.e., low-level risks are typically not considered, but remain within the risk register to serve historical purposes as well as support follow-on risk studies as the project and risks evolve).

For the cost estimate, the contingency is calculated as the difference between the P80 cost forecast and the baseline cost estimate.

5.0 PROJECT ASSUMPTIONS

The following data sources and assumptions were used in quantifying the costs associated with the report.

a) The cost comparisons and risk analyses performed and reflected within this report are based on design scope and estimates that are at the Reconnaissance level.

b) The schedule was analyzed for impact to the project cost in terms of both uncaptured escalation (variance from OMB factors and the local market) and "Hotel" costs (unavoidable fixed contract costs and/or languishing federal administration costs incurred throughout delay).

c) Per the CWCCIS Historical State Adjustment Factors in EM 1110-2-1304, State Adjustment Factor for Oregon is 1.07, meaning that this project is inflating at a differential between the local market and OMB inflation factors for future construction of approximately 7%.

d) Per the data in the estimate, the Overhead amounts for the Contract Cost comprises approximately 14.9% of the Project Cost at Baseline. For the P80 schedule, this comprises approximately 9.0% of the total contingency due to the accrual of residual fixed costs associated with delay.

e) The Cost DX guidance generally focuses on the eighty-percent level of confidence (P80) for cost contingency calculation. For this risk analysis, the eighty-percent level of confidence (P80) was used. It should be noted that the use of P80 as a decision criteria is a moderately risk averse approach, generally resulting in higher cost contingencies. However, the P80 level of confidence also assumes a small degree of risk that the recommended contingencies may be inadequate to capture actual project costs.

f) Only moderate and significant risk elements are considered for the purposes of calculating cost contingency. For the Cost Risk analysis risk model, 7 elements were selected which ranked as moderate or significant risk elements due to their high qualitative risk ranking, potentially large cost impacts, and constrained mitigation options. For the Schedule Risk analysis risk model, 6 elements were selected on the same basis. Low level risk impacts should be maintained in project management documentation, and reviewed at each project milestone to determine if they should be placed on the risk "watch list" for further monitoring and evaluation.

6.0 RESULTS

The cost and schedule risk analysis results are provided in the following sections. In addition to contingency calculation results, sensitivity analyses are presented to provide decision makers with an understanding of variability and the key contributors to the cause of this variability.

6.1 Risk Register

A risk register is a tool commonly used in project planning and risk analysis. The actual risk register is provided in Appendix A. The complete risk register includes low level risks, as well as additional information regarding the nature and impacts of each risk. See Appendix A for the risk register which discusses and details the risk elements. This includes the specifics of the risk elements, concerns, discussions and reasoning for each.

It is important to note that a risk register can be an effective tool for managing identified risks throughout the project life cycle. As such, it is generally recommended that risk registers be updated as the designs, cost estimates, and schedule are further refined, especially on large projects with extended schedules. Recommended uses of the risk register going forward include:

- Documenting risk mitigation strategies being pursued in response to the identified risks and their assessment in terms of probability and impact.
- Providing project sponsors, stakeholders, and leadership/management with a documented framework from which risk status can be reported in the context of project controls.
- Communicating risk management issues.
- Providing a mechanism for eliciting feedback and project control input.
- Identifying risk transfer, elimination, or mitigation actions required for implementation of risk management plans.

6.2 Cost Contingency and Sensitivity Analysis

Table 1 provides the project cost contingencies calculated for the P80 confidence level and rounded to the nearest thousand. The construction cost contingencies for the P50 and P100 confidence levels are also provided for illustrative purposes only.

Contingency was quantified as approximately $6.3 Million at the P80 confidence level (24.5% of the baseline cost estimate). For comparison, the cost contingency at the P50 and P100 confidence levels was quantified as 13.0% and 46.1% of the baseline cost estimate, respectively.

Table 1. Project Cost Contingency Summary

Risk Analysis Forecast	Baseline Estimate	Total Contingency^{1,2} ($)	Total Contingency (%)
50% Confidence Level			
Project Cost	$29,242,300	$ 3,360,956	13.0%
80% Confidence Level			
Project Cost	$32,213,988	$6,332,644	24.5%
100% Confidence Level			
Project Cost	$37,821,878	$11,821,878	46.1%

Notes:
1) These figures combine uncertainty in the baseline cost estimates and schedule.
2) A P100 confidence level is an abstract concept for illustration only, as the nature of risk and uncertainty (specifically the presence of "unknown unknowns") makes 100% confidence a theoretical impossibility.

6.3 Sensitivity Analysis

Sensitivity analysis generally ranks the relative impact of each risk/opportunity as a percentage of total cost uncertainty. The Crystal Ball software uses a statistical measure (contribution to variance) that approximates the impact of each risk/opportunity contributing to variability of cost outcomes during *Monte Carlo* simulation.

Key cost drivers identified in the sensitivity analysis can be used to support development of a risk management plan that will facilitate control of risk factors and their potential impacts throughout the project lifecycle. Together with the risk register, sensitivity analysis results can also be used to support development of strategies to eliminate, mitigate, accept or transfer key risks.

6.4 Sensitivity Analysis Results

The risks/opportunities considered as key or primary cost drivers are ranked in order of importance in contribution to variance bar charts. Opportunities that have a potential to reduce project cost and are shown with a negative sign; risks are shown with a positive sign to reflect the potential to increase project cost. A longer bar in the sensitivity analysis chart represents a greater potential impact to total project cost.

Figure 1 presents a sensitivity analysis for cost growth risk from the high level cost risks identified in the risk register. Likewise, Figure 2 presents a sensitivity analysis for schedule growth risk from the high level schedule risks identified in the risk register.

6.5 Schedule and Contingency Risk Analysis

Table 2 provides the schedule duration contingencies calculated for the P80 confidence level. The schedule duration contingencies for the P50 and P100 confidence levels are also provided for illustrative purposes.

Schedule duration contingency was quantified as 28 months based on the P80 level of confidence. These contingencies were used to calculate the projected "Hotel" cost impact of project delays that are included in the Table 1 presentation of total cost contingency. Hotel costs are the overhead costs which would occur during a delay. The schedule contingencies were calculated by applying the moderate and high level schedule risks identified in the risk register for each option to the durations of tasks.

The schedule was not resource loaded and contained open-ended tasks and non-zero lags (gaps in the logic between tasks) that limit the overall utility of the schedule risk analysis. Some parts of construction are possible only during the construction season each year due to in water work limitations. These issues should be considered as limitations in the utility of the schedule contingency data presented. Schedule risks were applied to the 9 month design time and accumulative durations of the construction seasons. The possible risk delays do not affect the non-work periods. Schedule contingency impacts presented in this analysis are based on projected "Hotel" costs and escalation costs. The baseline schedule of 57 months includes Design, Construction during the work seasons and the intervening non work seasons.

Table 2. Schedule Duration Contingency Summary

Risk Analysis Forecast	**Baseline Schedule Duration (months)**	**Contingency[1] (months)**	**Contingency (%)**
50% Confidence Level			
Total Project Duration	57	20	34.6%
80% Confidence Level			
Total Project Duration	57	27	47.0%
100% Confidence Level			
Total Project Duration	57	42	73.0%

Notes:

1) The schedule was not resource loaded and contained open-ended tasks and non-zero lags (gaps in the logic between tasks), that limit the overall utility of the schedule risk analysis. These issues should be considered as limitations in the utility of the schedule contingency data presented in Table 2.

2) A P100 confidence level is an abstract concept for illustration only, as the nature of risk and uncertainty (specifically the presence of "unknown unknowns") makes 100% confidence a theoretical impossibility.

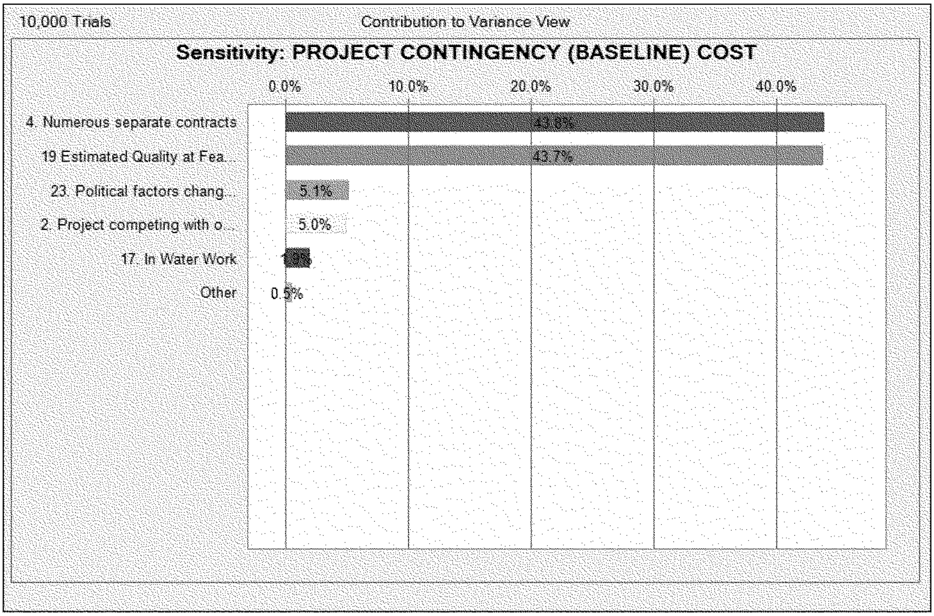


Figure 1: Cost Sensitivity Analysis

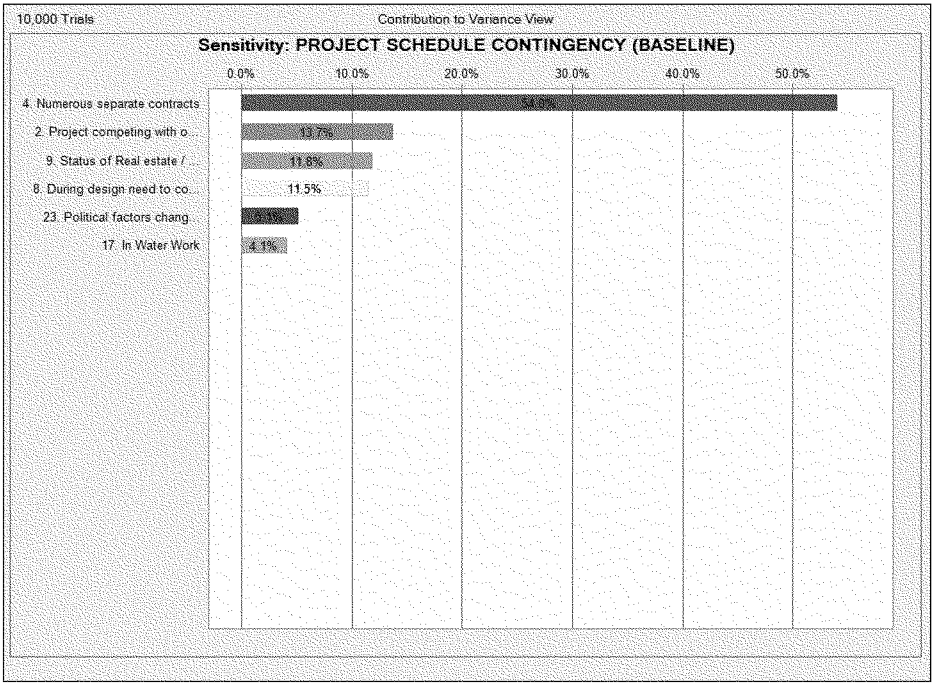


Figure 2: Schedule Sensitivity Analysis

7.0 MAJOR FINDINGS/OBSERVATIONS/RECOMMENDATIONS

This section provides a summary of significant risk analysis results that are identified in the preceding sections of the report. Risk analysis results are intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as to provide tools to support decision making and risk management as projects progress through planning and implementation. Because of the potential for use of risk analysis results for such diverse purposes, this section also reiterates and highlights important steps, logic, key assumptions, limitations, and decisions to help ensure that the risk analysis results are appropriately interpreted. . See Appendix A for the risk register which discusses and details the risk elements. This includes the specifics of the risk elements, concerns, discussions and reasoning for each.

7.1 Major Findings/Observations

Total project cost comparison summaries are provided in Table 3. Additional major findings and observations of the risk analysis are listed below.

1. Based on the results of the analysis, CENWP-EC-CC recommends a contingency value of \$8.7 Million, or 33.8%. This contingency includes \$6.3 Million (24.5%) for cost growth potential due to risk analyzed in the base cost estimate and \$2.4 Million (9.3%) for cost growth potential due to risk analyzed in the baseline schedule.

2. The key cost risk drivers identified through sensitivity analysis are

   a) Risk 4, Numerous Separate Contracts which contributes 44% of the statistical cost variance, and

   b) Risk 19, Estimated Quality at Feasibility Level which contributes 44% of the statistical cost variance.

   c) Risk 23, Political factors change at state, Local, or federal Level which contributes 5% of the statistical cost variance.

   d) Risk 2, Political Project competing with other projects for funding and resources which contributes 5% of the statistical cost variance.

   e) Risk 17, In Water Work which contributes 2% of the statistical cost variance.

3. The main schedule risk drivers identified through sensitivity analysis are

   a) Risk 4, Numerous Separate Contracts which contributes 54%, of the statistical Schedule variance.

   b) Risk 2, Project Competing with Other Projects for Funding and Resources, which contributes 14% of the statistical Schedule variance.

   c) Risk 9, Status of Real estate / easement acquisition which contributes 12% of the statistical cost variance.

   d) Risk 8, Political During design need to complete detailed reach-scale evaluation to refine design which contributes 12% of the statistical cost variance.

   e) Risk 23, Political factors change at state, Local, or federal Level which contributes 5% of the statistical cost variance.

   f) Risk 17, In Water Work which contributes 4% of the statistical cost variance.

4. The schedule was not resource loaded and contained open-ended tasks and non-zero lags (gaps in the logic between tasks) that limit the overall utility of the schedule risk analysis. Some stages of construction are possible only during a limited construction season each year due to in an in water work window. These issues should be considered as limitations in the utility of the schedule contingency data presented. Schedule risks were applied to the 9 month design time and accumulative durations of the construction seasons.

5. Operation and maintenance activities were not included in the cost estimate or schedules. Therefore, a full lifecycle risk analysis could not be performed. Risk analysis results or conclusions could be significantly different if the necessary operation and maintenance activities were included.

Table 3. Project Cost Comparison Summary

Most Likely Cost Estimate	$25,881,344		
Confidence Level	Total Value	Amt Contingency	Contingency
0%	$20,346,165	$(5,535,179)	-21.39%
5%	$24,322,110	$(1,559,234)	-6.02%
10%	$25,694,707	$(186,636)	-0.72%
15%	$26,944,188	$1,062,844	4.11%
20%	$27,643,622	$1,762,279	6.81%
25%	$28,370,748	$2,489,404	9.62%
30%	$29,094,959	$3,213,615	12.42%
35%	$29,675,527	$3,794,183	14.66%
40%	$30,125,915	$4,244,571	16.40%
45%	$30,627,228	$4,745,884	18.34%
50%	$31,125,846	$5,244,503	20.26%
55%	$31,582,282	$5,700,939	22.03%
60%	$32,083,424	$6,202,080	23.96%
65%	$32,627,529	$6,746,185	26.07%
70%	$33,359,614	$7,478,270	28.89%
75%	$33,999,961	$8,118,617	31.37%
80%	$34,626,706	$8,745,362	33.79%
85%	$35,399,338	$9,517,995	36.78%
90%	$36,346,668	$10,465,324	40.44%
95%	$37,558,047	$11,676,703	45.12%
100%	$41,344,144	$15,462,801	59.74%

Figure 3. Project Cost Summary

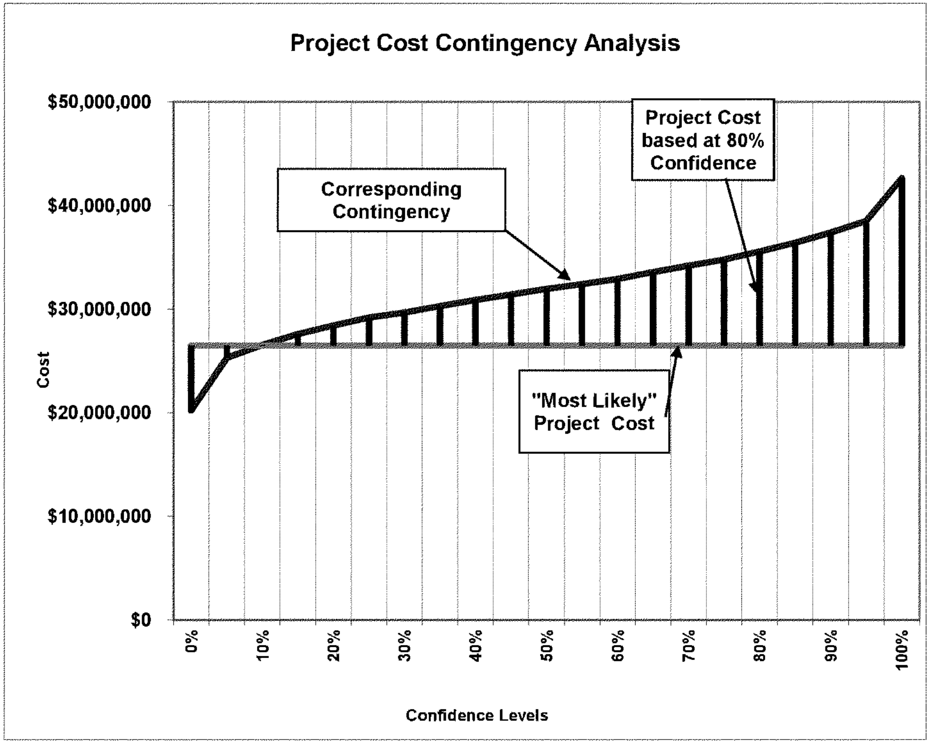
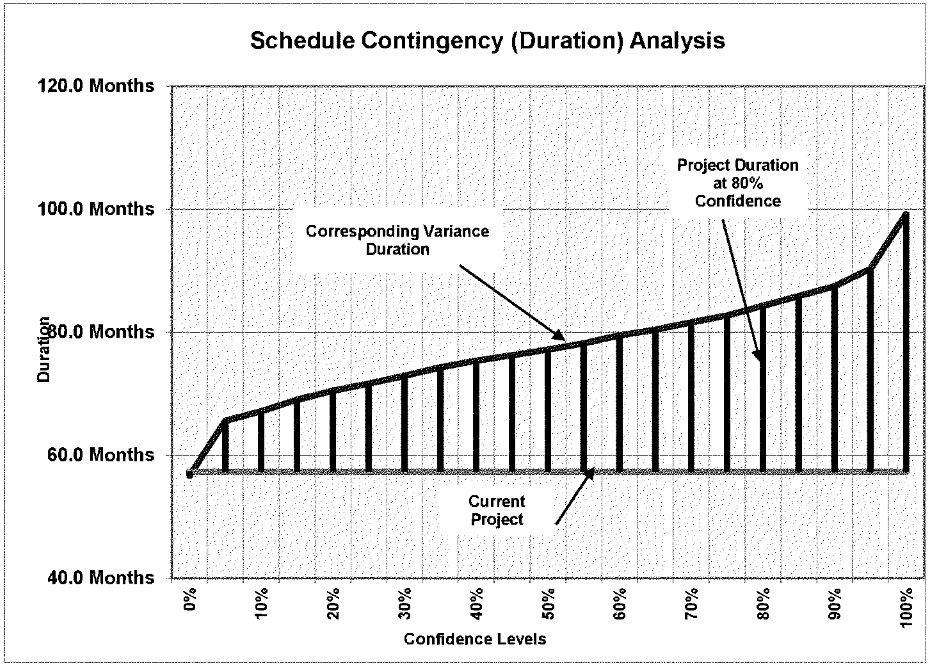


Figure 4. Project Duration Summary



7.2 Recommendations

1. Based on the results of the analysis, CENWP-EC-CC recommends a **contingency value of $8.7 Million, or 33.8%**. This contingency includes $6.3 Million (24.5%) for cost growth potential due to risk analyzed in the base cost estimate and $2.4 Million (9.3%) for cost growth potential due to risk analyzed in the baseline schedule.

2. Risk Management : Risk Management is an all-encompassing, iterative, and life-cycle process of project management. The Project Management Institute's (PMI) *A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 4th edition*, states that "project risk management includes the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control on a project." Risk identification and analysis are processes within the knowledge area of risk management. Its outputs pertinent to this effort include the risk register, risk quantification (risk analysis model), contingency report, and the sensitivity analysis. Note that the risk register is not all-inclusive nor static.

   The intended use of these outputs is implementation by the project leadership with respect to risk responses (such as mitigation) and risk monitoring and control. In short, the effectiveness of the project risk management effort requires that the proactive management of risks not conclude with the study completed in this report.

3. Risk Management Process: Cost Engineering DX recommends use of the outputs created during the risk analysis effort as tools in future risk management processes. The risk register should be updated at each major project milestone. The results of the sensitivity analysis may also be used for response planning strategy and development. These tools should be used in conjunction with regular risk review meetings. The risk elements identified in the sensitivity analysis and discussed As the Key Risk Drivers, indicate risk elements with the greater uncertainties.

4. Risk Analysis Updates: Project leadership should review risk items identified in the original risk register and add others, as required, throughout the project life-cycle. Risks should be reviewed for status and reevaluation (using qualitative measure, at a minimum) and placed on risk management watch lists if any risk's likelihood or impact significantly increases. Project leadership should also be mindful of the potential for secondary (new risks created specifically by the response to an original risk) and residual risks (risks that remain and have unintended impact following response).

7.3 Contingency Amonnt

The recommended contingency amount is 33.8% which is based on this formal cost schedule risk analysis. The Risk Register, attached in Appendix A, discusses and details the risk elements. The Risk Analysis highlights the impact of these risk elements showing the contingency amount to be appropriate at this stage. Also as an environmental restoration project (as opposed to life safety project), there can be greater flexibility in the scope of work in reaction to funding. This increases possible cost variance which is also reflected in the contingency amount.

APPENDIX A

of

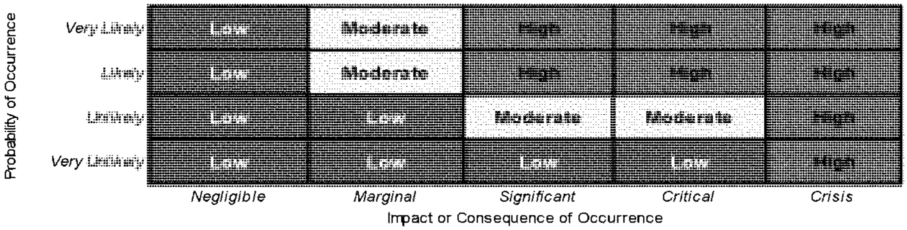
Willamette River Flood Plain Restoration Alternative Study
Project Cost and Schedule Risk Analysis Report

RISK REGISTER

Cost and Schedule Risk Rating Guidelines for Team Discussions[1]

Revision 2/26/2013

Table 1. USACE CSRA Risk Matrix



Probability of Occurrence	Negligible	Marginal	Significant	Critical	Crisis
Very Likely	Low	Moderate	High	High	High
Likely	Low	Moderate	High	High	High
Unlikely	Low	Low	Moderate	Moderate	High
Very Unlikely	Low	Low	Low	Low	High

Impact or Consequence of Occurrence

Table 2. Illustrative Probability Rating Guidelines

Probability Rating	Qualitative Guideline	Quantitative Guideline
Very Unlikely	You would be surprised if this happened.	>0% - 10%
Unlikely	Less likely to happen than not.	>10% - 40%
Likely	More likely to happen than not.	>40% - 70%
Very Likely	You would be surprised if this didn't happen.	>70% - 90%*

* The impact of risks with a probability greater than 90% are generally included in the baseline.

Table 3. Illustrative Impact Rating Guidelines

Impact Rating	Cost Impact Guideline	Schedule Impact Guideline
Negligible	<$100,000	<1 month
Marginal	$100,000 - $1 million	1 - 3 months
Significant	>$1 million - $5 million	>3 - 6 months
Critical	>$5 million - $10 million	>6 - 12 months
Crisis	>$10 million	>12 months

Notes:

1. Guidelines shown are for illustrative purposes and are intended to establish a common understanding for team discussions. Individual risk ratings will be further refined by cost engineering for use in Monte Carlo simulation.

Cost Schedule Risk Analysis
Willamette River Flood Plain Restoration
Feasibility Report Estimate Level

PDT Members

Project Manager COE:	Christine Budai
Project Manger Tetra Tech AE:	Merri Martz
Project Manager Local Sponsor	Leslie Bach
Technical Lead COE:	Julie Amman
Civil Design/Cost Tetra Tech:	Ike Pace
Cost Engineering Tetra Tech	Ric McCallan
Cost Engineering COE:	Rick Russell
Construction Services COE:	Rick Russell

MEETINGS

Date	Comment
10/3/2011	Draft Risk Register
10/5/2011	Develop Risk Register
1/13/2012	Revise Risk Register
3/2/2012	Revise 2 Risk Register
3/14/2012	Revise 3 Risk Model
1/24/2013	Revise 4 Risk Model
2/26/2013	Revise 5 Risk Model

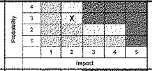
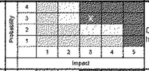
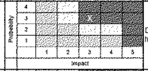
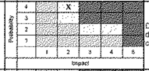
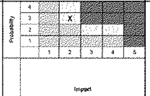
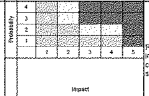
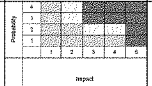
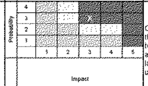
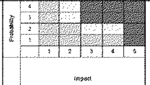
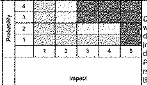
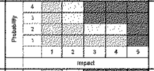
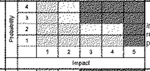
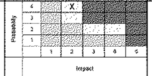
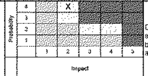
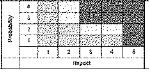
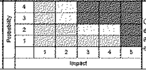
Willamette River Flood Plain Restoration – RISK REGISTER

Revision 2: 03/20/2012 See "Cost Risk Model" tab for Update

PROBABILITY ASSESSMENT	
Rating	Guideline
Very Unlikely	0% - 10%
Unlikely	>10% - 40%
Moderately Likely	>40% - 70%
Very Likely	>70% - 90%

COST ASSESSMENT	
Impact Rating	Cost Guideline
Negligible	<$100,000
Marginal	$100,000 - $1 million
Significant	>$1 million - $5 million
Critical	>$5 million - $10 million
Crisis	>$10 million

SCHEDULE ASSESSMENT	
Impact Rating	Schedule Guideline
Negligible	<1 month
Marginal	1 - 3 months
Significant	>3 - 6 months
Critical	>6 - 12 months
Crisis	>12 months

												Cost Assessment						Schedule Assessment					
Risk #	Risk/Opportunity	Cost Priority	Schedule Priority	Category	Risk Name	Risk Description	Risk Discussion	Risk Discussion Revision 2 Changes to the Risk Register (Changes in Risk Assessment shown in Yellow)	Probability *See Guidelines*	Cost Impact *See Guidelines*	Probability *See Guidelines*	Impact *See Guidelines*	Probability *See Guidelines*	Risk Matrix	Probability *See Guidelines*	Schedule Impact *See Guidelines*	Probability *See Guidelines*	Impact *See Guidelines*	Probability *See Guidelines*	Risk Matrix	Risk Mitigation Strategy	Functional Assignment (Owner)	Schedule for Completing Mitigation Actions
2	Risk	Moderate	Critical	Organizational and Project Management	Project competing with other projects for funding and resources	Local sponsor does not have other sources of funding to supplement and federal money has been difficult to obtain.	Need to prioritize this project within the district and division for funding.	Risk 1 "No Control over Staff priorities", and Risk 22 "Adequacy of project funding" duplicates/overlaps this risk element and is represented here. No change in Assessment Rankings	Likely	Marginal	3	2	3		Likely	Significant	3	3	3		Discuss with district and division staff how to prioritize this project.	CB	Fall 2011
3	Risk	Minor	Critical	Organizational and Project Management	Internal red tape causes delay getting approvals, decisions	Corps review process difficult to anticipate level of comments/issues, various review teams don't sign off until all revisions prepared/issues addressed.	Need to prioritize this project within the district and division for reviews.	No Change	Likely	Negligible	3	1	3		Likely	Significant	3	3	3		Discuss with district and division staff how to prioritize this project.	CB	Fall 2011
4	Risk	Moderate	Moderate	Contract Acquisition	Numerous separate contracts	Each project site will likely have one or more separate contracts to construct.	Makes sense logically for phased construction on multiple sites to occur via separate contracts, vs. one contract for all, which could be riskier for pricing and schedule.	Numerous Contract diversifies the work among the multiple sites and construction seasons and increases the competition	Very Likely	Marginal	4	2	4		Very Likely	Marginal	4	2	4		Develop contracting plan early in the design phase and work with district contracting and construction staff.	CB	Spring 2013
8	Risk	Moderate	Minor	Design/Technical	During design need to complete detailed reach-scale evaluation to refine design	Need to refine designs based on site specific survey data and analysis of ponds and river channel	Programmatic or watershed-scale evaluation of restoration projects provided suitable data for selection of sites/measures but additional needed to complete final designs.	Risk 5, "Design development stage, incomplete, or preliminary", Risk 6, "Confidence in scope, investigations, design, critical quantities", and Risk 7, "Incomplete studies" duplicates/overlaps this risk element and is represented here Change Sched Assessment Ranking from Marginal to Negligible. The need to get and use this data was considered in the potential design cost and schedule determinations at this stage making the Impact Negligible instead of Marginal.	Likely	Marginal	3	2	3		Likely	Negligible	3	1	3		Plan for survey and additional analysis in design phase. This has been considered in potential design cost and schedule	CB/LB	Fall 2011 to Spring 2013
9	Risk	Minor	Critical	Lands and Damages	Status of real estate/ easement acquisition	Sponsor will be required to obtain easements, etc. during design phase -- only some parcels currently owned or in process. Primarily applies to sites C1B and C3B	Potential for schedule delay due to acquisition process	Risk 10, "Ancillary owner rights, ownerships in question" duplicates/overlaps this risk element and is represented here. Changed Cost Impact from Marginal to Negligible. As noted in Mitigation column, properties of concern would be removed from program rather than increasing cost (via contingency) however this process could cause delay there still Marginal for schedule risk.	Likely	Negligible	3	1	3		Likely	Significant	3	3	3		Conduct outreach with landowners through remainder of feasibility phase to identify final recommended acquisition plan. Sequence Site C3B later and drop off if landowner ultimately cannot be negotiated with	CB/LB/MM	Fall 2011 to Fall 2012
11	Risk	Minor	Minor	Regulatory and Environmental	Historic/Cultural site, endangered species	Endangered species are present, cultural sites may be present	Projects are all intended to benefit endangered species. Site disturbance from previous uses has likely limited risk of finding cultural resources	Risk 12, "Reviewing agency requires higher level review than assumed "and Risk 13, "Permits or agency actions delayed or take longer than expected" duplicates/overlaps this risk element and is represented here. Changed Schedule Impact from Marginal to Negligible. As noted in Mitigation column, if one site encounters difficulties with this it should not affect other sites and minimized schedule risks.	Likely	Negligible	3	1	3		Likely	Negligible	3	1	3		Develop plan to remove fish and/or wildlife from construction area and develop plan for procedures to implement if any cultural resources are discovered during construction. Proposed seven separate contracts means if one site encounters difficulties that it should not affect other sites.	MM	Fall 2011 - Summer 2012
16	Risk	Minor	Minor	Construction	Limited transportation / haul routes	Most sites have only one access roadway in and out. Potential to cause disturbances/issues with neighbors.	Roads have been historically used for gravel mining, so are generally sized and built for trucks and equipment, but haven't been used for this purpose for a while and neighbors may have issues.	No Change	Unlikely	Negligible	2	1	2		Unlikely	Negligible	2	1	2		Include discussion of truck traffic/haul routes with landowners for acquisition plan.	CB/LB	Summer 2012
17	Risk	Moderate	Moderate	Construction	In water work	All sites will require in-water construction.	Will require work area isolation, diversion, or other BMPs and procedures for handling materials, etc.	Risk 14 " Permit and environmental work windows (Constr Season/WW)." and Risk 15 "Permit and environmental work windows (In or Adj to Water)." and Risk 18" Control and diversion of water," duplicates/overlaps this risk element and is represented here. No change in risk impacts	Very Likely	Marginal	4	2	4		Very Likely	Marginal	4	2	4		Develop preliminary dewatering plans as part of design phase for each site, to be updated/finalized by the contractor as a submittal.	Design lead	2013
19	Risk	Minor	Minor	Estimate and Schedule	Estimate quality related to lesser designed features	Designs are at a feasibility level and will be refined with more detailed site specific H&H and geotech analysis during the design phase.	Quantities have been developed conservatively to minimize risk.	Risk 21, "Overall confidence in estimate and schedule," duplicates/overlaps this risk element and is represented here. Since Quantities have been developed Conservatively to minimize risk the risk impact is reevaluated from Marginal to Negligible.	Likely	Negligible	3	1	3		Likely	Negligible	3	1	3		Conduct additional analyses required early in the design phase to alert team and sponsor to changes in quantities, etc. early.	Design lead	2013

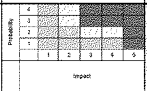
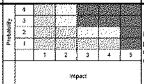
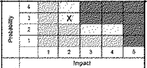
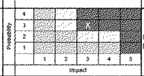
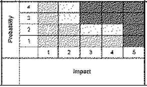
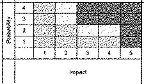
Willamette River Flood Plain Restoration – RISK REGISTER

Revision 2: 03/20/2012 See "Cost Risk Model" tab for Update

PROBABILITY ASSESSMENT	
Rating	Guideline
Very Unlikely	[illegible]
Unlikely	>10% - 40%
Moderately Likely	>40% - 70%
Very Likely	>70% - 90%

COST ASSESSMENT	
Impact Rating	Cost Guideline
Negligible	<$100,000
Marginal	$100,000 - $1 million
Significant	>$1 million - $5 million
Critical	>$5 million - $10 million
Crisis	>$10 million

SCHEDULE ASSESSMENT	
Impact Rating	Schedule Guideline
Negligible	<1 month
Marginal	1 - 3 months
Significant	>3 - 6 months
Critical	>6 - 12 months
Crisis	>12 months

												Cost Assessment							Schedule Assessment					
Risk #	Risk/Opportunity	Cost Priority	Schedule Priority	Category	Risk Name	Risk Description	Risk Discussion	Risk Discussion Revision 2 Changes to the Risk Register (Changes in Risk Assessment shown in Yellow)	Probability *See Guidelines*	Cost Impact *See Guidelines*	Probability *See Guidelines*	Impact *See Guidelines*	Probability *See Guidelines*	Risk Matrix	Probability *See Guidelines*	Schedule Impact *See Guidelines*	Probability *See Guidelines*	Impact *See Guidelines*	Probability *See Guidelines*	Risk Matrix	Risk Mitigation Strategy	Functional Assignment (Owner)	Schedule for Completing Mitigation Actions
20	Risk	Minor	Minor	Estimate and Schedule	Schedule depicts logical construction sequencing, phasing and parallel activities	Schedule developed based on prior experience, but without communication with local contractors.	Schedule developed based on prior experience with similar projects and primary work is grading and planting. Only ELJs require more complicated in-water methods. Team considers separate contracts an advantage to allow each site to proceed separately and not be slowed down by any issues that may arise at any individual site.	During reevaluation of this risk element, it was noted that the separate contact is an advantage allowing diversification of the work, which reduces risk, and that the conservative estimate of quantities also reduces the risk changing the probability from likely to unlikely.	Unlikely	Marginal	**2**	**2**	**2**		Unlikely	Marginal	**2**	**2**	**2**		Update construction schedule with phasing plan information, etc. during design and coordinate with construction office.	Design lead	2013
23	Risk	Moderate	Critical	External	Political factors change at state, local, or federal level	Potential for changes at federal level to reduce restoration spending.	Prioritize project at district and division level.	No Change	Likely	Marginal	**3**	**2**	**3**		Likely	Significant	**3**	**3**	**3**		Discuss with district and division staff how to prioritize this project.	CB	Fall 2011
24	Risk/Oppor	Minor	Minor	External	Economic & Competitive Conditions	There have been some CENWP projects, with more than 5 bidders where the low bid has been 0.52 x IGE, and another one at 0.48xIGE. On the other side there have been projects solicited on the 8a and small business program that required negotiations since the proposal was more the 25% greater than the IGE.	Increase number of bidders would benefit accomplishment within budget. Policy may require promotion of small business and reduce competition if negotiated sole source solicitation are required.	Risk 4, "Overall confidence in estimate and schedule," duplicates/overlaps this risk element and is represented THERE.	Unlikely	Negligible	**2**	**1**	**2**		Unlikely	Negligible	**2**	**1**	**2**				

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Revision 1 01/23/2012 Update and reassignment shown in Italics

Revision 2: 03/20/2012 See "Cost Risk Model" tab for Update

				Project Cost					Crystal Ball Simulation Expected Values ($$$)			Crystal Ball Simulation Expected Values (%s)		
Risk No.	Risk/Opportunity Event	Revision 1 (01/23/2012) Comment	Revision 2 (3/20/2012) Comment	Likelihood*	Impact*	Risk Level*	Variance Distribution	Correlation to Other(s)	Low	Most Likely	High	Low	Most Likely	High
Internal Risks (Internal Risk Items are those that are generated, caused, or controlled within the PDT's sphere of influence.)														
PROJECT & PROGRAM MGMT														
2	2. Project competing with other projects for funding and resources	*See Ref2. Recognition of Mitigation Credits among parties is increasing certainty of funding*	*Inflation could be up to 3% annual/year & up to a 2 year delay during the 10 year implementation.*	Likely	Marginal	Moderate	Triangular		($1,600,000)	$0	$1,600,000	-6.0%	6.0%	6.0%
CONTRACT ACQUISITION RISKS														
4	4. Numerous separate contracts	*See Ref4. Separate contracts likely benefit the program to allow more adjustability and adoptions to changes. Revise with decreasing triangular variance distribution from -10% to +20%*	*Based on recent city of Eugene Bids, 2010-20911 bids range from -20% to 100% of IGE, but selected bids (more representative of trend) were in the range of -10% to +20%. So separate contracts could vary in that range with uniform distribution assumed.*	Very Likely	Marginal	Moderate	Uniform		($2,600,000)	$0	$5,200,000	-10.0%	n/a	20.0%
DESIGN/ TECHNICAL RISKS														
8	8. During design need to complete detailed reach-scale evaluation to refine design	*See Reference Tab REF8*	*Additional details may change quantities. Assume -5% to +5% More likely on the plus side even with conservative estimation, (experience shows).*	Likely	Marginal	Moderate	Triangular		($600,000)	$0	$600,000	-5.0%	5.0%	5.0%
LANDS AND DAMAGES RISKS														
9	9. Status of real estate/ easement acquisition	*5/20 see Ref9. Superseded; Risk mitigation action: remove properties that are unlikely to receive easement will be removed from consideration So High & Low reduced to +15% and -5%*	*No change in cost model from Rev1*	n/a	n/a	Moderate	Uniform		($14,000)	$0	$42,000	-0.05%	0.00%	0.16%
REGULATORY AND ENVIRONMENTAL RISKS														
RE-1												0.00%	0.00%	0.00%
CONSTRUCTION RISKS														
17	17. In Water Work	*See Ref17. Revise to only apply to WBS accts with IWW elements #09 Channels & Canals ($1,002,000) and #11 Levees & Floodwalls ($5,361,000) and to 30% of the #06 Fish & Wildlife(0.3*$19,549,000) total ($12,227,700)*	*Account for up to 1 year delay possible; But depending on water levels in river, could be equally cheaper or more expensive.*	Very Likely	Marginal	Moderate	Uniform		($1,200,000)	$0	$1,200,000	-10.0%	n/a	10.0%
18a	18a. Construction Methods and Production assumptions		See discussion at Ref18a. Although typical COE Civil works projects have complex construction and production can vary this work is fairly simple as discussed at Ref18a.	Unlikely	Marginal	Low	n/a					0.00%	0.00%	0.00%
ESTIMATE AND SCHEDULE RISKS														
19	19 Estimated Quality at Feasibility Level		*See Ref 19. After reconsidered, bidders could have a varied estimate of quantities affecting their bids.*	Likely	Marginal	Moderate	Uniform		($2,600,000)	$0	$5,200,000	-10.00%	0.00%	20.00%
FEATURE LEVEL RISKS														
FL-1												0.00%	0.00%	0.00%
Programmatic Risks (External Risk Items are those that are generated, caused, or controlled exclusively outside the PDT's sphere of influence.)														

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Revision 1 01/23/2012 Update and reassignment shown in italics

Revision 2: 03/20/2012 See "Cost Risk Model" tab for Update

				Project Cost					Crystal Ball Simulation Expected Values ($$$)			Crystal Ball Simulation Expected Values (%s)		
Risk No.	Risk/Opportunity Event	Revision 1 (01/23/2012) Comment	Revision 2 (3/20/2012) Comment	Likelihood*	Impact*	Risk Level*	Variance Distribution	Correlation to Other(s)	Low	Most Likely	High	Low	Most Likely	High
Internal Risks (Internal Risk Items are those that are generated, caused, or controlled within the PDT's sphere of influence.)														
PROJECT & PROGRAM MGMT														
22	22. Adequacy of project funding	*Recognition of Mitigation Credits among parties is increasing certainty of funding*	*Remove from cost model this risk is a duplicate of Risk #2 and account for there.*	Duplicate	Marginal	Low	n/a							
23	23. Political factors change at state, local, or federal level	*Recognition of Mitigation Credits among parties is increasing certainty of funding*	*No Change*	Likely	Marginal	Moderate	Uniform		($1,300,000)	$0	$1,300,000	-5.0%	0.0%	5.0%
24	24. Economic & Competitive Conditions	*Economic Conditions are trending to more normal and unlikely to see the extreme price swings seen in 2009 and 2010 for construction bids*	*See Ref24 for more data. Remove from cost model this risk is a duplicate of Risk #4 and account for there.*	Very Likely	Critical	Low	Triangular		$0	$0	$0	0.0%	0.0%	0.0%
												Not Part of Study - Placeholder for Project Summation Purposes Only		
										$0				

PROJECT CONTINGENCY (BASELINE)	Revised		Percentile	Baseline TPC	Contingency	Baseline w/ Contingency	Contingency %
			0%	$25,881,344	($5,895,554)	$19,985,790	-22.78%
			5%	$25,881,344	($2,583,685)	$23,297,659	-9.98%
			10%	$25,881,344	($1,324,540)	$24,556,803	-5.12%
			15%	$25,881,344	($213,907)	$25,667,437	-0.83%
			20%	$25,881,344	$374,727	$26,256,071	1.45%
			25%	$25,881,344	$1,017,867	$26,899,210	3.93%
			30%	$25,881,344	$1,646,788	$27,528,132	6.36%
			35%	$25,881,344	$2,124,926	$28,006,269	8.21%
			40%	$25,881,344	$2,493,057	$28,374,401	9.63%
			45%	$25,881,344	$2,929,734	$28,811,078	11.32%
			50%	$25,881,344	$3,360,956	$29,242,300	12.99%
			55%	$25,881,344	$3,741,562	$29,622,906	14.46%
			60%	$25,881,344	$4,145,134	$30,026,478	16.02%
			65%	$25,881,344	$4,620,486	$30,501,829	17.85%
			70%	$25,881,344	$5,265,958	$31,147,301	20.35%
			75%	$25,881,344	$5,820,972	$31,702,316	22.49%
			80%	$25,881,344	$6,332,644	$32,213,988	24.47%
			85%	$25,881,344	$6,986,496	$32,867,840	26.99%
			90%	$25,881,344	$7,814,585	$33,695,929	30.19%
			95%	$25,881,344	$8,817,399	$34,698,743	34.07%
			100%	$25,881,344	$11,940,535	$37,821,878	46.14%

Willamette River Flood Plain Restoration
5/31/2012
6/6/2012 received note that latest MII total is $36,067,472
1/15/2013 updated MII cost to $26,484,536
2/26/2013 Updted MII value to 25,881,343.77

Contingency on Base Estimate	80% Confidence Project Cost	
Baseline Estimate Cost (Most Likely) ->	$25,881,344	
Baseline Estimate Cost Contingency Amount ->	$6,332,644	
Baseline Estimate Construction Cost (80% Confidence) ->	$32,213,988	24.47%

[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	9.32%

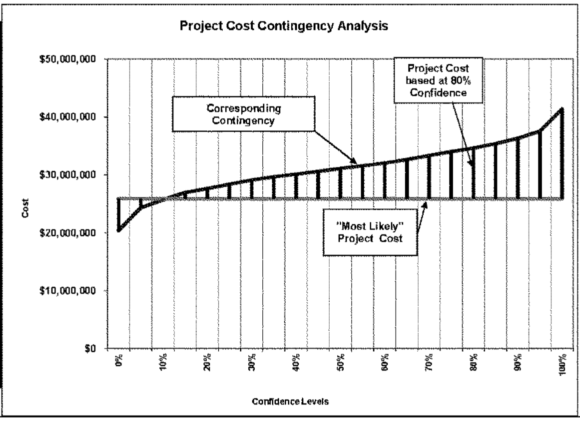
Project Contingency	80% Confidence Project Cost	
Project Contingency Amount (80% Confidence) ->	$8,745,362	
Project Contingency Percentage (80% Confidence) ->	34%	33.8%

Project Cost (80% Confidence) ->	$34,626,706

- PROJECT CONTINGENCY DEVELOPMENT -

Contingency Analysis

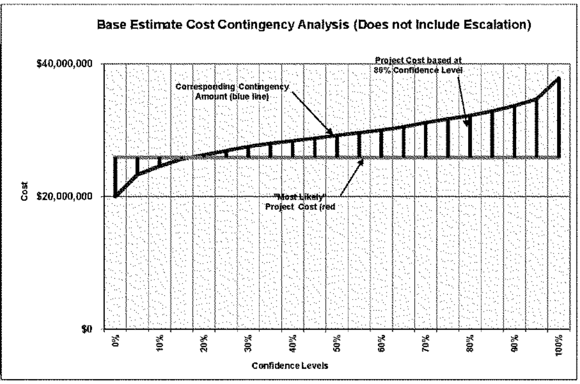
Most Likely Cost Estimate	$25,881,344	
Confidence Level	**Value**	**Contingency**
0%	$20,346,165	-21.39%
5%	$24,322,110	-6.02%
10%	$25,694,707	-0.72%
15%	$26,944,188	4.11%
20%	$27,643,622	6.81%
25%	$28,370,748	9.62%
30%	$29,094,959	12.42%
35%	$29,675,527	14.66%
40%	$30,125,915	16.40%
45%	$30,627,228	18.34%
50%	$31,125,846	20.26%
55%	$31,582,282	22.03%
60%	$32,083,424	23.96%
65%	$32,627,529	26.07%
70%	$33,359,614	28.89%
75%	$33,999,961	31.37%
80%	$34,626,706	33.79%
85%	$35,399,338	36.78%
90%	$36,346,668	40.44%
95%	$37,558,047	45.12%
100%	$41,344,144	59.74%



- BASE COST CONTINGENCY DEVELOPMENT -

Contingency Analysis

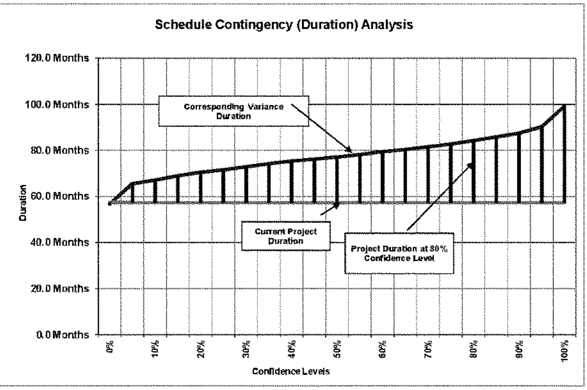
Most Likely Cost Estimate	$25,881,344	
Confidence Level	**Value**	**Contingency**
0%	$19,985,790	-22.78%
5%	$23,297,659	-9.98%
10%	$24,556,803	-5.12%
15%	$25,667,437	-0.83%
20%	$26,256,071	1.45%
25%	$26,899,210	3.93%
30%	$27,528,132	6.36%
35%	$28,006,269	8.21%
40%	$28,374,401	9.63%
45%	$28,811,078	11.32%
50%	$29,242,300	12.99%
55%	$29,622,906	14.46%
60%	$30,026,478	16.02%
65%	$30,501,829	17.85%
70%	$31,147,301	20.35%
75%	$31,702,316	22.49%
80%	$32,213,988	24.47%
85%	$32,867,840	26.99%
90%	$33,695,929	30.19%
95%	$34,698,743	34.07%
100%	$37,821,878	46.14%



- SCHEDULE CONTINGENCY (DURATION) DEVELOPMENT -

Contingency Analysis

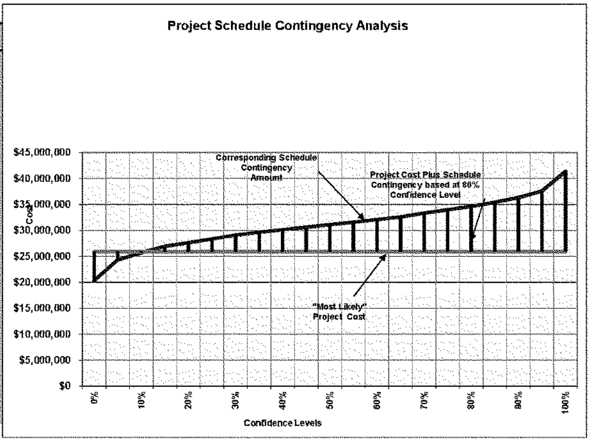
Most Likely Cost Estimate	57.3 Months	
Confidence Level	Value	Contingency
0%	56.7 Months	-1.11%
5%	65.6 Months	14.46%
10%	67.1 Months	17.12%
15%	69.0 Months	20.38%
20%	70.5 Months	22.98%
25%	71.6 Months	24.94%
30%	72.9 Months	27.18%
35%	74.2 Months	29.58%
40%	75.4 Months	31.51%
45%	76.2 Months	33.03%
50%	77.1 Months	34.61%
55%	78.1 Months	36.39%
60%	79.5 Months	38.67%
65%	80.4 Months	40.29%
70%	81.5 Months	42.32%
75%	82.7 Months	44.32%
80%	84.2 Months	47.02%
85%	85.8 Months	49.80%
90%	87.4 Months	52.60%
95%	90.2 Months	57.49%
100%	99.1 Months	73.04%



- SCHEDULE CONTINGENCY (AMOUNT) DEVELOPMENT -

Contingency Analysis

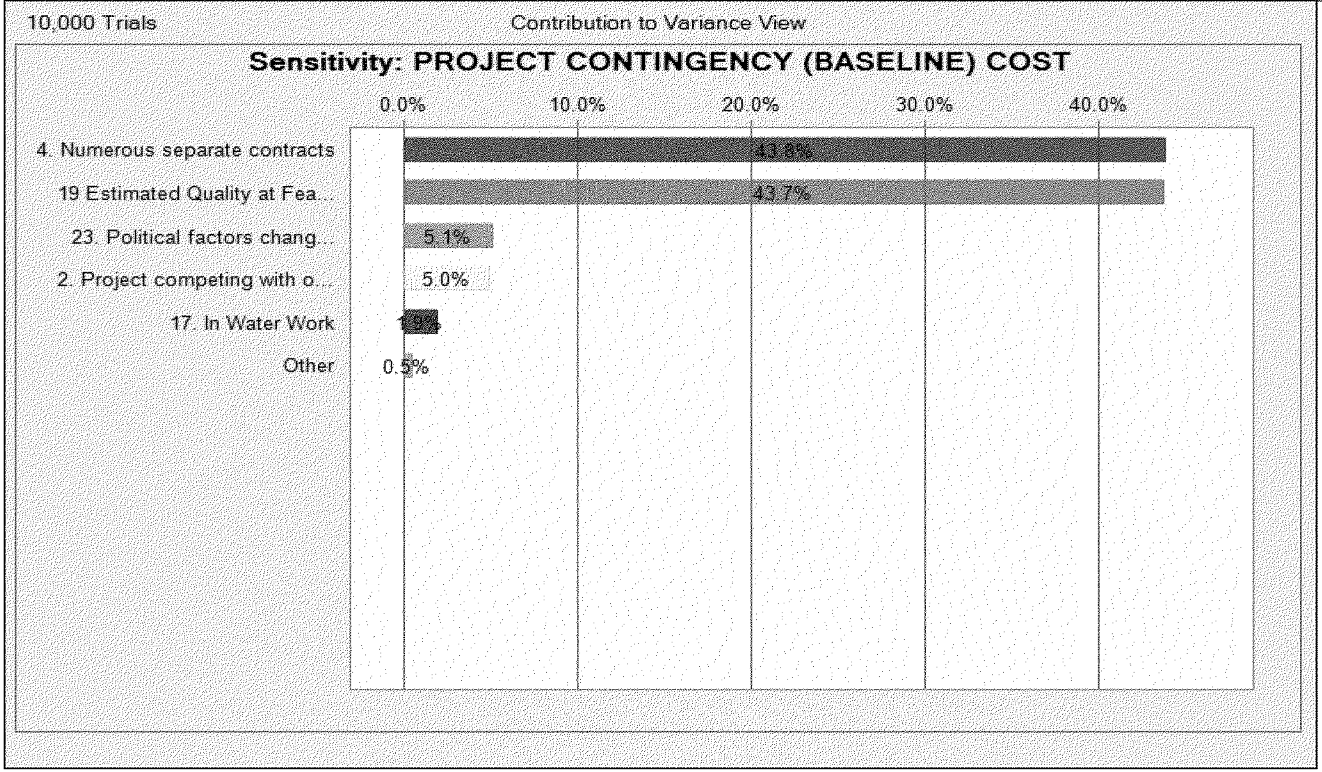
Most Likely Cost Estimate	$25,881,344	
Confidence Level	Value	Contingency
0%	$360,375	1.39%
5%	$1,024,451	3.96%
10%	$1,137,904	4.40%
15%	$1,276,751	4.93%
20%	$1,387,552	5.36%
25%	$1,471,537	5.69%
30%	$1,566,827	6.05%
35%	$1,669,257	6.45%
40%	$1,751,514	6.77%
45%	$1,816,150	7.02%
50%	$1,883,546	7.28%
55%	$1,959,376	7.57%
60%	$2,056,946	7.95%
65%	$2,125,700	8.21%
70%	$2,212,313	8.55%
75%	$2,297,645	8.88%
80%	$2,412,718	9.32%
85%	$2,531,498	9.78%
90%	$2,650,740	10.24%
95%	$2,859,305	11.05%
100%	$3,522,266	13.61%



Contingency Analysis Total Contingency

Most Likely Cost Estimate	$25,881,344		
Confidence Level	Total Value	Amt Contingency	Contingency
0%	$20,346,165	$(5,535,179)	-21.39%
5%	$24,322,110	$(1,559,234)	-6.02%
10%	$25,694,707	$(186,636)	-0.72%
15%	$26,944,188	$1,062,844	4.11%
20%	$27,643,622	$1,762,279	6.81%
25%	$28,370,748	$2,489,404	9.62%
30%	$29,094,959	$3,213,615	12.42%
35%	$29,675,527	$3,794,183	14.66%
40%	$30,125,915	$4,244,571	16.40%
45%	$30,627,228	$4,745,884	18.34%
50%	$31,125,846	$5,244,503	20.26%
55%	$31,582,282	$5,700,939	22.03%
60%	$32,083,424	$6,202,080	23.96%
65%	$32,627,529	$6,746,185	26.07%
70%	$33,359,614	$7,478,270	28.89%
75%	$33,999,961	$8,118,617	31.37%
80%	$34,626,706	$8,745,362	33.79%
85%	$35,399,338	$9,517,995	36.78%
90%	$36,346,668	$10,465,324	40.44%
95%	$37,558,047	$11,676,703	45.12%
100%	$41,344,144	$15,462,801	59.74%

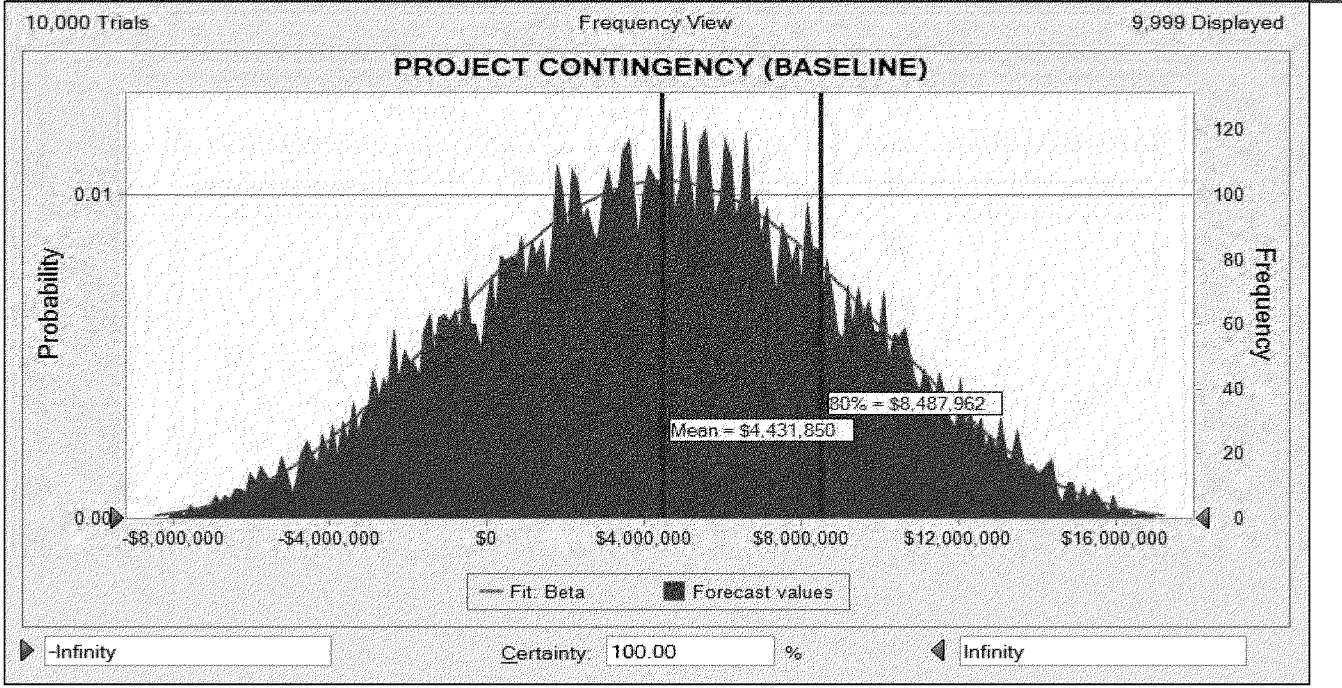
Willamette River Flood Plain Restoration- Cost Risk Analysis


10,000 Trials

Contribution to Variance View

Sensitivity: PROJECT CONTINGENCY (BASELINE) COST

Willamette River Flood Plain Restoration- Cost Risk Analysis



-Infinity

Certainty: 100.00 %

Infinity

CSRA_RiskAnalysis_Cost_WRFPR130226.xlsx

Crystal Ball Report - Assumptions

Simulation started on 4/16/2012 at 11:58:34

Simulation stopped on 4/16/2012 at 11:58:42

Run preferences:	
Number of trials run	10,000
Extreme speed	
Monte Carlo	
Seed	450
Precision control on	
Confidence level	95.00%
Run statistics:	
Total running time (sec)	2.11
Trials/second (average)	4,739
Random numbers per sec	28,434
Crystal Ball data:	
Assumptions	6
Correlations	0
Correlated groups	0
Decision variables	0
Forecasts	1

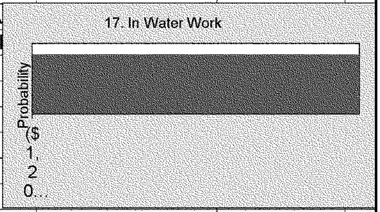
Assumptions

Worksheet: [CSRA_RiskAnalysis_Cost_WRFPR120320.xlsx]Cost Risk Model

Assumption: 17. In Water Work **Cell: K49**

Uniform distribution with parameters:

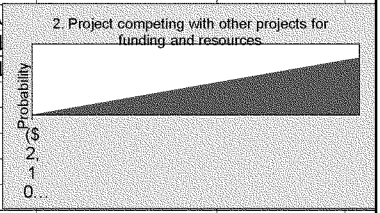
Minimum	($1,200,000)	(=
Maximum	$1,200,000	(=



Assumption: 2. Project competing with other projects for funding and resources **Cell: K9**

Triangular distribution with parameters:

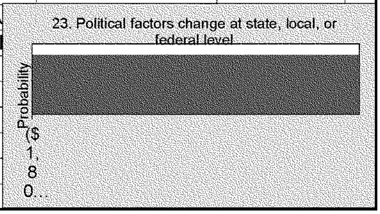
Minimum	($2,100,000)	(=
Likeliest	$2,100,000	(=
Maximum	$2,100,000	(=



Assumption: 23. Political factors change at state, local, or federal level **Cell: K74**

Uniform distribution with parameters:

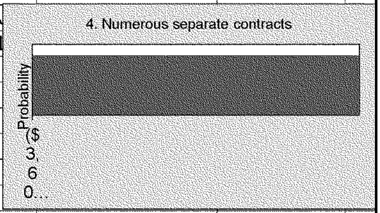
Minimum	($1,800,000)	(=
Maximum	$1,800,000	(=



Assumption: 4. Numerous separate contracts **Cell: K17**

Uniform distribution with parameters:

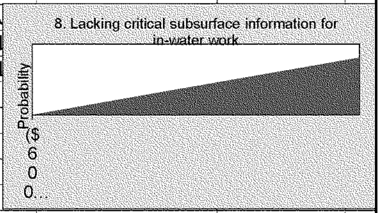
Minimum	($3,600,000)	(=
Maximum	$7,100,000	(=



Assumption: 8. Lacking critical subsurface information for in-water work **Cell: K25**

Triangular distribution with parameters:

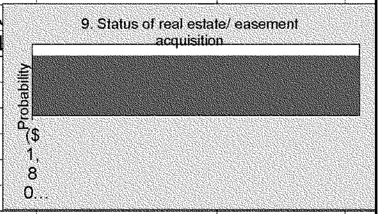
Minimum	($600,000)	(=
Likeliest	$600,000	(=
Maximum	$600,000	(=



Assumption: 9. Status of real estate/ easement acquisition **Cell: K33**

Uniform distribution with parameters:

Minimum	($1,800,000)	(=
Maximum	$5,300,000	(=



End of Assumptions

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
2	2. Project competing with other projects for funding and resources	-6%	6%	6%

Notes: This item captures the risk that other projects competing for funding will cause a variance from the current baseline estimate.

During the feasibility study, Federal funding has been sporadic, with less money allocated than necessary to complete tasks in many years. This has led to schedule delays; the feasibility study has been on-going since 2000. Due to Federal deficits, many agencies, likely including the Corps will experience reduced budgets for the coming several years. Congressional policies now also discourage ear-marks. Thus, this project will compete nationwide with all other CG projects and there are already more projects in the pipeline than available funding. It is likely that this project will experience funding shortfalls during construction and this may delay implementation by as much as 2 years over the 5-6 year implementation schedule. Material and labor inflation, while currently quite low (<2%), is likely to increase costs as well. Thus, the schedule could on the high end increase up to 20% in duration, and the cost would increase by up to 6% due to inflation.

Likely Likely assumes no change from the baseline estimate.

Low Low assumes the project would be funded ahead of schedule saving 2 years of inflation. Say -6% for Low.

High High assumes the schedule could on the high end increase up to 20% in duration, and the cost would increase by up to 6% due to inflation.

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Risk Refer No	Risk Event	Low	Most Likely	High
4	4. Numerous separate contracts	-10%	n/a	20%

Notes: This item captures the risk that Numerous separate contracts will cause a variance from the current baseline estimate.

The recommended plan has seven different restoration sites located in Lane County, Oregon on the outskirts or within 30 miles of Eugene. It is proposed that a separate contract be let for each site to allow each to proceed independently and not be dependent on progress made on a previous site. While there could be some efficiencies achieved if one contractor was building more than one site in close proximity (i.e. mob/demob of equipment), for the most part, the distance between sites would typically not provide any mobilization/demobilization savings. A review of recent competitive bids by the City of Eugene (www.eugene-or.gov) for 2010-2011 showed that the range of competitive bids received by the City ranged from -20% to +100% of the government cost estimate. However, the majority of bids were in the -10% to +20% range of the government cost estimate. The years 2010 and 2011 were during a recession and the post-recession slow recovery and it may be expected that bids would be more volatile in this climate due to firms low bidding when business is slow or overbidding when business is good. It is more likely as the slow economic recovery continues that bids will become more uniform, but -10% to +20% is still within a common range of bidding for public works projects.

Likely Likely assumes no change from the baseline estimate.

Low Low assumes -10% range as a realistic limit from the data below for post-recession expectations.

High High assumes +20% range as a realistic limit from the data below for post-recession expectations. There is uniform likelihood the variance among the range.

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
8	During design need to complete detailed reach-scale evaluation to refine design	-5%	5%	5%

Notes: This item captures the risk that During design need to complete detailed reach-scale evaluation to refine design will cause a variance from the current baseline estimate.

This feasibility study has been conducted at a watershed scale and somewhat less detail has been provided for hydrologic/hydraulic analysis, sediment transport, survey/topography than would typically be conducted if only one site were being considered. However, this work has been planned for the PED phase and the schedule assumes additional analysis will be conducted. Thus, no significant schedule impacts are anticipated.. Detailed reach scale evaluations could cause changes or refinements to the designs affecting costs. Based on experience with the types of changes possible, costs could vary from -5% to +5%.

Likely Likely assumes no change from the baseline estimate.

Low Low assumes conditions, water elevations and design elements are more favorable than assumed likely and costs could be less by 5%.

High High assumes conditions, water elevations and design elements are more difficult than assumed likely and are more costly by 5%.

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
9	Status of real estate/ easement acquisition	($14,100)	$0	$42,300
		-5%	0%	15%
			$282,000	

Notes: This item captures the risk that Status of real estate/ easement acquisition will cause a variance from the current baseline estimate.

A search of real estate tracking organizations and publications for the Eugene area (including www.hybridrealestate.org www.realtytimes.com and www.eugene-real-estate.com) indicate that real estate prices have been declining about 5% year to year and sales are limited. However, as inventory has been reduced sales have been increasing. As the non-Federal sponsor will need to begin certifying lands approximately in 2014 for the first project, the cost of real estate could decline another 5% or could increase up to +15% for the later year projects. Real estate is already owned by the non-Federal sponsoi for some of the sites, thus the land certification could happen very quickly for some sites (potentially reducing the schedule by 10%). The current gross appraisal indicates a low overall value for the TNC owned properties due to the conservation easement that is already encumbering the sites. If fair market value or a higher value is allowed for use on this project, then the real estate value would be increased. The primary site which is currently privately owned is C3B. The acquisition of that real estate could delay the project schedule by up to 10% if the landowner is difficult to negotiate with. If the owner of Site C3B is unwilling to negotiate a reasonable offer, then this site would be eliminated from the recommended plan.

Likely Likely assumes no change from the baseline estimate.

Low Low assumes declining real estate price prevail and real estate costs would be -5% for assumed likely value. The TPCS has Real Estate costs of $828,000

High High assumes real estate prices and costs more than likely of up to 15%, See notes above.

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
17	In Water Work	-10%	0%	10%

Notes: This item captures the risk that In Water Work will cause a variance from the current baseline estimate.

In-water construction work will be required for some features at each site; primarily the installation of engineered log jams (ELJs) and the connection of channels to the river. In-water work will need to be conducted during the designated in-water work windows (designated by Oregon Dept of Fish and Wildlife), or with limited extension requests (it is typical that up to one month extensions may be granted). The in-water work windows have been incorporated into the construction schedules for each site. If work could not be accomplished within the work window, then a year delay is possible. Thus, up to a 10% schedule delay is possible. The cost and effort required for the in-water work can be affected by river levels during construction. During low flow years, in-water work can be speeded up significantly due to easier access. During high flow years, work can be delayed. Thus, a potential for -10% and +10% changes in cost are possible depending on water levels.

Likely Likely assumes no change from the baseline estimate.

Low Low assumes low water allows costs to be 10% less.

High High assumes higher water and costs are 10% more than assumed likely.

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
18a	Construction Methods and Production assumptions	n/a	n/a	n/a

Notes:	This item captures the risk that Construction Methods and Production assumptions will cause a variance from the current baseline estimate. This work is judged as fairly simple as discussed below and is not included in the cost risk model due to is Low Risk Level. Construction at all sites includes the following primary elements: a) excavation and grading; b) installation of engineered log jams; c) plantings. These primary elements are straight forward and have recently been used for multiple projects implemented by Portland District including Eugene Delta Ponds, Springfield Millrace, etc. The primary productivity issue with excavation and grading is the type of soils and the groundwater table or water levels. At all sites, the primary soils present are gravel and cobbles which are easily excavated and graded even when wet or underwater. No grading is proposed beyond the shoreline of the gravel mined ponds where mucky soils are present. Geotechnical investigation will occur early in PED to confirm and is included in the schedule. Engineered log jams will require the use of excavators to move the wood and install wooden pilings and excavate for burial of key pieces. At some locations, coffer damming and dewatering will be required. Recent projects have installed bank ELJs (i.e. Springfield Millrace) and installation was rapid even with an 8(a) contractor. The schedule risk has accounted for the possibility of a one-year delay depending on the difficulty of installing in-water features.
Likely	Likely assumes no change from the baseline estimate.
Low	n/a
High	n/a

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
19	Estimated Quality at Feasibility Level	-10%	0%	20%

Notes: This item captures the risk that Estimated Quality at Feasibility Level will cause a variance from the current baseline estimate.

This feasibility study has been conducted at a watershed scale due to the multiple sites included in the recommended plan. However, because LiDAR topography was available at all sites, the site topography is likely to be very good. The bathymetry of the gravel mined ponds in the floodplain has just been surveyed for Sites C1C, M1A, M1B, and M2A and indicates depths are as predicted. The hydraulic model used for analysis is a bank-full calibrated model and the design flows for the sites are typically at or below bankfull. Thus, the quantities generated for the cost estimate are likely to be accurate. Supplemental topography in areas of heavy tree canopy or shrub cover will be conducted during PED and is accounted for in the schedule. However, due to the bidding environment described for the numerous separate contracts risk, it is possible that the costs will come in ranging from -10% to +20% of the government cost estimate.

Likely Likely assumes no change from the baseline estimate.

Low Low assumes possible low end cost of 10% less than likely

High High assumes Possible Higher cost range of up to +20% for the project.

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
23	Political factors change at state, Local, or federal Level	-5%		5%

Notes:	This item captures the risk that Political factors change at state, Local, or federal Level will cause a variance from the current baseline estimate. Recognition of Mitigation Credits among parties is increasing certainty of funding
Likely	Likely assumes no change from the baseline estimate.
Low	Low assumes Recognition of Mitigation Credits among parties is increasing certainty of funding. Stable funding and program execution, reduces risks and costs to the contractor's planning allowing the program to benefit with an assumed 5% decrease from the likely.
High	High assumes potential for shortfalls in government budgets could reduce restoration spending, delaying the project and increasing the uncertainty to contractors of possible additional work with the next contract. The increase uncertainty to contractors could increase costs an assumed 5% for a possible limited opportunities as opposed to steady work for several years.

Willamette River Flood Plain Restoration - Cost Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
24	Economic & Competitive Conditions	n/a	n/a	n/a

Notes: This item captures the risk that Economic & Competitive Conditions will cause a variance from the current baseline estimate. Updating of the Risk Elements changed the Risk level of this element from Critical to Low due to the reasons discussed below. **The Low Risk Level removed this from the Risk Cost Model**

A review of recent competitive bids by the City of Eugene (www.eugene-or.gov) for 2010-2011 showed that the range of competitive bids received by the City ranged from -20% to +100% of the government cost estimate. However, the majority of bids were in the -10% to +20% range of the government cost estimate. The years 2010 and 2011 were during a recession and the post-recession slow recovery and it may be expected that bids would be more volatile in this climate due to firms low bidding when business is slow or overbidding when business is good. It is more likely as the slow economic recovery continues that bids will become more uniform, but -10% to +20% is still within a common range of bidding for public works projects.

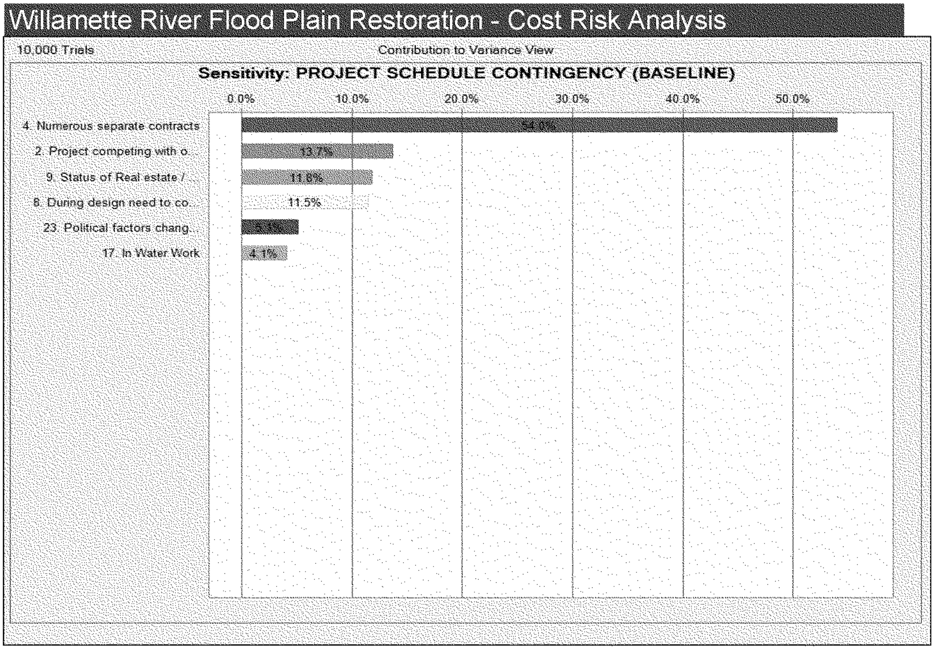
Likely Likely assumes no change from the baseline estimate.

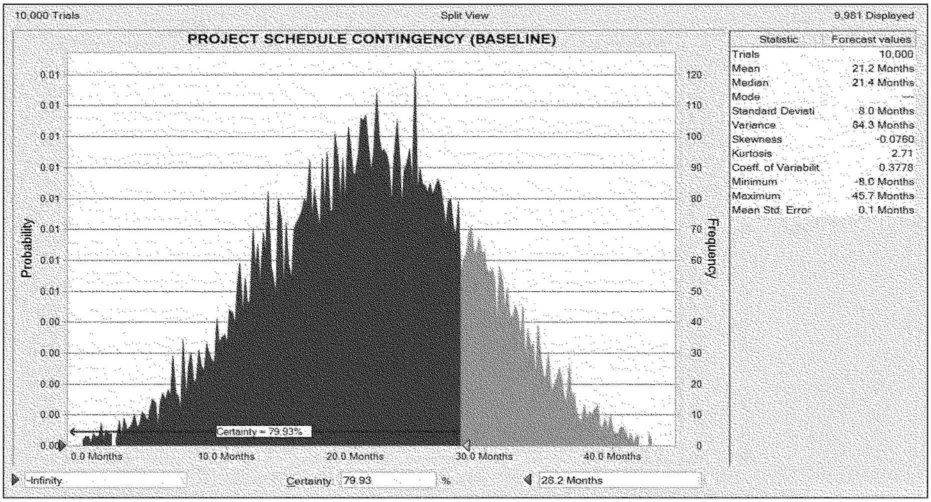
Low Low assumes [enter best case development assumptions and discussion here].

High High assumes [enter worst case development assumptions and discussion here].

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model					
Rev. 5					
Based on 2/26/2013 Project Schedule					
	Dates	Duration			
Design Start	29-Aug-13				
Design end	21-May-14				
TOTAL Design duration		9	Months		
NOTE: All in-water construction assumed during in-water work windows from July 1 through August 31 (for Middle Fork) or June 1 through October 31 (Coast Fork).					
Construction Phase 1					
Start	5/16/2014				
End	Jan-15				
		8	Months		
Construction Phase 2					
Start	5/15/2015				
End	Dec-15				
		8	Months		
Construction Phase 3					
Start	5/27/2016				
End	Apr-17				
		10	Months		
Construction Phase 4					
Start	5/26/2017				
End	May-18				
		11	Months		
CONSTRUCTION Only Duration			37	Months	
Outside work season duration			11	Months	
Total at construction phase			48	Months	

Willamette River Flood Plain Restoration - Cost Risk Analysis





Statistic	Forecast values
Trials	10,000
Mean	21.2 Months
Median	21.4 Months
Mode	---
Standard Deviati	8.0 Months
Variance	64.3 Months
Skewness	-0.0760
Kurtosis	2.71
Coeff. of Variabilit	0.3778
Minimum	-8.0 Months
Maximum	45.7 Months
Mean Std. Error	0.1 Months

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model

Risk No.	Risk/Opportunity Event	Revision 1 (1/13/2012)	Revision 2 (3/20/2012)	Project Schedule			Variance Distribution	Other(s) or Phase applied to	Crystal Ball Simulation Expected Values (mos.)		
				Likelihood*	Impact*	Risk Level*			Low	Most Likely	High
Internal Risks (Internal Risk Items are those that are generated, caused, or controlled within the PDT's sphere of influence.)											
PROJECT & PROGRAM MGMT											
2	2. Project competing with other projects for funding and resources	Recognition of Mitigation Credits among parties is increasing certainty of project progress	Risk 1, and Risk 22 duplicates/overlaps this risk element and is represented here. Estimate of Schedule High Low values changed to -20% to +20% based on reevaluation of current staffing funding situations and developing delays in other project. Due to IWW and construction season limits small delays could cause a delay to the next year.	Likely	Significant	High	Triangular	All	0	0	11.5
CONTRACT ACQUISITION RISKS											
4	4. Numerous separate contracts	Separate contracts likely benefit the program to allow more adjustability and adoptions to changes. Revise with decreasing triangular variance distribution from -5% to +5%	Estimate of Schedule High Low values changed to uniform based on recent City of Eugene Experience.	Very Likely	Marginal	Moderate	Uniform	Design	-0.9	0	0.9
DESIGN/ TECHNICAL RISKS											
8	8. During design need to complete detailed reach-scale evaluation to refine design		No change	Likely	Marginal	Moderate	Triangular	ALL	0	0	12
LANDS AND DAMAGES RISKS											
9	9. Status of Real estate / easement acquisition	Risk mitigation actions: properties that are unlikely to receive easement will be removed from consideration So High & Low reduced to +5% and -5% for possible schedule impacts	Recent work with similar projects is tending to more variation in schedule due to real estate issues. Increase Hi/Low to -10% to +10%	Moderately Likely	Significat	High	Uniform	Const & Non Constr Season Duration	-4.8	0	4.8
REGULATORY AND ENVIRONMENTAL RISKS											
RE-1											
CONSTRUCTION RISKS											
17	17. In Water Work		Depending upon water levels in river would could be quicker than assumed change Low value to -10%	Very Likely	Marginal	Moderate	Triangular	Construction Only	-3.7	0	3.7
18a	18a Construction Methods and Production assumptions		See discussion at Ref18a. Although typical COE Civil works projects have complex construction and production can vary this work is fairly simple as discussed at Ref18a.	Unlikely	Marginal	Low	n/a				
ESTIMATE AND SCHEDULE RISKS											
EST-1											
FEATURE LEVEL RISKS											
Programmatic Risks (External Risk Items are those that are generated, caused, or controlled exclusively outside the PDT's sphere of influence.)											
22	22. Adequacy of project funding	Recognition of Mitigation Credits among parties is increasing certainty of funding. Schedule impacts lessened. Change to -5% (same) and +5% (from +15%)	Remove from Schedule model this risk is a duplicate of Risk #2 and account for there.	see #2	See #2	n/a	Triangular	ALL		0	
23	23. Political factors change at state, local, or federal level	Recognition of Mitigation Credits among parties is increasing certainty of funding. Schedule impacts lessened. Change to -5% (same) and +5% (from +15%)	See Ref 23.	Likely	Marginal	High	Uniform	ALL	0	0	5.7
24								N/A			

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model

									Crystal Ball Simulation			Crystal Ball Simulation		
				Project Schedule					Expected Values (mos.)			Expected Values (%s)		
Risk No.	Risk/Opportunity Event	Revision 1 (1/13/2012)	Revision 2 (3/20/2012)	Likelihood*	Impact*	Risk Level*	Variance Distribution	Other(s) or Phase applied to	Low	Most Likely	High	Low	Most Likely	High
Internal Risks (Internal Risk Items are those that are generated, caused, or controlled within the PDT's sphere of influence.)														
PROJECT & PROGRAM MGMT														
PR-4												0.00%	0.00%	0.00%
									Design Duration	9.0 Months				
									Constr Season Dur	37.0 Months				
									Not Constr Season Dur	11.0 Months				
									Total Project	57.3 Months				
										0.0 Months				

PROJECT SCHEDULE CONTINGENCY (BASELINE)			Percentile	Baseline Schedule Duration	Contingency (Duration)	Baseline w/ Contingency	Contingency %
			0%	57.3 Months	-0.6 Months	56.7 Months	-1.11%
			5%	57.3 Months	8.3 Months	65.6 Months	14.46%
			10%	57.3 Months	9.8 Months	67.1 Months	17.12%
			15%	57.3 Months	11.7 Months	69.0 Months	20.38%
			20%	57.3 Months	13.2 Months	70.5 Months	22.98%
			25%	57.3 Months	14.3 Months	71.6 Months	24.94%
			30%	57.3 Months	15.6 Months	72.9 Months	27.18%
			35%	57.3 Months	16.9 Months	74.2 Months	29.58%
			40%	57.3 Months	18.1 Months	75.4 Months	31.51%
			45%	57.3 Months	18.9 Months	76.2 Months	33.03%
			50%	57.3 Months	19.8 Months	77.1 Months	34.61%
			55%	57.3 Months	20.8 Months	78.1 Months	36.39%
			60%	57.3 Months	22.2 Months	79.5 Months	38.67%
			65%	57.3 Months	23.1 Months	80.4 Months	40.29%
			70%	57.3 Months	24.2 Months	81.5 Months	42.32%
			75%	57.3 Months	25.4 Months	82.7 Months	44.32%
			80%	57.3 Months	26.9 Months	84.2 Months	47.02%
			85%	57.3 Months	28.5 Months	85.8 Months	49.80%
			90%	57.3 Months	30.1 Months	87.4 Months	52.60%
			95%	57.3 Months	32.9 Months	90.2 Months	57.49%
			100%	57.3 Months	41.8 Months	99.1 Months	73.04%

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model

Enter Estimated Total Project Cost (Price Level)	$ 25,881,344
Max. Anticipated Annual Amount	$5,423,500
Enter Current OMB Escalation Rate	1.60%
Enter Current Project Location Escalation Rate	1.93%
Enter Assumed Hotel Rate	14.90%

	Date	Escalation Delta Amount	Hotel Amount	Total Schedule Contingency
Enter Current Project Start	1-Aug-13			
Enter Baseline Project Completion	10-May-18	[illegible]		[illegible]
Project Completion at 0% Confidence	20-Apr-18	[illegible]	[illegible]	[illegible]
Project Completion at 5% Confidence	17-Jan-19	[illegible]	[illegible]	[illegible]
Project Completion at 10% Confidence	4-Mar-19	[illegible]	[illegible]	[illegible]
Project Completion at 15% Confidence	30-Apr-19	[illegible]	[illegible]	[illegible]
Project Completion at 20% Confidence	14-Jun-19	[illegible]	[illegible]	[illegible]
Project Completion at 25% Confidence	15-Jul-19	[illegible]	[illegible]	[illegible]
Project Completion at 30% Confidence	26-Aug-19	[illegible]	[illegible]	[illegible]
Project Completion at 35% Confidence	1-Oct-19	[illegible]	[illegible]	[illegible]
Project Completion at 40% Confidence	10-Nov-19	[illegible]	[illegible]	[illegible]
Project Completion at 45% Confidence	6-Dec-19	[illegible]	[illegible]	[illegible]
Project Completion at 50% Confidence	3-Jan-20	[illegible]	[illegible]	[illegible]
Project Completion at 55% Confidence	3-Feb-20	[illegible]	[illegible]	[illegible]
Project Completion at 60% Confidence	14-Mar-20	[illegible]	[illegible]	[illegible]
Project Completion at 65% Confidence	11-Apr-20	[illegible]	[illegible]	[illegible]
Project Completion at 70% Confidence	19-May-20	[illegible]	[illegible]	[illegible]
Project Completion at 75% Confidence	25-Jun-20	[illegible]	[illegible]	[illegible]
Project Completion at 80% Confidence	6-Aug-20	$599,613.23	$1,813,104.78	$2,412,718.01
Project Completion at 85% Confidence	24-Sep-20	[illegible]	[illegible]	[illegible]
Project Completion at 90% Confidence	11-Nov-20	[illegible]	[illegible]	[illegible]
Project Completion at 95% Confidence	5-Feb-21	[illegible]	[illegible]	[illegible]
Project Completion at 100% Confidence	3-Nov-21	[illegible]	[illegible]	[illegible]

Entry Required

Do Not Overwrite

Summary Data – Do Not Overwrite

CSRA_RiskAnalysis_Schedule_WRFPR130226.xlsx

Crystal Ball Report - Assumptions

Simulation started on 6/1/2012 at 13:44:51
Simulation stopped on 6/1/2012 at 13:44:53

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Monte Carlo	
Seed	450
Precision control on	
Confidence level	95.00%
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Trials/second (average)	24,174
Random numbers per sec	145,046
Crystal Ball data:	
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Correlations	0
Correlated groups	0
Decision variables	0
Forecasts	1

CSRA_RiskAnalysis_Schedule_WRFPR130226.xlsx

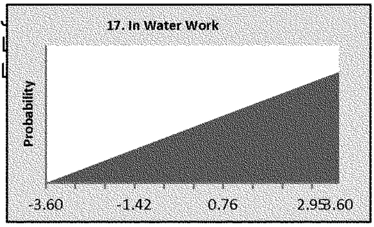
Assumptions

Worksheet: [CSRA_RiskAnalysis_Schedule_WRFPR120522.xlsx]Schedule Risk Model

Assumption: 17. In Water Work **Cell: K49**

Triangular distribution with parameters:

Minimum	-3.60	(=
Likeliest	3.60	(=
Maximum	3.60	(=



Assumption: 2. Project competing with other projects for funding and resources **Cell: K9**

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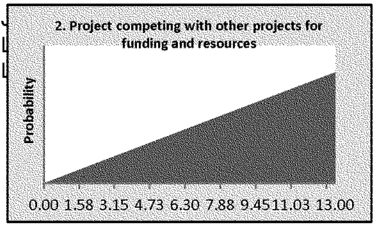
Likeliest	13.00	(=
Maximum	13.00	(=



Assumption: 23. Political factors change at state, local, or federal level **Cell: K74**

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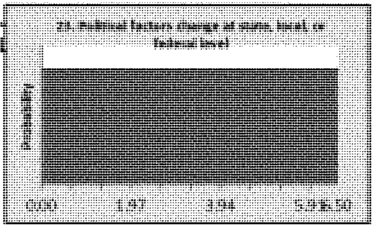

Assumption: 4. Numerous separate contracts **Cell: K17**

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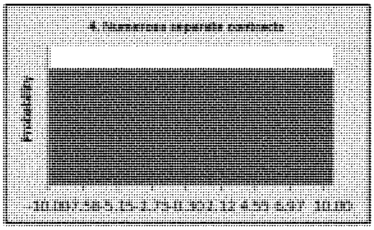
Minimum	-10.00
Maximum	10.00



Assumption: 8. During design need to complete detailed reach-scale evaluation to re **Cell: K25**

Triangular distribution with parameters:

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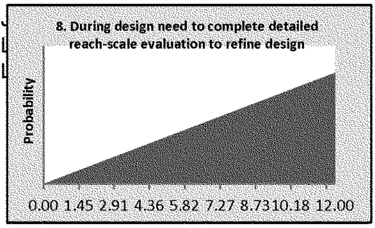
Maximum	12.00	(=



Assumption: 9. Status of Real estate / easement acquisition **Cell: K33**

Uniform distribution with parameters:

Minimum	-4.80	(=
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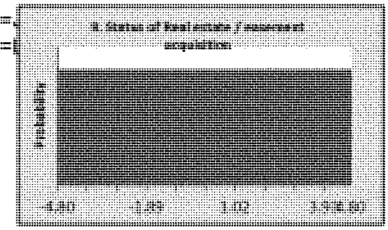

End of Assumptions

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
2	Project competing with other projects for funding and resources	0.0 Months	0.0 Months	20%

Notes: This item captures the risk that Project competing with other projects for funding and resources will cause a variance from the current baseline schedule.

During the feasibility study, Federal funding has been sporadic, with less money allocated than necessary to complete tasks in many years. This has led to schedule delays; the feasibility study has been on-going since 2000. Due to Federal deficits, many agencies, likely including the Corps will experience reduced budgets for the coming several years. Congressional policies now also discourage ear-marks. Thus, this project will compete nationwide with all other CG projects and there are already more projects in the pipeline than available funding. It is likely that this project will experience funding shortfalls during construction and this may delay implementation by as much as 2 years over the 5-6 year implementation schedule. Thus, the schedule could on the high end increase up to 20% in duration.

Likely Likely assumes no change from the baseline schedule.

Low Low assumes No Change from the baseline

High High assumes 20% increase in duration due to funding delays.

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
4	Numerous separate contracts	-10%	n/a	10%

Notes: This item captures the risk that Numerous separate contracts will cause a variance from the current baseline schedule.

The recommended plan has seven different restoration sites located in Lane County, Oregon on the outskirts or within 30 miles of Eugene. It is proposed that a separate contract be let for each site to allow each to proceed independently and not be dependent on progress made on a previous site. While there could be some efficiencies achieved if one contractor was building more than one site in close proximity (i.e. mob/demob of equipment), for the most part, the distance between sites would typically not provide any mobilization/demobilization savings. A review of recent competitive bids by the City of Eugene (www.eugene-or.gov) for 2010-2011 showed that the range of competitive bids received by the City ranged from -20% to +100% of the government cost estimate. However, the majority of bids were in the -10% to +20% range of the government cost estimate. The years 2010 and 2011 were during a recession and the post-recession slow recovery and it may be expected that bids would be more volatile in this climate due to firms low bidding when business is slow or overbidding when business is good. It is more likely as the slow economic recovery continues that bids will become more uniform, but -10% to +20% is still within a common range of bidding for public works projects.

Likely Likely assumes no change from the baseline schedule.

Low Low assumes during of the program could decrease by 10% due to multiple contractors and contracts have there own equipment and can independently work concurrently.

High High assumes multiple contracts increase work for COE to get awarded. If one contract has a delay, working that issue could use resources intended for the getting the next contract out causing a delay. And multiple contracts would each be smaller allowing smaller contractors to work, but a smaller contractor and require more S&A resources. Both these effects relate to limited resources creating small bottlenecks would could cause a delay from the expected. This increase could be in the range of +10% of duration based on judgment.

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
8	During design need to complete detailed reach-scale evaluation to refine design	0.0 Months	0.0 Months	12.0 Months

Notes: This item captures the risk that During design need to complete detailed reach-scale evaluation to refine design will cause a variance from the current baseline schedule.

This feasibility study has been conducted at a watershed scale and somewhat less detail has been provided for hydrologic/hydraulic analysis, sediment transport, survey/topography than would typically be conducted if only one site were being considered. However, this work has been planned for the PED phase and the schedule assumes additional analysis will be conducted. Thus, no schedule impacts are anticipated. However, detailed reach scale evaluations could cause changes or refinements to the designs affecting costs and schedule due to resulting change in funding requirements and/or the scale of the design changes. Such a schedule delay could be for up to a year.

Likely Likely assumes no change from the baseline schedule.

Low Low assumes no change from the baseline schedule.

High High assumes a 12 month delay as discussed.

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
9	Status of Real estate / easement acquisition	-10%	0%	10%

Notes: This item captures the risk that Status of Real estate / easement acquisition will cause a variance from the current baseline schedule.

A search of real estate tracking organizations and publications for the Eugene area (including www.hybridrealestate.org www.realtytimes.com and www.eugene-real-estate.com) indicate that real estate prices have been declining about 5% year to year and sales are limited. However, as inventory has been reduced sales have been increasing. As the non-Federal sponsor will need to begin certifying lands approximately in 2014 for the first project, the cost of real estate could decline another 5% or could increase up to +15% for the later year projects. Real estate is already owned by the non-Federal sponsor for some of the sites, thus the land certification could happen very quickly for some sites (potentially reducing the schedule by- 10%). The current gross appraisal indicates a low overall value for the TNC owned properties due to the conservation easement that is already encumbering the sites. If fair market value or a higher value is allowed for use on this project, then the real estate value would be increased. The primary site which is currently privately owned is C3B. The acquisition of that real estate could delay the project schedule by up to 10% if the landowner is difficult to negotiate with. If the owner of Site C3B is unwilling to negotiate a reasonable offer, then this site would be eliminated from the recommended plan.

Likely Likely assumes no change from the baseline schedule.

Low Low assumes Land certification happen very quickly for sites already owned by the non-Federal sponsor reducing the schedule by -10%

High High assumes: The primary site which is currently privately owned is C3B. The acquisition of that real estate could delay the project schedule by up to 10% if the landowner is difficult to negotiate with. If the owner of Site C3B is unwilling to negotiate a reasonable offer, then this site would be eliminated from the recommended plan.

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
17	In Water Work	-10%	0%	10%

Notes: This item captures the risk that In water work will cause a variance from the current baseline schedule.

In-water construction work will be required for some features at each site; primarily the installation of engineered log jams (ELJs) and the connection of channels to the river. In-water work will need to be conducted during the designated in-water work windows (designated by Oregon Dept of Fish and Wildlife), or with limited extension requests (it is typical that up to one month extensions may be granted). The in-water work windows have been incorporated into the construction schedules for each site. If work could not be accomplished within the work window, then a year delay is possible. Thus, up to a 10% schedule delay is possible. The cost and effort required for the in-water work can be affected by river levels during construction. During low flow years, in-water work can be speeded up significantly due to easier access. During high flow years, work can be delayed. Thus, a potential for -10% and +10% changes in cost are possible depending on water levels.

Likely Likely assumes no change from the baseline schedule.

Low Low assumes a low water years speeding up significantly the site work and reducing it by a cummulative 12 month amount of site work. Thus, up to a 10% schedule savings.

High High assumes High flow years where the work would be delayed into the next IWW/year, so an increase in schedule of 10%.

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
18a	Construction Methods and Production assumptions	n/a	n/a	n/a

Notes: This item captures the risk that Construction Methods and Production assumptions will cause a variance from the current baseline estimate. This work is judged as fairly simple as discussed below and is **not included in the Schedule risk model due to is Low Risk Level**.

Construction at all sites includes the following primary elements: a) excavation and grading; b) installation of engineered log jams; c) plantings. These primary elements are straight forward and have recently been used for multiple projects implemented by Portland District including Eugene Delta Ponds, Springfield Millrace, etc. The primary productivity issue with excavation and grading is the type of soils and the groundwater table or water levels. At all sites, the primary soils present are gravel and cobbles which are easily excavated and graded even when wet or underwater. No grading is proposed beyond the shoreline of the gravel mined ponds where mucky soils are present. Geotechnical investigation will occur early in PED to confirm and is included in the schedule. Engineered log jams will require the use of excavators to move the wood and install wooden pilings and excavate for burial of key pieces. At some locations, coffer damming and dewatering will be required. Recent projects have installed bank ELJs (i.e. Springfield Millrace) and installation was rapid even with an 8(a) contractor. The schedule risk has accounted for the possibility of a one-year delay depending on the difficulty of installing in-water features.

Likely Likely assumes no change from the baseline estimate.

Low n/a

High n/a

Willamette River Flood Plain Restoration - Schedule Risk Analysis Model

Risk Refer No.	Risk Event	Low	Most Likely	High
23	Political factors change at state, Local, or federal Level	0%	$0	10%

Notes:	This item captures the risk that Political factors change at state, Local, or federal Level will cause a variance from the current baseline schedule. Recognition of Mitigation Credits among parties is increasing certainty of funding
Likely	Likely assumes no change from the baseline schedule.
Low	Low assumes Recognition of Mitigation Credits among parties is increasing certainty of funding. Stable funding and program execution, No Change from Baseline schedule.
High	High assumes potential for shortfalls in government budgets could delay the project up to a year for a 10% increase in schedule.

APPENDIX D: Biological Assessment

November 2013

BIOLOGICAL ASSESSMENT

WILLAMETTE RIVER FLOODPLAIN RESTORATION STUDY

LOWER COAST AND MIDDLE FORKS WILLAMETTE RIVER SUBBASINS

DECEMBER 2012

Prepared by:

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Portland District

WILLAMETTE RIVER FLOODPLAIN RESTORATION STUDY

LOWER COAST AND MIDDLE FORKS WILLAMETTE RIVER SUBBASINS

Biological Assessment

December 2012

Abstract:

This Biological Assessment (BA) evaluates the potential effects on listed and proposed species and their critical habitats under the Endangered Species Act (ESA) and the potential effects on Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act from the proposed floodplain habitat restoration actions along the Coast and Middle Forks of the Willamette River, Oregon. The Willamette River Floodplain Restoration Study proposes the following restoration goal and objectives:

Restoration Goal:

> Restore natural floodplain ecosystem function and condition to the Coast and Middle Fork subbasins.

Objectives:

1. Increase channel complexity and diversity
2. Restore connectivity of river to floodplain habitats
3. Restore native floodplain habitats including riparian and wetland habitats

Overall, the project will enhance and restore floodplain habitats for a wide variety of plant, fish and wildlife species. The types of individual restoration measures proposed in this restoration plan have been implemented widely throughout the Pacific Northwest and much is known relative to their effects, primarily during construction. All restoration actions implemented as part of this plan will be conducted using appropriate conservation measures and best management practices (BMPs) to avoid and minimize any adverse effects during construction. The long-term effects of this proposed plan are beneficial and will specifically benefit sensitive fish and wildlife species and contribute to the restoration of natural riverine and floodplain processes. This BA evaluates the proposed restoration plan and determines if there will be adverse effects on the listed and proposed species.

There are likely to be temporary adverse effects during construction, thus conservation measures including appropriate provisions of the Standard Local Operating Procedures for Endangered Species to Administer Stream Restoration and Fish Passage Improvement Actions Authorized or Carried out by the U.S. Army Corps of Engineers in Oregon (SLOPES IV Restoration) have been proposed to avoid and minimize effects.

The following effect determinations were made for the listed and proposed species that may occur in the project area.

Species	Effect Determination	Critical Habitat Determination
Marbled murrelet	No effect	No effect
Northern spotted owl	No effect	No effect
Oregon chub	May affect, likely to adversely affect	No effect
Bull trout	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Upper Willamette River Chinook salmon	May affect, likely to adversely affect	May affect, not likely to adversely affect
Fender's blue butterfly	No effect	No effect
Willamette daisy	No effect	No effect
Bradshaw's desert parsley	May affect, not likely to adversely affect	N/A
Kincaid's lupine	No effect	No effect

Please send questions and requests for additional information to:

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1.0 INTRODUCTION

The proposed restoration plan described in this Biological Assessment (BA) will restore natural floodplain functions and fish and wildlife habitats along the Lower Coast and Middle Forks of the Willamette River. The floodplain functions restored by the proposed project will restore aquatic and riparian ecosystems, help to support recovery of listed threatened and endangered species, and may improve water quality conditions for support of salmonid habitats.

The purpose of the Willamette River Floodplain Restoration study is to restore natural floodplain functions throughout the Willamette River basin and its major tributaries. The study emphasizes the identification of opportunities for the restoration of aquatic and riparian ecosystems, recovery of proposed and listed threatened and endangered species, flood storage, and improvement of water quality for fish and wildlife habitat purposes via groundwater recharge. The study area is the Willamette River Basin of western Oregon. The Willamette is a major tributary of the Columbia River and is the tenth largest river in the United States, based on average annual flow (Figure 1).

The types of individual restoration measures proposed in this restoration plan have been implemented widely throughout the Pacific Northwest and much is known relative to their effects, primarily during construction. All restoration actions implemented as part of this plan will be conducted using appropriate conservation measures and best management practices (BMPs) to avoid and minimize any adverse effects during construction. The long-term effects of this proposed plan are beneficial and will specifically benefit sensitive fish and wildlife species and contribute to the restoration of natural riverine and floodplain processes. This BA evaluates the restoration plan and determines if there will be adverse effects on the listed and proposed species.

The lower Coast and Middle Forks of the Willamette River subbasins are the subject of this first phase of the larger study of the entire Willamette Basin. The project is a collaborative effort between the Mid-Willamette Council of Governments, the Nature Conservancy and the U.S. Army Corps of Engineers. This BA has been prepared to comply with the requirements for a Section 7 consultation under the federal Endangered Species Act (ESA) and the Essential Fish Habitat (EFH) evaluation under the Magnuson-Stevens Fishery Conservation and Management Act.

1.1 Location and Site Description

The Coast Fork and Middle Fork subbasins are located in the southern portion of the Willamette River Basin.

1.1.1 Coast Fork Willamette River Subbasin

The Coast Fork Willamette River subbasin covers an area of about 665 square miles within the Calapooya Mountains (Western Cascades province) and the floor of the Willamette Valley. The mainstem river is 40 miles long and joins the Middle Fork Willamette near Eugene to form the mainstem Willamette River. Big River and Saroute Creek in the Calapooya Mountains join to form the Coast Fork Willamette River.

About 96% of the Coast Fork subbasin is in Lane County, with the remainder of its southern extremity in Douglas County. About 64% of land in the subbasin is privately owned with the remainder under federal ownership. Management of federal lands is almost equally divided between the Forest Service and the Bureau of Land Management (BLM). Ninety percent of the subbasin is forested.

Figure 1. Coast Fork and Middle Fork Willamette River Subbasins

The Row River, the largest tributary, drains nearly 60% of the Coast Fork subbasin and joins the Coast Fork Willamette River just below the City of Cottage Grove. Two dams divide the Coast Fork subbasin, Cottage Grove on the Coast Fork Willamette and Dorena on the Row River. These dams limit upstream fish passage and control downstream hydrologic regimes, temperature patterns, sediment and bedload transport, and large wood delivery to the lower reaches.

Stream gradients are generally high in the upper Coast Fork subbasin and gentler in the middle to lower reaches. The Row and Coast Fork Willamette Rivers downstream of the dams flow through narrow valleys filled with erodible alluvial sediments. Downstream of the confluence the gradient is less than 0.2% and widens considerably. Sand and gravel are mined in the lower subbasin, and much of the area is farmed and developed for agriculture.

The upper subbasin drains the lower elevations of the western Cascade Range and the Calapooya Mountains. Headwater elevations in the Coast Fork are lower than in the Middle Fork and the Coast Fork hydrograph does not exhibit a spring snowmelt runoff. As a result of the subbasin's low elevations, summer stream flows are not supplemented by large amounts of snowmelt or numerous spring-fed sources.

The floodplain restoration projects included in this proposed restoration plan in the Coast Fork subbasin are all located in the floodplain below Cottage Grove dam and down to the confluence with the Middle Fork Willamette River.

1.1.2 Middle Fork Willamette River Subbasin

The Middle Fork Willamette River subbasin covers an area of approximately 1,360 square miles on the western slope of the Cascade Mountains and the floor of the Willamette Valley. The river is 84 miles long and joins the Coast Fork Willamette River near Eugene to form the mainstem Willamette River. The Middle Fork Willamette River originates in two connecting lakes formed by lava flows; Opal and Timpanogas Lakes in the Willamette National Forest.

About 94% of the Middle Fork subbasin is in Lane County, with the remainder of its southern extremity in Douglas County. About 75% of the land in the upper subbasin (above Dexter Dam) is publicly owned, most of which is managed by the U.S. Forest Service (Forest Service). The majority of the land below Dexter is privately owned, although there are a few large publicly owned sites, including Elijah Bristow State Park and Howard Buford Regional Recreation Area.

The headwaters of the subbasin are characterized by two major physiographic provinces; the High Cascades and the Western Cascades provinces (Franklin and Dyrness 1988). In the High Cascades the headwater elevations are high enough to form a seasonal snowpack, which contributes to summer stream flows and maintains low water temperatures. The western foothills and lower peaks of the Western Cascades province has runoff patterns dominated by a rain-on-snow hydrology in the mid to upper elevations and rain-dominated flow patterns in the lower subbasin, which lead to rapid delivery of water into the stream network.

The Lookout Point/Dexter dam projects divide the Middle Fork subbasin, limiting upstream fish passage and greatly influencing downstream hydrologic regimes, temperature patterns, sediment and bedload transport, and large wood delivery to the lower reaches. Below Dexter Dam, the Middle Fork Willamette River flows into the wide, alluvial Willamette Valley. Fall, Little Fall, and Lost Creeks are major tributaries in the lower subbasin. Below Dexter, the river is very low gradient (less than 0.2%) and flows through a relatively wide valley with an extensive floodplain.

The floodplain restoration projects included in this proposed restoration plan in the Middle Fork subbasin are all located in the floodplain below Dexter dam and down to the confluence with the Coast Fork Willamette River.

1.1.3 River Reaches

To provide a consistent reference, each river has been broken into the reaches outlined below and shown in Figure 2. Reaches C1 and C3 of the Coast Fork and M1 and M2 of the Middle Fork are the highest priority reaches for restoration and include floodplain restoration project sites in the proposed restoration plan. Detailed descriptions of these reaches are provided below.

Throughout this report, river mile locations on each river are referenced in the text. River Mile (RM) locations for the Coast Fork start at RM 0 (corresponding to the confluence with the Middle Fork) and extend upstream. When referencing RM locations for the Middle Fork, the confluence of the Coast Fork and Middle Fork is referred to as RM 187 and increases moving upstream along the Middle Fork.

1.1.3.1 Coast Fork Willamette River Priority Reaches

1. *Reach C1 – Middle Fork/Coast Fork confluence to Highway 58 crossing (RM 0 to 6.4).* This reach is approximately 6.4 miles in length and flows between Buford Park (Mt. Pisgah) and I-5/Hwy 58 for its entire length. There are two tributaries that enter this reach, Wild Hog and Papenfus Creeks, and several remnant sloughs and/or cut-off meanders of the river. Land uses in the floodplain include agriculture, rural residential, suburban residential, and park/open space. Howard Buford Recreation Area (Lane County) occupies the majority of the right bank in this reach. There are numerous roads and residential structures in the left bank floodplain, with several dense developments. There are several gravel ponds located near the confluence. This reach is predominantly a single-thread channel with rock bank protection in many locations, except at the confluence where gravel bars and islands are present.

2. *Reach C3 – I-5 crossing to Row River confluence (RM 15.6 to 21).* This reach is approximately 5.4 miles in length and the floodplain is somewhat constrained between I-5 and Highway 99. There are numerous gravel ponds in this reach. There are three tributaries that enter this reach, Gettings and Hill Creeks, and the Row River, and several remnant sloughs and/or cut-off meanders of the river. Land uses in the floodplain include agriculture, rural residential, suburban residential, and industrial.

1.1.3.2 Middle Fork Willamette River Priority Reaches

1. *Reach M1 – Middle Fork/Coast Fork confluence to Springfield Millrace (RM 187 to 191).* This reach is approximately 4 miles in length and generally flows along the southern edge of the City of Springfield. The Middle Fork is constrained by a few revetments and the natural basalt hill slopes of Mt. Pisgah, but there is otherwise a large area of floodplain in this reach. The river flows adjacent to Howard Buford Recreation Area (Mt. Pisgah) on the south. Several gravel ponds are present directly adjacent to the river on the south side and gravel mining within the channel has occurred in the past in this reach. Prior to the construction of upstream dams, this reach of the Middle Fork meandered extensively and frequently with numerous gravel bars and a multi-thread channel. Land uses in the floodplain include agriculture, rural residential, and park/open space. There are very few structures located within 1000 feet of the river in this reach, except on the right bank at the MF/CF confluence and some houses adjacent to the Millrace. A significant portion of the floodplain in this reach is publicly owned, as well as one major private landowner (The Nature Conservancy recently acquired the Wildish Land Company that had been formerly gravel mined). Islands and bars are present in the river in several locations.

2. *Reach M2 – Springfield Millrace to Hills Creek confluence (RM 191 to 195.2).* This reach is approximately 4.2 miles in length and generally flows from Jasper to Springfield. There are multiple Corps revetments in this reach, although there is limited development in the floodplain. The revetments generally protect agricultural lands. The Springfield-Creswell Highway and Southern Pacific Railroad line are located very close to the Middle Fork and constrain the river's right bank for approximately 1.5 miles of this reach. The tributaries that enter this reach include Pudding and Wallace Creeks and Hill Creek. Land uses in the floodplain include agricultural, rural residential, gravel mining, and forested/undeveloped. Several old meander scars and oxbows are present in this reach.

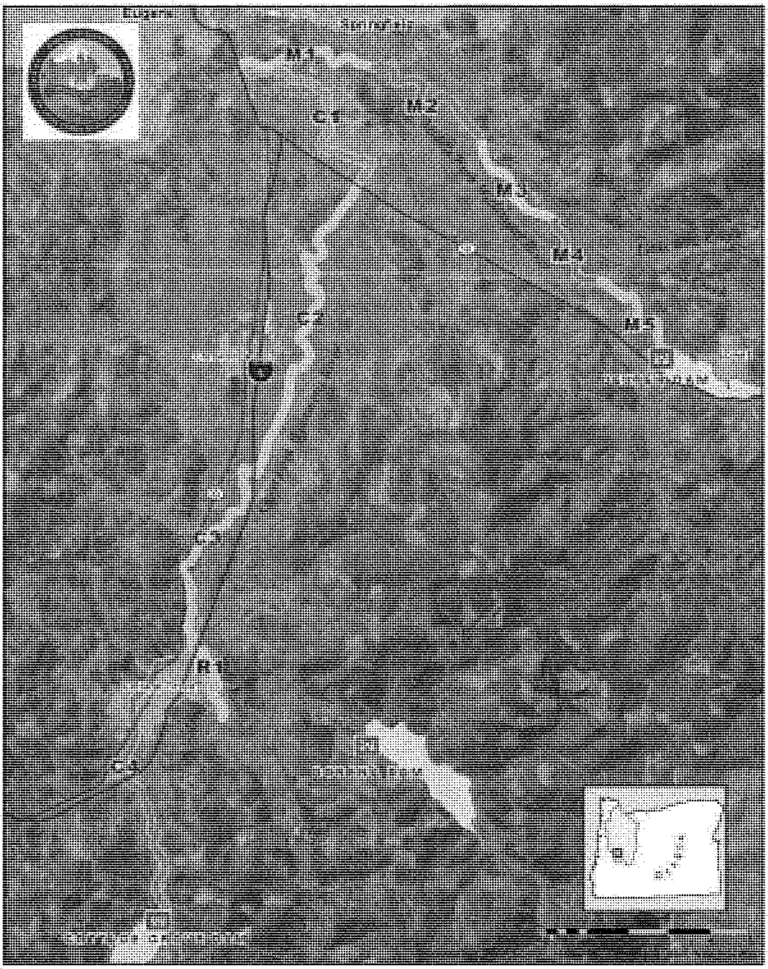


Figure 2. Coast Fork and Middle Fork with Study Reaches Delineated

1.2 Restoration Goals and Objectives

In the early stages of this project, a large group of stakeholders including watershed councils, federal agencies, state agencies, local governments, and other interest groups met and identified a set of goals and objectives for the restoration of the floodplain of the Coast and Middle Forks of the Willamette River. A number of broader study and public outreach goals and objectives were identified, but were refined to the specific restoration goal directed at restoring floodplain functions and conditions. The remaining focused goals and objectives were used to guide the development of the proposed restoration plan and are listed in Table 1.

Table 1. Goals and Objectives

	Goal / Objective Statement
Restoration Goal	Restore natural floodplain ecosystem function and condition to the Coast and Middle Fork Subbasins
Objective 1	Restore lost historic channel complexity and diversity
Objective 2	Restore connectivity of river to floodplain habitats
Objective 3	Restore and protect native floodplain habitat, including cottonwood gallery forests, riparian and wet prairie habitats

2.0 DESCRIPTION OF THE PROJECT AREA AND ACTION AREA

The proposed project area includes the five floodplain project sites where restoration actions are proposed: Sites C1B, C1C, M1A, M1B, and M2A (see Figure 3), and the adjacent Coast and Middle Forks channels along those sites. The action area includes the Coast and Middle Forks from RM 18 down to the confluence, and RM 192 down to the confluence, respectively. This action area encompasses the river channels along and downstream of the project sites to the confluence and the likely fish species and aquatic habitats associated with the respective channels.

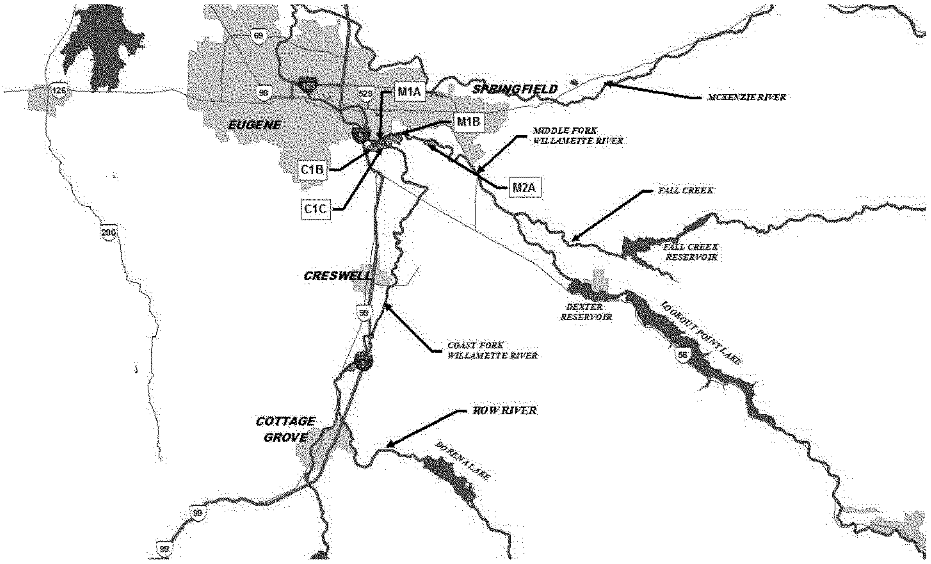


Figure 3. Project Area Map.

Site C1B (Figure 4). This site is located on the south bank of the Coast Fork Willamette River near Rivermile (RM) 0.5 and encompasses 90 acres. Public access is available to the site from Seavey Loop Road with a semi-developed point of ingress/egress for pedestrians and bicyclists. The site has been gravel mined in the past but is not currently mined and is used informally for public access and use. The site is within the 100-year floodplain and the majority of the site is within the designated floodway. The site has been highly disturbed and then left fallow. Along the riverbank, numerous willows, with dogwood and young Oregon ash, dominate the shoreline providing overhanging vegetation and cover along the shoreline. On the uplands surrounding the ponds, the dominant vegetation is Himalayan blackberry. Numerous other invasive species are present including reed canary grass and pennyroyal. Riprap is present along the river bank to a limited extent. Large woody debris is sparse.

Figure 4. Site C1B Gravel Pond.

Site C1C (Figure 5). This site is located on the south bank of the Coast Fork Willamette River near RM 1.2 and encompasses 80 acres. There is an existing gravel road access to the site from Seavey Loop Road and multiple gravel roads all over the site. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site and several other Wildish Land Company parcels adjacent to the site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. The majority of the vegetation on the site is disturbed and young aged (less than 20 years), although some older cottonwoods are also present. Numerous invasive species are present including Himalayan blackberry, knotweed, purple loosestrife, pennyroyal, and teasel. Some willows and other native species are sparsely present. Much of the upland areas are bare ground in gravel roads and access routes for gravel mining. Riprap and debris such as used concrete is present along the river bank in many areas. The gravel mined ponds are typically fairly shallow on this site (less than 10 feet deep), with steep banks dominated by invasive species. Numerous aquatic plants are also present. Several high flow channels are present on this site that allow connections between some of the ponds and the Coast Fork on an approximately annual basis.

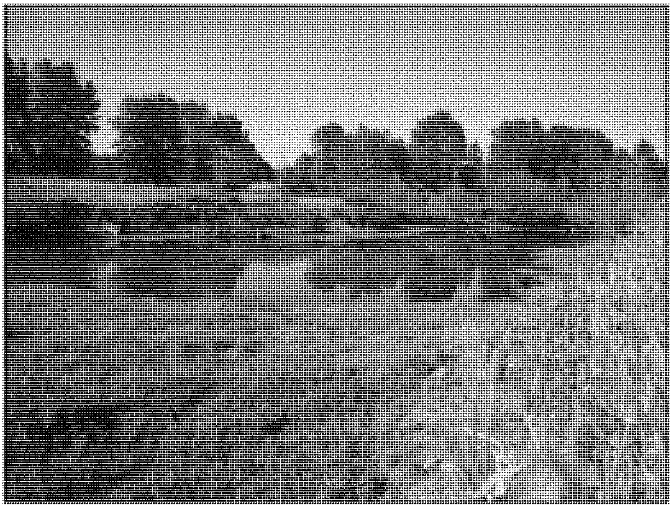


Figure 5. Site C1C, Northwest Gravel Pond.

Site M1A (Figure 6). This site is located between the Coast Fork and the Middle Fork of the Willamette River near RMs 2 and 188, respectively and encompasses 150 acres. Access is available to the site via a gravel road from Seavey Loop Road and Site C1C. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site and several other Wildish Land Company parcels adjacent to the site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. Similar to Site C1C, the majority of the vegetation on the site is disturbed and young aged (less than 20 years), although some older cottonwoods are also present. Numerous invasive species are present including Himalayan blackberry, knotweed, purple loosestrife, pennyroyal, and teasel. Some willows and other native species are sparsely present. Much of the upland areas are bare ground in gravel roads and access routes for gravel mining, with a portion of the site used for cattle grazing and includes weedy pasture grasses and forbs. Riprap and debris such as used concrete is present along the river bank in many areas. The gravel mined ponds are typically fairly shallow on this site, with steep banks dominated by invasive species. Numerous aquatic plants are also present.

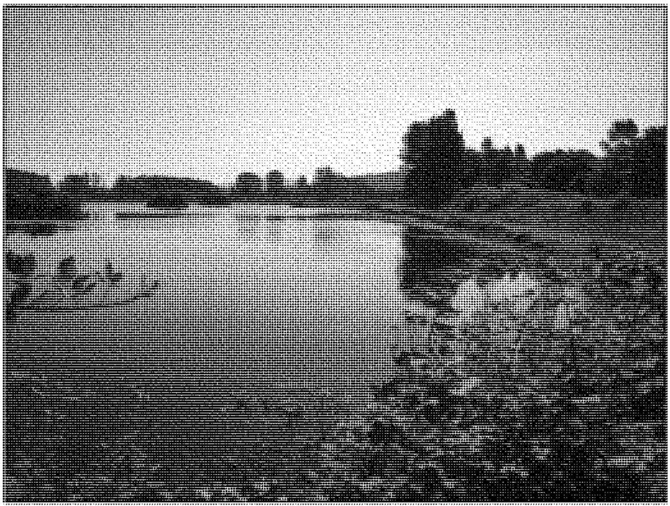


Figure 6. Site M1A, Large Gravel Pond.

Site M1B (Figure 7). This site is located on the left bank of the Middle Fork Willamette River near RM 189 and encompasses 174 acres. The site is accessible via gravel roads from Seavey Loop Road (via Site C1C) or from the Buford Access Road through Buford/Mt. Pisgah County Recreation Area. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site and several other Wildish Land Company parcels adjacent to the site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. This site has two very large gravel ponds, including one that extends for nearly one mile parallel with the Middle Fork. This pond was formerly part of the river channel, but was separated via a pushed up gravel/rock berm as restrictions on mining in the river became effective in the 1970s and 1980s. The ponds on this site are the deepest, up to around 20 feet depth. The majority of the vegetation on the site is disturbed and young aged (less than 20 years), although some older cottonwoods are also present. Numerous invasive species are present including Himalayan blackberry, knotweed, purple loosestrife, pennyroyal, and teasel. Some willows and other native species are sparsely present. Much of the upland areas are bare ground in gravel roads and access routes for gravel mining. Riprap and debris such as used concrete is present along the river bank in many areas. Few aquatic plants are present due to the depth and steepness of the pond banks.

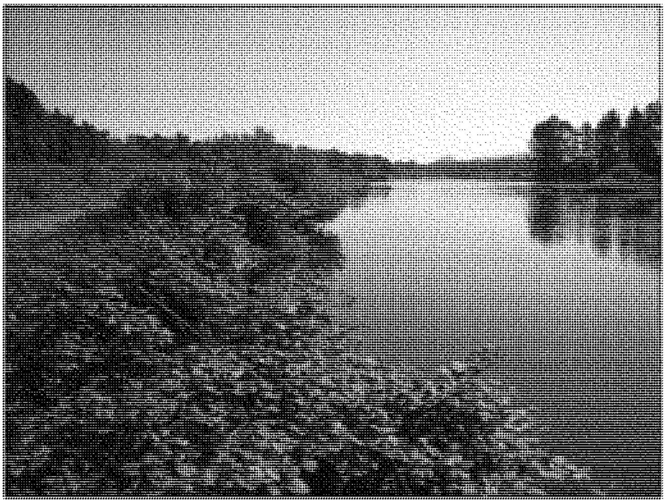


Figure 7. Site M1B, Large Gravel Pond Adjacent to River.

Site M2A (Figure 8). This site is located on the left bank of the Middle Fork Willamette River near RM 191 and encompasses 78 acres. The site is accessible via gravel roads from Buford Access Road through Site M1B. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site and several other Wildish Land Company parcels adjacent to the site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. This site is primarily forested and has shallower ponds with connection to Pudding Creek and occasional river backwatering. Vegetation includes cottonwood, various grasses and rushes and Himalayan blackberry. Oregon chub and red-legged frog are known to be present (TNC recent sampling 2011), and salmonids can access Pudding Creek during winter when the river or creek levels are high enough to connect over the roadway (more frequent than annual connection). An existing culvert intended to pass Pudding Creek under the gravel roadway on the site does not really pass flow or fish, and the creek typically flows out over the road.

Figure 8. Site M2A, Gravel Ponds and Road Crossing Flow from Pudding Creek.

3.0 DESCRIPTION OF THE ACTION

The proposed restoration plan that is the subject of this BA includes five floodplain restoration project sites totaling approximately 585 acres. The five sites are all located within the 100-year floodplains (and typically floodways) of the Coast and Middle Forks and include riparian and wetland habitats. Below are the locations and land ownership for each site. In addition, a brief summary of the key restoration elements proposed at each site is provided.

Table 2. Project Site Descriptions

Project ID	Landowner	Location	Section/ Township / Range	Acres	Project Description
C1B	Lane County	Left bank of the CF at the confluence of CF and MF	T18S, R3W, S11	90	Enhance and reconnect gravel pits on south bank of Coast Fork near confluence. Grade banks to lessen slopes, regrade onsite material into ponds to reduce depths, remove invasive species, revegetate, excavate connections between ponds and connect to river, place large wood in ponds and floodplain, install one ELJ in river.
M1A	TNC	Between MF and CF at MF RM 188	T18S, R3W, S11 and 12	150	Enhance and reconnect downstream TNC gravel pits at confluence of CF and MF. Grade banks to lessen slopes, remove invasive species, revegetate, excavate connections between ponds and connect to both rivers (backwater to MF, high-flow only to CF), place wood in ponds and floodplain, install 2 ELJs to promote scour at channel openings.
M1B	TNC	Left bank of MF at RM 189	T18S, R3W, S1 and 12	174	Restore large TNC gravel pits along MF. Remove and rebuild levee along MF to make as overflow terrace, regrade fill in floodplain into pits to provide diverse shorelines and reduce water depths, remove invasive species, revegetate, excavate connections between ponds and connect to MF, place wood in ponds.
C1C	TNC	Left bank of CF at RM 1.2	T18S, R3W, S11	80	Enhance and reconnect TNC ponds on south side of CF, excavate upstream and downstream connections, grade banks to lessen slopes, remove invasive species, revegetate, install 2 ELJs at upper end to maintain channel openings and promote channel migration.
M2A	TNC	Left bank of MF at RM 191	T18S, R3W, S8	78	Enhance and reconnect TNC ponds on back side of Mt. Pisgah to MF, excavate upstream (high-flow) and downstream (backwater) connections, grade banks to lessen slopes, remove invasive species, revegetate, install 4 ELJs to maintain channel openings and promote channel migration.

The proposed habitat restoration plan consists of the following project design elements at the proposed project sites. Each restoration site includes a combination of design features and quantities, but the primary intent at all sites are to restore and connect off-channel habitats to allow fish refuge and rearing, to install in-channel wood (ELJs) and/or place wood in floodplains and off-channel areas to provide cover and aquatic habitat diversity, and to restore diverse floodplain, riparian and wetland plant communities on the sites. Since all of the sites included in the recommended restoration plan have had some gravel mining occur in the past, they all have varying approaches to the same intent. The design features are detailed below. The proposed design features generally fit within the following 3 categories of stream restoration and fish passage that are included in the biological opinion prepared for Standard Local Operating Procedures for Endangered Species to Administer Stream Restoration and Fish Passage Improvement Actions (SLOPES IV Restoration): 1) large wood restoration; 2) off- and side-channel habitat restoration;

and 3) streambank restoration. The exception is restoration and connections of gravel mined ponds, which are not included in the SLOPES biological opinion.

3.1 Clearing

Clearing includes the removal of large rocks, boulders and debris from land for access and in advance of vegetative restoration. This item does not include removal of invasive vegetation. Clearing will be accomplished by hydraulic excavators, dozers, front end loaders, and dump trucks. Unusable rocks and debris will be removed to an off-site landfill or reuse site.

3.2 Removal of Invasive Vegetation

While it is unlikely that all invasive species can be permanently removed, the removal of these species will be to the level that planted native vegetation can more readily compete to establish a dominant community in subsequent growing seasons. Hand labor and small equipment will be used to cut and/or pull to remove invasive vegetation. Spot application of herbicide is appropriate after cutting to kill or reduce the vigor of the invasive plant stems, while also minimizing any potential for spills or over-application. The removed vegetation will be disposed of off-site, such as at a compost facility, or chipped and composted on-site. It is expected that this would occur prior to planting, and then maintenance to continue to cut and/or apply herbicide to the invasive species would be conducted for three years following construction.

3.3 Excavation

Excavation is the removal of earth for the development of side channels and pond connections and/or to regrade bank slopes or disturbed floodplain areas to provide a better planting surface (see 6.1.4: Construction of side channels and pond re-connections). Excavation limits are determined by the design details at each restoration site. Two sites – M1A and M1B – include excavation and regrading or reuse of previously-placed piles of fill or debris in the floodplain (these piles include windrows of top soil removed prior to gravel mining operations as well as piles of cobbles and other material excavated during the gravel mining operations).

Excavation will be accomplished by hydraulic excavators, dozers, front end loaders and dump trucks. Excavated materials will be placed at both on-site and off-site disposal locations. Care and diversion of water will be needed for excavations that are in or adjacent to water. This will be accomplished by placement and maintenance of temporary coffer dams and pumps. Best management practices for erosion control will be placed and maintained to avoid excessive turbidity in adjacent waterways. Work will generally be accomplished isolated from the rivers, with final connections made during the allowed in-water work windows (coordination with ODFW will be required to determine site-specific in-water work windows).

3.4 Construction of High Flow Side Channels and Pond Connections

Side channel construction involves the placement of one or more of the following: channel bed material, bank stabilization measures, streambank vegetation restoration, and riparian vegetation restoration. Bed material is typically a well graded mix of fine material and gravel and cobbles either imported from off-site sources or from suitable material on-site. Channel invert grades are designed to provide a backwater connection during the typical winter/spring flows (November to June) at the channel outlets, so grade control measures are unnecessary. Bank stabilization is accomplished using vegetation, large woody debris and root wads, and fabric as necessary. Bank and riparian restoration will include the planting of local, native vegetation species.

Connecting previously mined gravel ponds to the Coast or Middle Forks is a relatively new restoration design concept. Some stakeholders are concerned about the potential for the ponds to "capture" the river if the ponds are very deep (i.e. 50 feet and greater). Gravel mined ponds further upstream on the Middle Fork did capture the river in the 1996 flood event, but now provide a highly braided channel system and a few deep pools to the river. None of the ponds proposed in this project are deeper than 25 feet, and are typically 6-15 feet in depth.

Pond connections include the elements of side channel construction, but are typically shorter because they will be designed to achieve a backwater connection or connections between ponds using existing topographic features (following overflow channels or other existing channels), and may not typically include riparian restoration features if an existing overflow channel is simply widened and/or deepened. No frequent flow-through channels are included; some high-flow connection channels will be excavated to allow connections above a 2-year event. These channels will include roughness features to slow velocities and minimize the potential for river capture. All of the proposed pond connections will connect ponds that are within the 100-year floodplain to their respective rivers. These sites were all inundated during the 1996 flood event, but did not experience avulsions. Some sites already have partial connections below the 2-year flow, including C1C and M2A. These existing connections will be enhanced for frequent accessibility by fish.

Construction of the side channel and pond connection habitat elements will be staged to follow clearing and excavation. Bed material will be placed with excavators, front end loaders, and dump trucks. Large woody debris, root wads, and native rock materials will be placed by using a combination of machines and hand labor. Streambank and riparian vegetative plantings will be accomplished using hand labor during the fall after other construction activities are complete.

3.5 Concrete and Debris Removal

In its existing state, Site M1B includes a berm that is protected on its river-side by a privately installed revetment of miscellaneous debris and rock. This berm was created to separate a large gravel mined pond from the river during the mining operations. The M1B design includes partial removal of this private (non-Corps) revetment and replacement with wood and rock, as appropriate. Debris present on M1A and M1B would be removed as appropriate. The existing concrete and debris will be removed using excavators, dump trucks, small equipment and hand labor. The debris will be disposed of or recycled off-site.

3.6 Engineered Log Jam Construction

Engineered log jams (ELJs) are large wood structures designed to withstand 100-year flows and provide fairly long-term (i.e. 25 years or more) stable elements of habitat in otherwise more uniform channels. Their presence will trap and store additional wood that drifts down the rivers. The construction of engineered log jams requires excavation to install key pieces and driving of wooden piles to support the structures. Chains may be used to temporarily anchor the wood to the piles until sufficient sediment or additional wood has racked up on the ELJs to stabilize the structure. Cables will not be used. Ballast of river cobbles/gravel or large rock may also be used as necessary.

Large wood would be installed during low flows (within in-water work windows) using excavators, cranes, helicopters, and hand labor, as appropriate. The work sites would be isolated as much as feasible using coffer dams and/or silt curtains and dewatered if feasible to facilitate construction. Access to islands would be provided by temporary bridges or dewatering of side channels via coffer dams and pumping.

3.7 Placement of Large Wood in Floodplains and Ponds

Much of the riparian area, floodplain and the formerly gravel mined ponds in the project area are lacking in large woody debris. Large wood will be placed in vegetated floodplain areas to provide habitat diversity and cover for amphibians, reptiles, and other wildlife species. This wood will not be anchored, but will be installed in well vegetated areas, particularly floodplain forested areas where it is unlikely that the wood could be floated back into the river during a flood event. It is expected that this material will move somewhat around the floodplain over time, but will not cause a navigation hazard. Wood placed in restored ponds will be anchored with large rock or keyed into banks. This wood will provide cover for fish species as well as perching or basking habitat for wildlife.

Rootwads and large woody debris, cut to specified dimensions, will be obtained from a local source. The rootwads will be placed using an excavator, dump truck, small equipment, and hand labor. Large woody debris will be placed using small equipment and hand labor.

3.8 Riprap Installation

Riprap may be used, only as necessary, to protect culvert footings, as part of a bioengineered bank with installed wood and vegetation to protect the toe of the existing berm at site M1B and the flow-through notches from hydraulic scour and potential avulsions. It will only be used as necessary, particularly on the M1B site where erosive forces could be high and where there could be the potential for the large gravel pits to "capture" the river. All connection channels to gravel mined ponds are designed to either function as backwater connections with low velocities, or to connect above the 2-year flow event when water spreads out on many floodplain areas and velocities are reduced in the roughened floodplain. Riprap will only be used following the guidelines in the NMFS SLOPES IV Roads, Culverts, and Bridges Biological Opinion (NMFS 2008b). Riprap will be placed using a hydraulic excavator.

3.9 Culvert Installation

In a few locations, new side channels and pond connections cross existing roads or trails that will be preserved. In these cases, the channels will be passed under the road in three-sided culverts that, in addition to providing hydraulic capacity, provide a natural bottom and room for the channel to meander slightly. The culvert size will be determined with hydraulic design calculations and will meet the State of Oregon's requirements for fish passage. Culvert construction will be staged to occur during the construction of the affected side channels or pond connections. Culvert installation will be conducted with mechanized equipment, and when necessary will include the pouring of concrete footings below the soil surface.

3.10 Reshaping Pond Banks

The ponds that currently exist in the floodplain of the project sites are mostly remnants of historical gravel mining activities, and thus have typically steep banks. The steep banks provide little habitat for fish, insects, aquatic and riparian plants, and primary production. Regrading and reshaping the pond banks to a much gentler slope will create shallow water habitat, wetland areas, and a much larger and more extensive riparian zone. It will also allow reptiles and other species better access to and from the ponds.

Pond bank reshaping consists of excavating the upper portion of the bank back to a 5:1 (H:V) slope or gentler and then pushing that bank material and other regraded material into the ponds to create shallow water and wetland habitats. High ground above the pond will be graded to a design slope by excavation using a front end loader or an excavator. The excavated material will be deposited below the water line inside the pond banks to create the shallow water habitat. The disturbed areas will be restored with bank and riparian vegetative plantings using a combination of machines and hand labor.

3.11 Constructing Footpath Bridges

Footpath trails intersect new side channels at two sites, so in order to maintain the existing pedestrian access, pedestrian bridges will be installed. The design includes the installation of prefabricated pedestrian bridges to cross these channels. The bridge material and design parameters will vary from location to location, but will be either wooden or aluminum/steel prefabricated bridge with concrete abutments on the banks. The trails may need minor grading to match the bridge approaches. Hydraulic modeling will be performed to set the bridge low chord elevation and determine appropriate bridge spans to meet fish passage requirements. The bridges will be constructed using excavators and a crane.

3.12 Gravel Road Obliteration

Site C1C features the removal of a small, little-used gravel road that parallels the Coast Fork Willamette River bank. In order to maximize the efficacy of a restored riparian corridor, the road will be excavated down to remove compacted rock and the soil will be ripped to facilitate planting of native vegetation in its place. A nearby road will be preserved to allow access to this area of the site. The gravel road will be obliterated by excavating the surface material and subgrade using front end loaders and dump trucks. The material will be disposed of off-site. The road bed will be replaced with topsoil using dump trucks and front end loaders, and will be revegetated.

3.13 Vegetative Plantings

Native vegetation species will be planted at all sites. The primary plant community that will be planted will be the riparian community, dominated by black cottonwood, red alder, Oregon ash, incense cedar, Douglas fir, and a variety of shrub species. At sites with extensive tree cover, currently, the invasive understory will be removed and then replanted with appropriate riparian underplantings of shrub and conifer species. At sites with gravel pits, the shallow water and wetland zones will be planted with emergent wetland vegetation.

4.0 CONSERVATION MEASURES

It is planned for this proposed action to comply with relevant conservation measures included in the SLOPES IV Restoration Biological Opinion (NMFS 2008a). These conservation measures include those listed below.

General Construction Conservation Measures.

1. Flagging Sensitive Areas. Sensitive resources that should not be disturbed during construction will be flagged and protected during construction.
2. Temporary Erosion Controls. Temporary erosion controls will be installed, as appropriate, before any significant alteration of the action site occurs.
3. Temporary Access Roads. Temporary access roads will not be built on steep slopes, where grade, soil, or other features suggest a likelihood of excessive erosion or failure. For the most part, existing access roads are present, and only limited additional access would be required.
4. Fish Passage. Fish passage will be provided for any adult or juvenile fish present in the action area during construction, or will be salvaged and removed. All reconnection channels and passageways will meet NMFS fish passage criteria.
5. In-water Work Period. All work below the ordinary high water line will occur during the designated ODFW in-water work periods for the Lower Coast and Middle Forks of the Willamette River, as appropriate. These in-water work periods are generally listed in the Oregon Guidelines for Timing of In-water Work to Protect Fish and Wildlife Resources (ODFW 2000, or most recent version), but are then more specifically determined by coordination with ODFW staff, and coordination with ODFW will happen accordingly for this project. For work in the off-channel gravel ponds, coordination with ODFW will occur to determine if these waters can be considered "isolated" and whether work within these isolated work areas can be allowed outside of the normal fish windows.
1. Work Area Isolation. Any work within the wetted channel will be isolated from the Coast or Middle Forks and any upstream tributaries by installation of coffer dams and other measures, as appropriate. A work area isolation and fish salvage plan will be prepared for each site for approval by ODFW and NMFS and carried out with a Scientific Collection Permit. Fish and wildlife will be salvaged and removed from the work area. Any pumps used outside of isolated areas will be screened per ODFW requirements. Any groundwater present in the excavation area will be pumped and treated via infiltration or other methods (such as Baker tanks) prior to discharge back to either the river or wetlands.
6. Fish Capture and Release. Any fish that may be trapped within the isolated work area will be captured and released using a trap, seine, electrofishing, or other methods as prudent to minimize the risk of injury, then released at a safe release site. A scientific collection permit will be obtained to conduct this work, with approval of the fish salvage plan from NMFS and ODFW. Capture and release will be supervised by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of fish. If electrofishing is used, the NMFS electrofishing guidelines will be followed (NMFS 2000).
7. Fish Screens. It is not likely that the proposed work will require any pumping in excess of 3 cfs or diversion of any waterbodies aside from Pudding Creek. Any diversions required will have a fish screen that is installed, operated, and maintained that meets NMFS fish screen criteria (NMFS 2008, or most recent version).
8. Erosion and Pollution Control Plan. An erosion and pollution control plan will be prepared for each individual project site and carried out, commensurate with the scope of the action that includes the following information: (a) the name, phone number, and address of the person responsible for accomplishing the plan; (b) best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the

action, and otherwise prevent or minimize erosion associated with the action; (c) best management practices to confine, remove, and dispose of construction waste, including debris, discharge water, concrete, cement, grout, washout facility, petroleum product, or other hazardous materials generated, used, or stored on-site; (d) procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities; and (e) steps to cease work under high flows, except for efforts to avoid or minimize resource damage.

9. Choice of Equipment. Heavy equipment will be limited to that with the least adverse effects on the environment.
10. Staging Area. Preference for staging areas to be located more than 150 feet from rivers or wetlands; however since the project sites include many waterbodies (gravel ponds), this may not be feasible. If the staging area(s) will be located within 150 feet of the river or the wetlands, they will be fenced and contained to prevent the runoff of sediment or pollutant laden stormwater into the river or wetlands. Vehicles and equipment will be inspected daily for fluid leaks before leaving the staging area when operating within 50 feet of any stream, waterbody, or wetland and the equipment will be steam cleaned before operation below the ordinary high water or as necessary to remain grease free. Biodegradable lubricants and fuels will be used as available.
11. Work from Top of Bank. To the extent feasible, heavy equipment will work from the top of the bank.
12. Site Restoration. Any temporary access routes constructed will be removed in their entirety and the locations will be restored via mulching and hydroseeding and then planting of native shrub and tree species. Any fill placed in wetlands for temporary construction purposes will be removed and the area will be restored. Any large wood, native vegetation, topsoil and native channel material displaced by construction will be stockpiled for reuse on-site during restoration, as feasible. When construction is complete, all disturbed areas will be restored as necessary to renew ecosystem processes. Fencing will be installed as necessary to prevent damage to newly revegetated sites by livestock or unauthorized persons.
13. Large Wood Condition/Use. Key pieces of large wood that will be relied upon to provide streambank stability or redirect flows will be intact, hard, undecayed logs of the specified engineering design length and diameter with untrimmed rootwads.
14. Streambank Shaping. Streambank shaping will occur to restore regraded banks to a more natural or stable slope suitable for establishment of permanent woody vegetation without changing the location of the bank toe. Rock riprap will only be used when absolutely necessary to prevent catastrophic avulsion or erosion conditions or for the stabilization of large wood structures.
15. Soil Reinforcement. Soil reinforcement earthwork will occur in the dry with the use of biodegradable fabrics that are penetrable by plant roots.
16. Planting or Installing Vegetation. A diverse mix of native species adapted to the site conditions will be used for all revegetation efforts. Non-native or invasive species will not be included. Existing non-native or invasive species will be controlled as feasible on the site to promote native vegetation growth and dominance.
17. Monitoring and Adaptive Management. A monitoring plan to track the success of the restoration features will be developed.

5.0 STATUS OF THE SPECIES

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species. Twelve threatened or endangered species may be found in the project area (Table 3). Also, see Figure 9 for salmonid presence in the action area. While steelhead are present in the action area, the ESU for Upper Willamette River steelhead does not include the action area and are thus, not discussed in this BA. The following sections briefly summarize relevant life history information on the protected species and their presence and utilization of the project and action area.

Table 3. Listed Species that may occur in the Project Vicinity.

Species	Listing Status	Critical Habitat
Marbled murrelet *Brachyramphus marmoratus*	Threatened	Designated None in Action Area
Northern spotted owl *Strix occidentalis caurina*	Threatened	Designated None in Action Area
Upper Willamette River Chinook Salmon *Oncorhynchus tshawytscha*	Threatened	Designated Middle Fork Willamette River
Oregon chub *Oregonichthys crameri*	Threatened	Designated Middle Fork Upstream of Project Area (Elijah Bristow State Park)
Bull tront *Salvelinus confluentus*	Threatened	Designated Middle Fork Willamette River
Fender's blue butterfly *Icaricia icarioides fenderi*	Endangered	Designated None in Action Area
Willamette daisy *Erigeron decumbens var. decumbens*	Endangered	Designated None in Action Area
Bradshaw's desert parsley *Lomatium bradshawii*	Endangered	Not Designated
Kincaid's lupine *Lupinus sulphureus ssp. kincaidii*	Threatened	Designated None in Action Area

5.1 Marbled Murrelet, Threatened

The marbled murrelet was federally listed as threatened on October 1, 1992 (57 FR 45328). Critical habitat was designated on May 24, 1996 (61 FR 26256) and revised on October 5, 2011 (76 FR 61599). Critical habitat in Oregon is only located within the Coast Range. In Lane County, all critical habitat for marbled murrelet is located west of the Willamette Valley.

Marbled murrelets are small seabirds of the family Alcidae that occur along the north Pacific coast from the Aleutian Islands and southern Alaska south to central California. Murrelets feed on small fish and invertebrates usually within 2 miles of shore in open but somewhat sheltered marine waters, such as bays or sounds where water depth is less than 330 feet (Carter 1984). The nesting period begins around the end of March and continues through mid-September (Hamer and Nelson 1995). Nest sites are restricted to stands of mature and old-growth forest (Carter 1984). Because of the scarcity of such stands, it is common for murrelets to fly inland many miles to nest; over 40 miles in some studies (Cooper et al. 2006, 2007). Marbled murrelets only fly to and from their nest sites during crepuscular hours, spending their diurnal hours foraging. The loss of old growth forests is the main cause for the decline of this species. In addition, it is believed that forest fragmentation forces nests closer to forest edges making them vulnerable to predation by jays, crows, ravens, and great horned owls. Other threats to this species include fishing nets and oil spills.

5.1.1. Utilization of the Action Area

There is no designated critical habitat in the action area. Marbled murrelets require old growth forest to nest and proximity to marine areas for feeding. Marbled murrelets are unlikely to be present in the action area.

5.2 Northern Spotted Owl, Threatened

The Northern spotted owl was first listed on June 26, 1990 (55 FR 26114) and is currently designated as threatened in its entire range. Critical habitat was designated on January 15, 1992 (57 FR 1796) and revised on August 13, 2008 (73 FR 47326). Critical habitat is located in coniferous forested lands in both the Coast Range and Cascades of Oregon. In Lane County, critical habitat for the Northern spotted owl is primarily located adjacent to and upstream of the Corps dams on the Coast Fork, Middle Fork, and McKenzie Rivers.

The Northern spotted owl is a forest bird that inhabits old-growth or late successional coniferous and mixed conifer-hardwood forest with multilayered canopies over a range extending from southwestern British Columbia south to San Francisco Bay (USFWS 1992). Northern spotted owls can be found throughout the west slope of the Cascade Range below elevations of 4,200 ft. in areas with habitat characteristics of moderate to high canopy closure, large overstory trees, substantial amounts of standing snags, in-stand decadence, and coarse woody debris of various sized and decay classes scattered on the forest floor (USFWS 2008). Northern spotted owls do not build their own nests but rely on naturally occurring nest sites, such as broken tree tops and cavities. In Oregon they only successfully breed in late-successional mixed conifer forests, usually dominated by Douglas fir (Csuti, *et al.* 2001). Critical habitat for Northern spotted owl was revised on August 22, 2008 and does not include the project area.

5.2.1. Utilization of the Action Area

Mature upland coniferous forests provide suitable foraging and nesting habitat for the spotted owl. Other habitats may provide foraging or dispersal habitat for the species. Critical habitat is located approximately from Dexter Dam and upstream on U.S. Forest Service lands in the Middle Fork subbasin. Several spotted owls have been located near Fall Creek Lake. Additional spotted owl activity centers are likely found at or near the Hills Creek project on Willamette National Forest lands (USACE 2000a).There are no known occurrences of Northern spotted owl in the action area; floodplains and lowlands along the lower Coast and Middle Forks of the Willamette River.

5.3 Upper Willamette River Chinook, Threatened

The Evolutionary Significant Unit (ESU) for the Upper Willamette River Chinook salmon was listed as threatened on March 24, 1999 (64 FR 14308) and that status was reaffirmed on June 28, 2005 (70 FR 37160) and the five-year status review completed on August 15, 2011 (76 FR 50448) confirmed that Chinook should remain listed as threatened. Critical habitat was designated on September 2, 2005 (70 FR 52630) and includes all river reaches within the Middle Fork Willamette River action area.

Chinook require clean, cool water and clean gravel to spawn. Females deposit their eggs in the gravel substrate in areas of relatively swift water, hatching approximately 6-12 weeks later. Chinook prefer to spawn in the mainstem of large tributaries (Healey 1991). Larvae remain in the gravel for another 2-4 weeks until the yolk is absorbed (Moyle 1976). For maximum survival of eggs and larvae, water temperatures must range between 41°F and 57°F. Optimum rearing habitat for Chinook consists of pools and wetland areas with woody debris and overhanging vegetation. Chinook salmon typically spend 2-4 years maturing in the ocean before returning to their native streams to spawn. All adult Chinook salmon die after spawning.

5.3.1 Utilization of the Action Area

Native spring Chinook salmon existed, but were never likely abundant, in the Coast Fork subbasin (USACE 2000a). The Dorena and Cottage Grove dams currently block upstream access to historic spawning areas, although significant suitable spawning habitats were also historically present in the lower river (McIntosh, *et al.* 1989). Low flows and warm water discharge from the two dams are believed to reduce the productivity of Chinook salmon below the dams (USACE 2000a).

The Middle Fork subbasin was a major natural production area for spring Chinook salmon in the Willamette Basin. In 1947, the spring Chinook run into the Middle Fork Willamette was estimated to comprise 21% of the spawning population above Willamette Falls (USACE 2000a). Dexter and Fall Creek dams blocked approximately 80% of habitat historically accessible to spring Chinook salmon in the Middle Fork subbasin (ODFW 1990; USACE 2000a). The current population of spring Chinook in the Middle Fork subbasin is derived almost entirely from hatchery stock (NMFS 2008c).

Historically, spring Chinook salmon in the Middle Fork subbasin spawned in Fall Creek, Salmon Creek, the North Fork of the Middle Willamette River, Salt Creek, and the mainstem Middle Fork Willamette River (Parkhurst *et al.*, 1950; NPCC 2004a). Mattson (1948) estimated that 98% of the 1947 run in the Middle Fork system spawned upstream of the Lookout Point Dam site. Construction of these dams restricted the population to only 20% of its historically accessible area, below Dexter/Lookout Point, which was not generally considered to have suitable spawning habitat (McIntosh *et al.*, 1995). In 1998, 10 redds were observed in the reach between the town of Jasper and Dexter Dam, which was not used for spawning before the dams were built (Lindsay *et al.*, 1999). Key limiting factors include the lack of access to historic spawning areas, high pre-spawning mortality of adults (from high water temperatures and crowding at the dams), altered water temperatures during the incubation period downstream of the dams, lack of gravel recruitment downstream of the dams, and loss of channel complexity and habitat formation due to reduced peak flows (NMFS 2008).

Spring Chinook are present in the action area (see Table 4) from May through November as adults and year-round as juveniles. Yearlings migrate downstream typically from March through May.

5.4 Oregon Chub, Threatened

The Oregon chub was listed as endangered in 1993. A recovery plan was published in 1998. Critical habitat was designated on March 10, 2010. The species' status has recently improved, and on April 23, 2010, the USFWS downlisted the classification of the Oregon chub from endangered to threatened. When the species was listed in 1993, there were eight known populations. By 2007, there were 38 known populations and this met the recovery criteria for downlisting. Critical habitat has been designated specifically as 25 units representing 132 acres of habitat within the mainstem Santiam, North Santiam, South Santiam, McKenzie, mainstem Willamette, and Middle Fork Willamette Rivers subbasins. For the Middle Fork, 11 ponds, sloughs, and/or alcoves have been designated as critical habitat. Two sloughs and one pond are located within Elijah Bristow State Park at the upper end of the Action Area, but upstream of any proposed restoration actions.

Oregon chub are endemic to the Willamette River drainage of western Oregon. The current Oregon chub population is limited to the Santiam River, Middle Fork Willamette River, Coast Fork Willamette River, and several small tributaries to the mainstem Willamette River downstream of the Coast Fork/Middle Fork confluence. (USFWS 1998).

Oregon chub prefer slack water, off-channel habitats with minimal water flow, including beaver ponds, oxbows, side channels, backwater sloughs, low gradient tributaries, and flooded marshes. Oregon chub are typically found in waters that exceed 16°C in the summer and have an average depth greater than 6.6 feet (2 m). Dense, aquatic vegetation is also characteristic of Oregon chub habitat, and is used for cover in hiding and spawning. Oregon chub prey on water column fauna, primarily on small crustaceans. Spawning takes place between April and September under dense aquatic cover within the water column (USFWS 1998).

5.4.1 Utilization of the Action Area

Oregon chub were found historically in the Coast Fork Willamette River (NPCC 2004). Three records exist for chub presence near Cottage Grove (1950), Saginaw (1967), and Dorena (1958) in the Coast Fork subbasin. Currently, there is one natural and one introduced population near Creswell and in the upper Layng Creek drainage, respectively. The presence of nonnative predatory fish and bullfrog, and the loss of off-channel habitats limit chub recovery. No critical habitat has been designated in the Coast Fork subbasin.

Oregon chub were found historically in the Middle Fork Willamette River at least up to Oakridge (NPCC 2004; USFWS 1998a). Currently, there are 8 populations in the Middle Fork subbasin with 500 or more individuals and over 16 sites of known occurrence (USFWS 2010). Within the study area, Elijah Bristow State Park has two populations and three areas designated as critical habitat. Oregon chub have been captured in the Springfield Millrace (J. Ziller, ODFW, pers. comm.), and at Site M2A (L. Bach, TNC, pers. comm.). Oregon chub are likely to occur year-round throughout the action area (see Table 4 for timing information).

5.5 Bull Trout, Threatened

The Klamath River and Columbia River segments of the bull trout population were listed as a threatened species on June 10, 1998 (63 FR 31647) and the entire co-terminus U.S. population of bull trout was confirmed as threatened on November 1, 1999 (64 FR 58910). Critical habitat was designated on October 6, 2004 (69 FR 59996) and revised on October 18, 2010 (75 FR 63898). Critical habitat includes all reaches of the Middle Fork Willamette River in the Action Area.

The historic bull trout range extended throughout the Columbia River Basin, east to western Montana, south to the Jarbidge River in Nevada, the Klamath Basin in Oregon, and the McCloud River in California, and north to Alberta, British Columbia and possibly southeastern Alaska. The main populations existing in the lower 48 states today are in Montana, Idaho, Oregon, and Washington. Bull trout were historically present in the Willamette River and its tributaries, including the Middle Fork Willamette, McKenzie River, Santiam River and Clackamas River (USFWS 1998b).

Bull trout have habitat requirements that are more specific than other salmonids. Colder streams are preferred. In Oregon, trout were rarely found in streams above 15°C. Stream temperature also influences spawning and hatching. Spawning was triggered in an Oregon river when temperatures fell below 48° F (9°C) (Riehle 1993) and in British Columbia 80-95% of eggs hatched if water was between 2-4°C (McPhail and Murray 1979). Eggs incubate 4 to 5 months, hatching in late winter or early spring. Fry may remain in streambed for up to 3 weeks. Substrate and stream bottom conditions have been correlated to abundance of juvenile bull trout (Rieman and McIntyre 1993) and spawning site selection by adults (McPhail and Murray 1979). Bull trout prey on terrestrial and aquatic insects primarily, but become piscivorous, as they grow larger, and prey on whitefish, sculpins, and other salmon and trout.

5.5.1 Utilization of the Action Area

Little information exists on the historical distribution and abundance of bull trout in the Middle Fork subbasin (NPCC 2004). Buchanan, *et al.* (1997) reported that historical distribution of bull trout included the mainstem Middle Fork Willamette from its confluence with the Willamette River upstream to its headwaters, including Salmon and Salt Creeks below Hills Creek Reservoir, as well as the Middle Fork

Willamette above Hills Creek Reservoir, including Swift and Staley Creeks. It is likely that historical overwintering and foraging would have extended bull trout distribution into many other tributaries in the subbasin, including the North Fork of the Middle Fork Willamette River. The recent known distribution of bull trout occurs only in the upper Middle Fork subbasin from Chuckle Springs to Hills Creek Reservoir.

No bull trout were identified during extensive surveys in the Middle Fork subbasin in the early 1990s (NPCC 2004). Buchanan, *et al.* (1997) listed bull trout as probably extinct. A plan to rehabilitate bull trout in the upper Middle Fork subbasin was approved by the Willamette Basin Bull Trout Working Group in 1997. Beginning in 1997, bull trout fry from Anderson Creek in the McKenzie River subbasin were reintroduced into four cold-water springs and four creeks above Hills Creek Reservoir by the Forest Service and ODFW (NPCC 2004). Monitoring has shown good growth and survival of juvenile bull trout in the release sites (ODFW 2001). Adult bull trout are once again present in the Middle Fork Willamette. In 2005, ODFW and USFS began spawning gravel augmentation near fry release sites to create spawning habitat in critical habitat areas. An increase in monitoring of juvenile production and spawning in 2005 resulted in 20 spawning redds identified in the Middle Fork Willamette River from FS Road 2143 Bridge to Tumblebug Creek. Bull trout were not observed on redds but further monitoring may document a naturally producing population of bull trout in the upper Middle Fork subbasin.

Bull trout are unlikely to be present in the action area as the only population known to be present is upstream of the dams in the Middle Fork subbasin. Critical habitat is present in the action area, but high water temperatures may preclude the use of the action area during summer and fall. If any bull trout are present in the action area, they could potentially use the Middle Fork during winter and spring when water temperatures are low for rearing.

5.6 Fender's Blue Butterfly, Endangered

The Fender's blue butterfly was federally listed as endangered on January 25, 2000 (65 FR 3875). Critical habitat was designated on October 31, 2006 (71 FR 63862). Critical habitat designated within Lane County is located in West Eugene at several specified sites. Critical habitat is not present in the action area.

Fender's blue butterfly is confined in range to the native grassland habitats within the Willamette Valley. Fender's blue butterfly populations are present at 31 remnant prairie sites in Polk, Yamhill, Benton, and Lane counties. Most sites occupied within the valley are on the western side, within 50 miles of the Willamette River. Twenty-three of these sites occur on remnants less than 8.3 acres in size, and eighteen of the 31 populations consist of less than 50 individuals. (USFWS 2000)

The butterfly's host plant is primarily Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), but they will also use spurred lupine (*L. laxiflorus*), and sickle keeled lupine (*L. albicaulis*) if Kincaid's lupine is not present. Kincaid's lupine serves as the sole source for larval food and oviposition sites.

Adult butterflies lay their eggs on perennial Lupinus species (Ballmer and Pratt 1988). Larvae remain in the leaf litter near the base of the host plant through fall and winter, at a minimum, and typically become active in March or April of the following year. When diapause ends, larvae continue to feed and grow through an additional four instars. At this point, larvae enter their pupal stage and adults emerge in April and May. A complete life cycle can occur in one year.

5.6.1 Utilization of the Action Area

There is no designated critical habitat in the action area. There are no known occurrences of Fender's blue butterfly on any of the proposed project sites, and there are no identified potential habitat areas because no native grasslands occur on any of the project sites and no native lupine species are known to be present. It is unlikely that Fender's blue butterfly is present in the action area.

5.7 Willamette Daisy, Endangered

The Willamette daisy (*Erigeron decumbens* var. *decumbens*) is an endemic species to the Willamette Valley and was listed as endangered on January 25, 2000 (65 FR 3875). Critical habitat was designated on October 31, 2006 (71 FR 63862). Critical habitat designated within Lane County is located in West Eugene at several specified sites. Critical habitat is not present in the action area.

Since 1980, only 28 occurrences have been documented in Polk, Marion, Linn, Benton, and Lane Counties, Oregon. This perennial herb is endemic to the Willamette Valley and historically was likely widespread in native prairie habitat. Willamette Valley prairie is considered to be among the rarest habitats in western Oregon and is threatened by fragmentation, agriculture and urban growth (USFWS 2002).

Native wetland prairie is characterized by the seasonally wet tufted hairgrass (*Deschampsia cespitosa*) community, which grows in low, flat regions of the Willamette Valley where flooding creates anaerobic and strongly reducing soil conditions (USFWS 2000). The Willamette daisy produces large amounts of wind-dispersing seeds that are released in July and August. The short stature of the daisy likely limits long-distance travel of its wind-dispersed seeds. Syphrid flies and solitary bees carry out pollination, and flowering typically occurs in June and July. The daisy is also capable of vegetative spreading and can commonly be found in large clumps throughout a site (USFWS 2000).

5.7.1 Utilization of the Action Area

There is no designated critical habitat in the action area. There are no recorded occurrences of this plant from the OBIC (2011) database in the project vicinity. No native wetland prairie communities are present in the project area. It is unlikely that the Willamette daisy is present in the action area.

5.8. Bradshaw's Desert Parsley, Endangered

Bradshaw's desert parsley (*Lomatium bradshawii*) is a plant endemic to western Oregon and Washington and was listed as endangered on September 20, 1988 (53 FR 38448). No critical habitat has been designated.

This perennial herb occurs on seasonally saturated or flooded prairies, adjacent to creeks and small rivers in the southern Willamette Valley. Endemic to and once widespread in the wet, open areas of the Willamette Valley, Bradshaw's desert parsley is now limited to a few sites in Lane, Marion, and Benton counties.

This relatively inconspicuous member of the parsley family (Apiaceae) flowers in April and May, with fruit apparent in late May and June. During much of its blooming period, Bradshaw's desert parsley is the only yellow flower in its habitat (Kagan 1980), which aids its detection. After flowering, the plants produce large seeds that are quite noticeable and characteristic of the genus. The seasonally flooded tufted hairgrass (*Deschampsia cespitosa*) meadow community is the most common habitat for the species, it also occurs rarely in shallow, stream-covered basalt areas (USFWS 1993). Invasion by trees and shrubs, changes in hydrology (flood pattern and movement) critical to seed establishment, as well as urban, agricultural, and rural development are attributed to the decline of Bradshaw's desert parsley. Most of this plant's habitat has been destroyed by land development for agriculture, industry, and housing. In addition, water diversions and flood control structures have changed historic flooding patterns, which may be critical to seedling establishment (USFWS 2003).

5.8.1 Utilization of the Action Area

In Lane County, the greatest concentrations of remaining sites where plants occur are in and adjacent to the Eugene metropolitan area. There are recorded occurrences of Bradshaw's desert parsley in the project vicinity in the OBIC (2011) database, so it is likely that Bradshaw's desert parsley is present in the project vicinity. Basalt bedrock outcrops occur in multiple locations along the Coast Fork Willamette River and may provide suitable habitat for Bradshaw's desert parsley.

5.9 Kincaid's Lupine, Threatened

Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) occurs in the native grassland habitats within the Willamette Valley and was listed as a threatened species on January 25, 2000 (65 FR 3875). Critical habitat was designated on October 31, 2006 (71 FR 63862). Critical habitat designated within Lane County is located in West Eugene at several specified sites. Critical habitat is not present in the action area.

Specifically, this lupine is found in native upland prairie characterized by red fescue (*Festuca rubra*) and/or Idaho fescue (*Festuca idahoensis*) dominance and heavier soils with mesic to slightly xeric soil moisture levels.

Kincaid's lupine is a perennial forb in the Legume family (Fabaceae) that may live as long as 25 years. Seed production is low, with few numbers of flowers producing fruit each year. Each fruit typically produces less than 2 seeds (USFWS 2000). Seeds disperse as fruits open explosively upon drying. Solitary bees and flies carry out pollination. Individual plants may spread via rhizomes and produce clumps of plants greater than 6 feet in diameter (USFWS 2000). However, rhizomes do not produce adventitious roots, making clumps short-lived that regularly die back to the crown.

5.9.1 Utilization of the Action Area

There is no designated critical habitat in the action area. Willamette Valley prairie is considered to be among the rarest habitats in western Oregon and is threatened by fragmentation, agriculture and urban growth (USFWS 2003). There are no recorded occurrences in the project vicinity in the OBIC (2011) database. It is unlikely that Kincaid's lupine is present in the action area.

5.10 Bald Eagle, Delisted

The bald eagle was formally delisted from the federal Endangered Species Act in 2008 but remains protected under the Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712), and the Bald and Golden Eagle Protection Act of 1940, as amended (16 USC 668-668d). Bald eagles (*Haliaeetus leucocephalus*) breed along the southeastern coast of Alaska east across Canada and south to California and Florida. Winters are spent along lakes, rivers, marshes and seacoasts in much of the United States. Bald eagles are considered uncommon to locally common throughout the Willamette River Valley and its watershed during winter; migrants from north of Oregon begin arriving in late October and November (Gilligan 1996). The number of wintering bald eagles varies considerably, often depending upon weather and food availability both locally and elsewhere, but peak numbers occur during January and February. Eagle diets vary seasonally and geographically, but fish is the primary prey in Oregon, as in most areas (Frenzel 1984).

Bald eagles nest in open, mature forests near water. Nests are often located in large snags or old-growth trees (Brown 1999) where the canopy closure is greater than 40% (Call 1978). The tree species is less important than the diameter or height of the tree; eagles will typically build their stick platform nests in the largest trees available. Clutch size is usually two each year, but varies from one to three eggs (Brown 1999). Incubation duration is typically 34-36 days. Young are semi-altricial and hatch asynchronously (Ehrlich, *et al.* 1988). Fledging occurs 70 to 98 days after birds are hatched, and breeding age occurs at 4 to 5 years (Brown 1999). In Oregon, bald eagles typically begin exhibiting courtship and nesting behaviors in January with egg laying and incubation occurring in February and March. Young area reared throughout April, May, and June, and fledging occurs in July and August (Isaacs, *et al.* 1983). Most eagles that breed in Oregon winter in the vicinity of their nests.

5.10.1 Utilization of the Action Area

Eagle Rock is a 200-acre sensitive area managed for the protection of bald eagles near the Lookout Point Reservoir. The eagles frequently forage in Dexter Lake especially in the winter months and in the nest initiation season. They also have been observed flying over Lowell Butte to forage in Fall Creek Lake and fishing in the river below Dexter Dam. Bald eagles have been observed at Fall Creek but no nest sites have been identified. Bald eagle territories also are found on Forest Service land at Hills Creek, on BLM land at Dorena, and on private land at Cottage Grove (USACE 2000a). Bald eagles are likely to be present in the action area.

Table 4. Life Stage Timing for ESA-listed Fish Species.

Species	Life Stage/Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spring Chinook	Upstream Migration					░	▓	▓	░	░			
	Spawning									▓	░		
	Incubation	░	░										
	Juvenile Rearing	░	░	░	░	░	░	░	░	░	░	░	░
	Smolt Outmigration			▓	░	░						▓	░
Bull Trout	Upstream Migration						▓	▓	▓	░	░		
	Spawning									▓	▓	░	
	Incubation	░	░	░	░	░				░	░	░	░
	Rearing	░	░	░	░	░	░	░	░	░	░	░	░
Oregon Chub	Spawning				░	░	░	░	░	░			
	Incubation				Chub incubation is for approximately one week after spawning.								
	Rearing	░	░	░	░	░	░	░	░	░	░	░	░
		▓	Darker shade indicates peak times.										

Source: Adapted from USACE 2000a (compiled from ODFW 1990; Taylor and Reasoner 1998; Unthank 1999; Scheerer 1999).

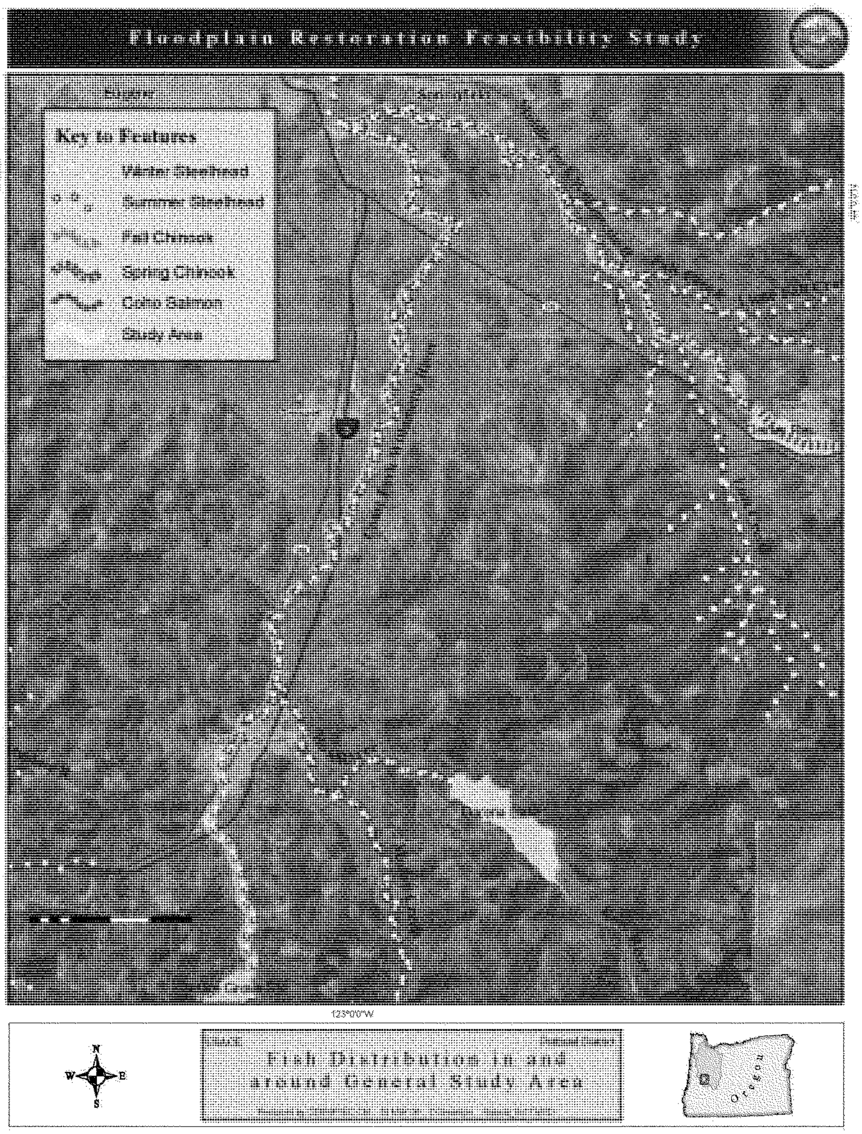


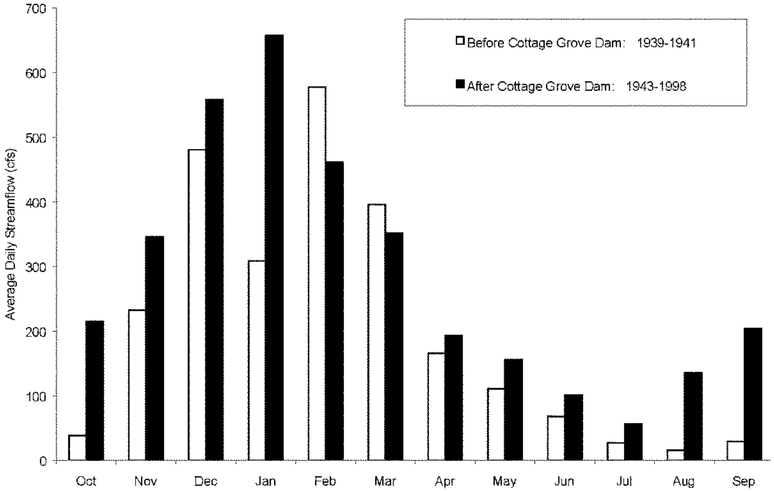
Figure 9. Salmonid Distribution in the Study Area.

6.0 ENVIRONMENTAL BASELINE

6.1 Coast Fork Willamette River Subbasin

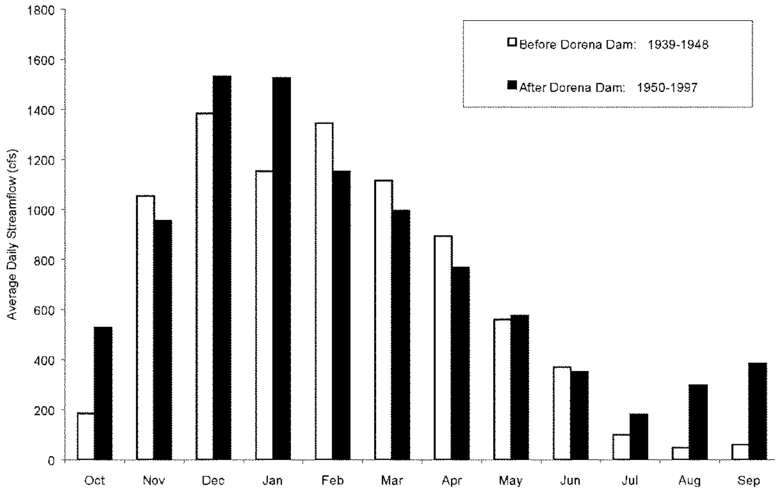
Flows in the lower Coast Fork Willamette River have been controlled by Dorena and Cottage Grove dams since1949 and 1943, respectively. The dams have substantially decreased the magnitude and frequency of extreme high flow events in the Coast Fork Willamette and Row Rivers. Additionally, the dams have decreased the magnitude of lower return period channel forming flood events (USACE 2000). Flood frequency analysis conducted by the USACE-Portland District for the USGS Gage at Goshen (USGS 14157500) has shown that the 2-year return period flood event is 15,800 cfs for the regulated condition, as compared to 26,700 cfs for the unregulated condition (OSU 2007); see Table 4 for flows for various frequencies of occurrence under existing conditions. The bankfull flow and regulation goal at Goshen is 12,000 cfs, so flows are typically maintained to this level unless runoff is above the 2-year return event.

Figures 10 and 11 illustrate the pre- and post-dam changes in average monthly flows below Cottage Grove and Dorena dams. In the Coast Fork subbasin, flows are naturally lowest in the late summer and early fall. The average daily flow of the Coast Fork Willamette near Goshen in August was 95 cfs prior to dam construction, which increased to 481 cfs after dam construction (USACE 2000).



Data from USGS gage 14153500 (USACE 2000a).

Figure 10. Average Monthly Flows, Coast Fork Willamette below Cottage Grove Dam.



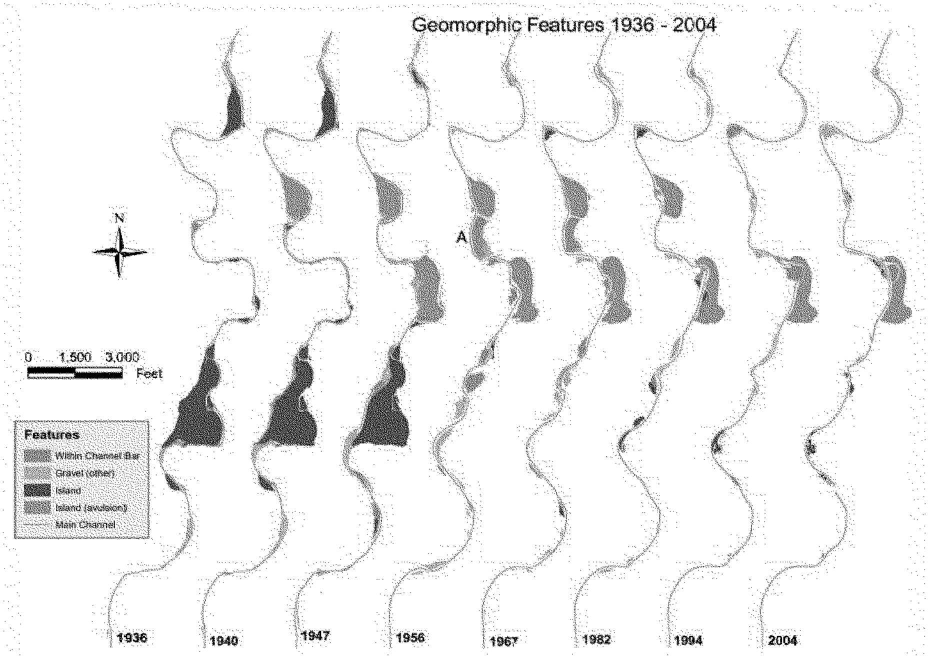
Data from USGS gage 14155500 (USACE 2000a).

Figure 11. Average Monthly Flows, Row River near Cottage Grove below Dorena Dam.

Dykaar (2005) conducted an assessment of the status and trends of river-floodplain habitat downstream from Corps' dams in the Coast Fork and Middle Fork subbasins. Representative reaches were chosen to assess the status and trends of habitats since the 1930s using geomorphic indicators as visible on historical aerial photography. Figure 12 shows the changes in riverine geomorphic features in a representative reach of the Coast Fork between 1936 and 2004.

Riverine and floodplain morphology is driven by the natural processes of erosion and sedimentation. Spatial and temporal patterns of erosion and sedimentation come from a combination of controlling factors: hydrologic regime, sediment and wood supply, and bed and bank erodability. River movement and fluvial landform and bedform development result from a combination of these controlling factors. Native species are adapted to, or dependent upon, an array of habitat types that are formed and reformed by the natural fluvial geomorphic regime of a river.

Human activities, however, have disrupted riverine and floodplain habitats by altering the controlling factors. For example, dams have reduced peak flood flows which diminish a river's capacity to erode, transport and deposit sediment; riprap hardens banks reducing sediment supply; and gravel mining also removes the sediment supply and changes the channel morphology. Disruptions to the natural hydrologic and sediment regimes change the rate and types of habitat forming processes.



Pre-dam periods are 1936, 1940, 1947, and 1956. Source: Dykaar 2005.

Figure 12. Comparison of Geomorphic Features, Coast Fork Willamette River (RMs 8-13).

Water quality is somewhat degraded in the Coast Fork subbasin. The ODEQ ambient water quality monitoring site on the Coast Fork Willamette River is located at Mt. Pisgah Park (RM 3.0). This site scored 87 points on the Oregon Water Quality Index (ODEQ 2008) and is ranked in the 'good' category.

Within the project area, the mainstem of the Coast Fork is listed on the 303(d) list for iron and Camas Swale Creek is listed for dissolved oxygen (DEQ 2010). Dorena Lake is newly listed for aquatic weeds or algae. Three health advisories issued were by Oregon Harmful Algae Bloom Surveillance (HABS) program based on cell counts or toxicity levels. Figure 19 shows the 303(d) listed waterbodies in the action area.

In the Coast Fork subbasin, the release of warm water from Cottage Grove and Dorena reservoirs appreciably reduces the value of the lower Coast Fork and Row River for salmonid production (USACE 2000a). Temperatures in excess of 26 °C have been measured downstream of the dams (Thompson *et al.*, 1966). Warm water species are much more abundant than salmonids, indicating an unfavorable temperature regime for native species (USACE 2000a).

Historical removal of large wood from the Coast Fork and tributary streams reduced the overall transport of wood, and along with removal of riparian vegetation for various land uses, interacted to reduce the quantity and distribution of instream large wood. In the Coast Fork subbasin, approximately 97% of the upper Row River drainage has been harvested, and 76% of the upper Coast Fork Willamette drainage has been harvested at least once, which has contributed to riparian areas having primarily younger-aged conifers and hardwoods (NPCC 2004). Also, many of the tributaries in the upper Coast Fork subbasin do not provide adequate shading or large wood recruitment. Limited wood in the river limits the formation of pools, thus reducing hiding areas for adult fish and restricting the quality and quantity of juvenile rearing habitat (NPCC 2004).

The lower Coast Fork subbasin contains extensive agricultural, urban, and residential development that has limited the extent and composition of riparian vegetation. Further loss of riparian vegetation and function was caused by the construction of levees and revetments along the banks of the lower Coast Fork Willamette River to protect agricultural development from flooding and erosion. The construction of Interstate 5 also reduced riparian vegetation along significant portions of the lower 25 miles of the Coast Fork Willamette River (NPCC 2004).

Backwater habitats, including pool margins, side channels, and alcoves, have been reduced from historical levels in the Coast Fork subbasin (NPCC 2004). In the lower Coast Fork subbasin, the productivity, capacity, and diversity of salmon populations are limited by the following factors (NPCC 2004):

- **Habitat Connectivity**. Cottage Grove and Dorena dams are complete barriers to adult and juvenile fish movement to historic spawning and rearing areas. Modification of the river's flow regime from dam regulation, channel and bank confinement, and reduced instream large wood have interacted to reduce backwater habitats important for juvenile rearing and winter refuge.
- **Habitat Modification**. Limited spawning areas and reduced levels of gravels/small cobbles are available in the lower rivers for spawning. Revetments along the lower Coast Fork Willamette and Row rivers have reduced habitat complexity. The lower subbasin has reduced floodplain forest extent and connectivity.
- **Large Wood**. Limited wood in the lower river and tributaries has modified gravel deposition patterns, reduced the frequency and depth of pools, and minimized hiding cover.
- **Water Quality**. The mainstem Coast Fork (mouth to RM 31) is listed as impaired for fish passage because of high mercury levels. There are water quality criteria exceedances of summer maximum temperatures below Cottage Grove and Dorena dams and in Camas Swale Creek. There is reduced canopy shade on many tributary streams, which leads to increased water temperatures. Changes in high and low water temperature regimes have affected adult spawning success and egg incubation and have limited the capacity of river and tributary streams to support juvenile fish.
- **Fish Passage Barriers**. Corps' dams and fish passage barriers at road crossings on tributary streams prevent access into historical spring Chinook spawning areas, block the interchange between the upper and lower subbasin cutthroat trout populations, and limit juvenile access into rearing and refuge habitat.

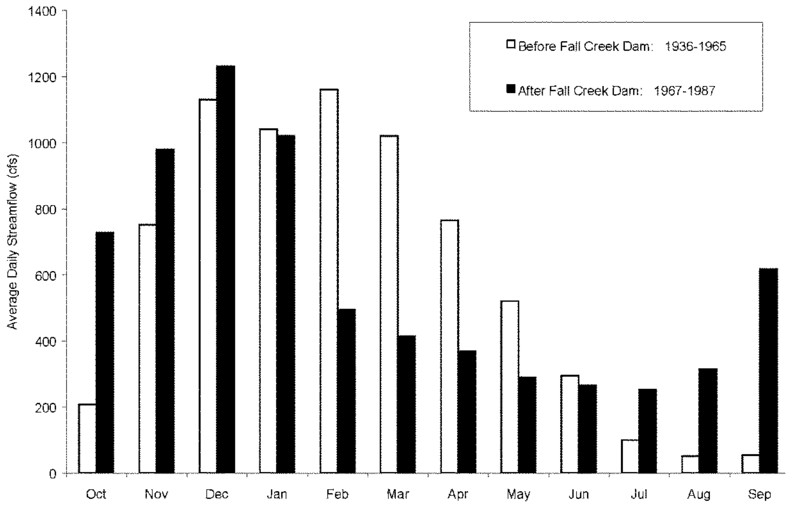
The productivity, capacity, and diversity of Oregon chub populations in the lower Coast Fork subbasin are limited by the following factors (NPCC 2004):

- The frequency and magnitude of high flows is not sufficient to create and maintain channel complexity and provide nutrient, organic matter, and sediment inputs from floodplain areas. Loss of connectivity to floodplain and wetland habitats has affected availability of suitable habitat. Dams and other structures have changed river hydrology and reduced the amount of side channel habitat.
- The lower subbasin has reduced floodplain forest extent and connectivity.
- The presence of non-native predators (i.e., bluegill, smallmouth bass, and bullfrog) in this system inhibits Oregon chub recolonization of formerly occupied habitat.

6.2 Middle Fork Willamette River Subbasin

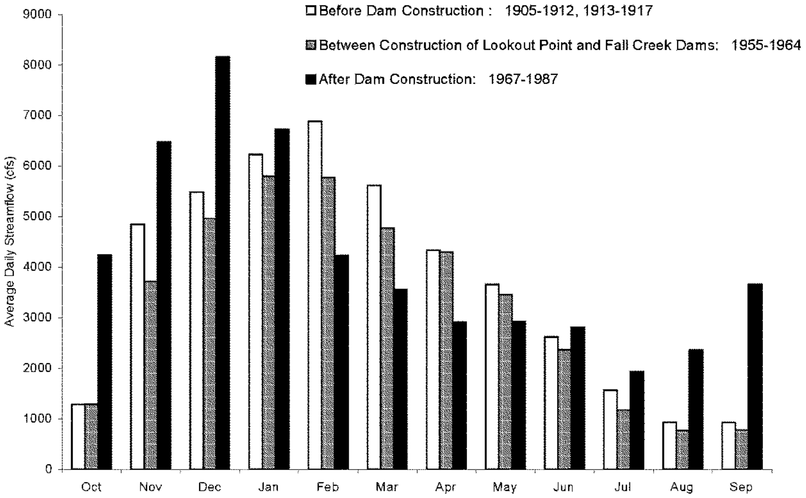
Flows in the Middle Fork have been controlled by the Lookout Point-Dexter, Hills Creek, and Fall Creek projects since 1954, 1961, and 1965, respectively. These dams are operated similarly in concert with the other Willamette system dams for flood risk management. Flood control operations at the dams have substantially decreased the magnitude and frequency of extreme high flow events in the lower Middle Fork Willamette River. Additionally, the dams have decreased the magnitude of channel forming flood events (USACE 2000). Flood frequency analysis conducted by the USACE-Portland District for the USGS Gage near Jasper (USGS 14152000) has shown that the 2-year return period flood event is 20,000 cfs for the regulated condition, as compared to 39,900 cfs for the unregulated condition (OSU 2007); see Table 5 for flows for various frequencies of occurrence under existing conditions. The bankfull flow and regulation goal at Jasper is 20,000 cfs.

In general, dam construction resulted in higher summer and fall flows, and lower spring flows. Figures 13 and 14 illustrate the pre- and post-dam changes in average monthly flows below Fall Creek dam, as well as on the Middle Fork at Jasper after construction of all the Corps' dams in the subbasin. In the Middle Fork subbasin, flows are naturally lowest in the early fall. The average daily flow at Dexter in September prior to dam construction was 846 cfs. Since construction, the average daily flow in September has increased to 2,760 cfs (USACE 2000).



Data from USGS gage 14151000 (USACE 2000a).

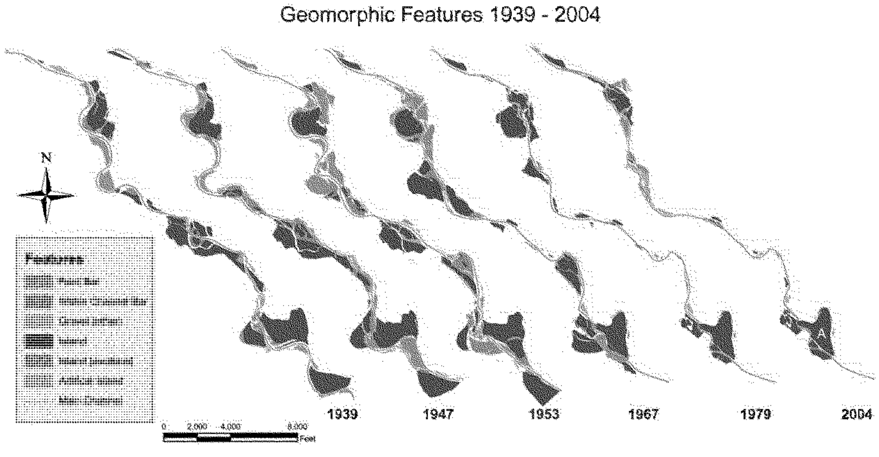
Figure 13. Average Monthly Flows, Fall Creek below Winberry Creek.



Data from USGS gage 14152000 (USACE 2000a).

Figure 14. Average Monthly Flows, Middle Fork Willamette River at Jasper.

Similar to the Coast Fork, the dams have changed the types and distribution of geomorphic features in the Middle Fork with a significant reduction in islands and in-channel bars (Dykaar 2005). Historic photos of Reaches 1 and 2 on the Middle Fork show substantial meandering of the river with numerous bars and islands versus the existing condition where the channel is single threaded with minimal bars.



Pre-dam periods are 1939, 1947, and 1953. Source: Dykaar 2005.

Figure 15. Comparison of Geomorphic Features, Middle Fork Willamette River (RMs 198-203).

Dykaar's investigation (2005) found that the rate of formation of new riverine and floodplain habitats has been reduced significantly in the post-dam time period for both the Coast and Middle Forks. The natural ecosystem was highly dynamic with many habitat types forming simultaneously over extended areas of the floodplain and time periods.

In addition to the dams, many existing revetments constructed by the Corps affect the geomorphology of both the Coast and Middle Forks. The result of the altered hydrology in the study area due to dams and revetments has been the loss of habitat quantity and complexity in the rivers due to a simplification of the channel network. It is highly unlikely that any of the major dams in the subbasins will be removed due to the large flood-prone population downstream in Eugene and Springfield.

Some change in the operation of the Coast and Middle Forks dams is expected in the future. Since the 1999 listing of salmon and steelhead as threatened under the ESA, the Corps has made significant adjustments in the operation of the Willamette Projects to better meet the needs of aquatic species. In particular, the initiation of mainstem Willamette River springtime (April-June) flow augmentation targets have resulted in significant changes in the timing and volume of storage in the reservoirs and downstream releases. The Corps is continuing to work with state and Federal fish management agencies to adjust the operational regime of all of the dams within the Willamette Project. In particular, the Corps is working collaboratively with the Nature Conservancy of Oregon under the Willamette Flow Management Project and under the requirements of the recent Biological Opinions (NMFS 2008c; USFWS 2008b) to determine if flow alterations to better meet ecological needs are possible on the Coast and Middle Forks.

Figure 16 shows the Corps' revetments along the Coast and Middle Forks that constrain natural geomorphic processes. There are additionally a number of other revetments along both rivers installed by other public and private entities.

Water quality is somewhat degraded in the Middle Fork subbasin. The DEQ ambient water quality monitoring site on the Middle Fork Willamette River is located at Jasper Bridge (RM 195.0). This site scored 93 points on the Oregon Water Quality Index and showed an increasing trend in the score over the past 10 years (ODEQ 2008). This site is ranked in the 'excellent' category.

The ODEQ (2006) states that the dissolved oxygen 303(d) listings were not addressed in the Willamette Basin TMDL. In the study area, Anthony Creek and Lost Creek are listed for dissolved oxygen on the 303(d) list (DEQ 2010). See Figure 17 for 303(d) listed waterbodies in the study area. The listings occurred in 2002 and there was not sufficient time to collect data for the TMDL analysis.

The Dexter Reservoir, Hills Creek Lake, and Lookout Point Lake, have all been newly listed on the 303(d) list for aquatic weeds or algae (DEQ 2010). Health advisories for each of these lakes were issued by Oregon Harmful Algae Bloom Surveillance (HABS) program based on cell counts or toxicity levels.

As a result of dam operations, water temperatures are cooler than historic in spring and summer and warmer in fall and winter. Figure 18 shows the effects that construction of the Lookout Point/Dexter projects has had on the water temperature regime below Dexter Dam. Inflow temperatures peak in July at about 16.7°C while outflow temperatures peak at about 15°C two months later in September. Returns to the Dexter adult collection facility indicate that a thermal influence on migration does not occur below the dam; the peak of adult spring Chinook returns occurs in mid-May as expected and the number of adults returning annually has generally remained strong (USACE 1997). However, the release of warmer water in the fall has likely adversely affected spring Chinook offspring downstream of Dexter through accelerated embryo development and consequent premature emergence during the winter (USACE 2000a) when there is less invertebrate prey availability. The temperature regime downstream of Fall Creek Dam follows a similar pattern, although with a more pronounced release of cooler water in the spring.

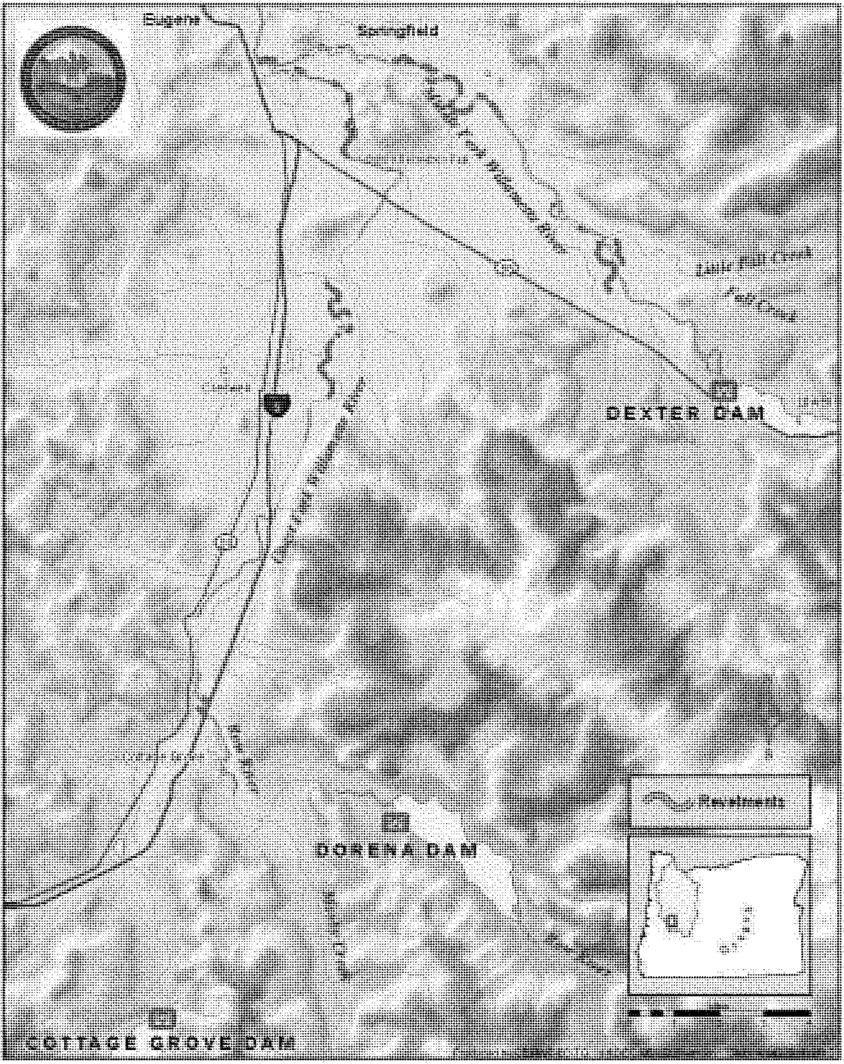


Figure 16. Corps' Revetments along the Coast and Middle Forks of the Willamette River.

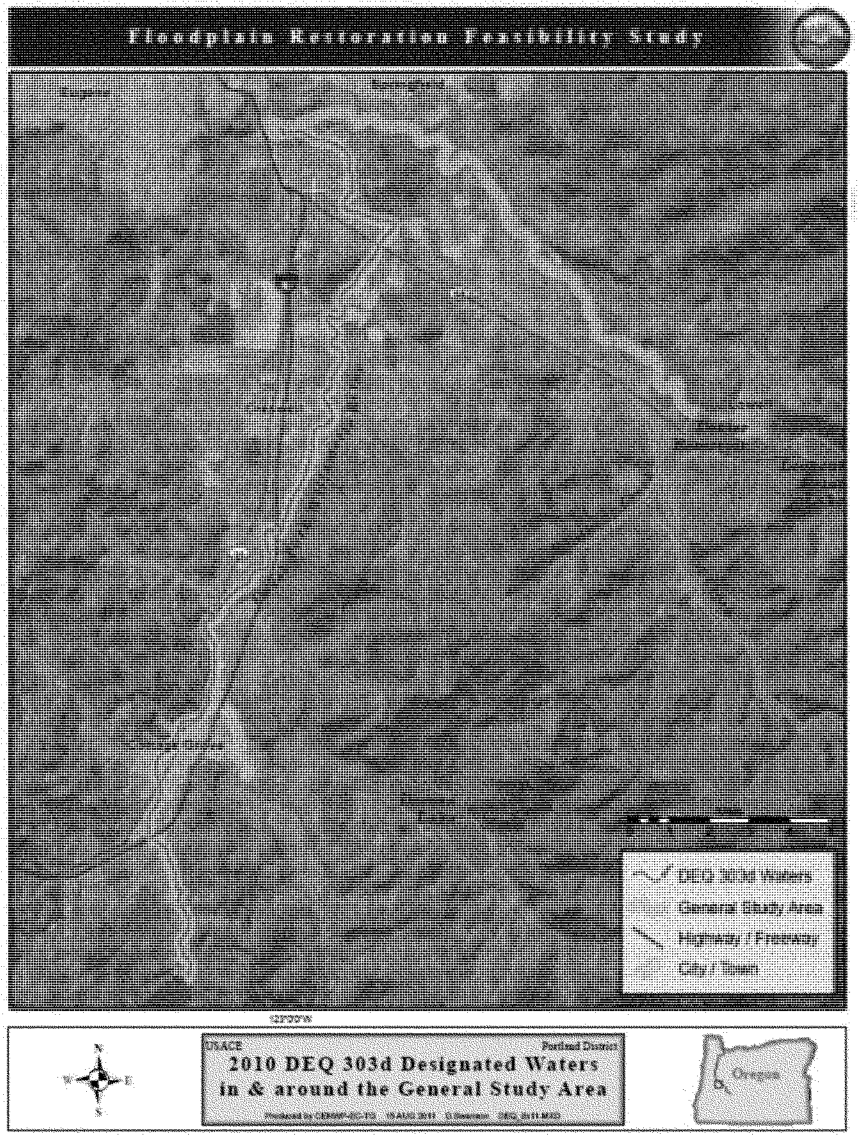
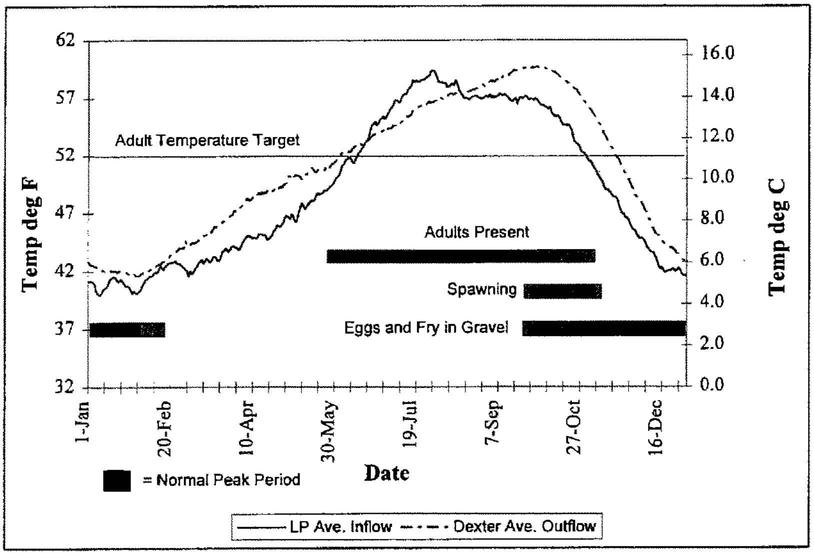


Figure 17. Oregon DEQ Designated 303(d) Waterbodies in the Action Area.



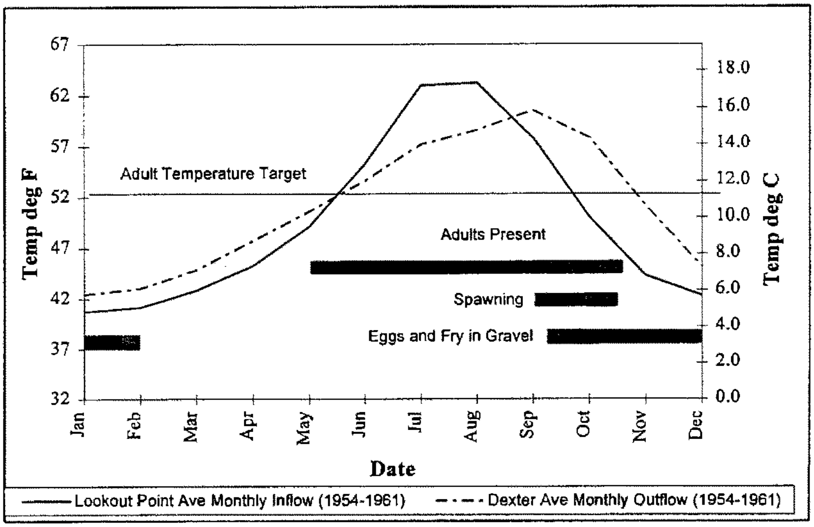


Figure 18. Daily (top) and Monthly (bottom) Average Water Temperatnres, Middle Fork.

Rapid flow fluctuations are also likely to adversely affect listed fish below Fall Creek Dam. Stranding of adults was noted to be significant below Fall Creek when releases were dropped within a day from 150 cfs down to 50 cfs (USACE 1982, 2000). Present operation of Fall Creek includes large fluctuations in flow. These fluctuations make it impractical to recommend spawning flows below the dam (USACE 1982, 2000). Downey and Smith (1992) noted that reducing flows by half from 1,500 cfs for a week in early September to meet the minimum pool scheduling goals may adversely affect bank stability, fish populations, aquatic invertebrate production, and angling opportunities below the dam.

Historical removal of large wood from the Middle Fork Willamette River and tributary streams reduced the overall transport of wood, and along with changes in riparian vegetation interacted to reduce the quantity and distribution of instream large wood. In the Middle Fork subbasin, approximately 74% of the riparian forests along the lower Middle Fork have reduced functions, including delivery of large wood (NPCC 2004).

The lower Middle Fork subbasin contains extensive agricultural, urban, and residential development that has limited the extent and composition of riparian vegetation. Further loss of riparian vegetation was caused by the construction of levees and revetments along the banks of the lower Middle Fork Willamette River to protect agricultural development from flooding and erosion (NPCC 2004).

Backwater habitats, including pool margins, side channels, and alcoves, have been reduced from historical levels in the Middle Fork subbasin (NPCC 2004). Key limiting factors in the Middle Fork subbasin for salmonids include the following (NPCC 2004):

- **Habitat Connectivity**. Corps' dams block access to an estimated 80% of historical habitat. Modification of the river's high flow regime as a result of dam regulation, channel and bank confinement, and reduced large wood in the channels have interacted to reduce backwater habitats important for juvenile rearing and winter refuge.
- **Habitat Modification**. The frequency of flows is not of sufficient magnitude to create and maintain channel complexity and provide nutrients, organic matter, and sediment inputs from floodplain areas. Limited spawning areas and reduced levels of gravels/small cobbles have reduced the areas available for spawning. Revetments along the lower Middle Fork Willamette have reduced habitat complexity. The lower subbasin has reduced floodplain forest extent and connectivity. Riparian vegetation within 100 feet of the small tributaries of the lower subbasin is generally in poor condition.
- **Large Wood**. Changes in the delivery and transport of large wood in the river and tributaries has modified gravel deposition patterns, reduced the frequency and depth of pools, and minimized hiding cover for adult and juvenile fish.
- **Water Quality**. Compared to historical conditions, cooler summer mainstem temperatures and warmer fall temperatures below the dams disrupt normal migration and spawning behaviors. Changes in high and low water temperature regimes have affected adult salmonid spawning success and egg incubation and have limited the capacity of river and tributary streams to support juvenile fish.
- **Fish Passage Barriers**. Corps' dams and fish passage barriers at road crossings on tributary streams prevent access to historical spring Chinook and cutthroat trout spawning areas, block the interchange between the upper and lower subbasin cutthroat trout populations, and limit juvenile access into rearing and refuge habitat.

The productivity, capacity, and diversity of Oregon chub populations in the lower Middle Fork subbasin are limited by the following factors:

- The frequency and magnitude of high flows is not sufficient to create and maintain channel complexity and provide nutrient, organic matter, and sediment inputs from floodplain areas. Loss of connectivity to floodplain and wetland habitats has affected availability of suitable habitat. Dams and other structures have changed river hydrology and reduced the amount of side channel habitat.

- The presence of non-native predators/competitors, such as bluegill and smallmouth bass, inhibits Oregon chub recolonization of formerly occupied habitat.
- Reduced water quality from upslope commercial timber operations.

6.3 Effects of the Baseline on the Primary Constituent Elements of Critical Habitat

Joint NMFS-United States Fish and Wildlife Service (USFWS) regulations for listing endangered and threatened species and designating critical habitat at 50 CFR 424.12(b) state that the agencies ''shall consider those physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection (hereafter also referred to as ''Essential Features'' or ''Primary Constituent Elements [PCEs]'').'' PCEs for the listed fish species are listed below, with the PCEs present in the action area shown in bold. PCEs for the bird, plant, and insect species are not discussed as critical habitat for those species is not within the action area.

6.3.1 Upper Willamette River Chinook ESU

The PCEs essential for conservation of the Upper Willamette River Chinook ESU are:

PCE 1: Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

PCE 2: Freshwater rearing sites with:

(i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;

(ii) Water quality and forage supporting juvenile development; and

(iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

PCE 3: Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;

PCE 4: Estuarine areas free of obstruction and excessive predation with:

(i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater;

(ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and

(iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

PCE 5: Nearshore marine areas free of obstruction and excessive predation with:

(i) Water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and

(ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

PCE 6: Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

6.3.2 Bull Trout

The PCEs essential for conservation of bull trout are:

> **PCE 1: Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.**
>
> **PCE 2: Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.**
>
> **PCE 3: An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.**
>
> **PCE 4: Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and un-embedded substrates, to provide a variety of depths, gradients, velocities, and structure.**
>
> **PCE 5: Water temperatures ranging from 2 to 15 □C (36 to 59 □F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.**
>
> **PCE 6: In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.**
>
> **PCE 7: A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.**
>
> **PCE 8: Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.**
>
> **PCE 9: Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.**

6.3.3 Oregon Chub

The PCEs essential for conservation of Oregon chub are:

> **PCE 1: Off-channel water bodies such as beaver ponds, oxbows, side-channels, stable backwater sloughs, low-gradient tributaries, and flooded marshes, including at least 500 continuous square meters (0.12 ac) of aquatic surface area at depths between approximately 0.5 and 2.0 m (1.6 and 6.6 ft.).**
>
> **PCE 2: Aquatic vegetation covering a minimum of 250 square meters (0.06 ac) (or between approximately 25 and 100 percent) of the total surface area of the habitat. This vegetation is primarily submergent for purposes of spawning, but also includes emergent and floating**

vegetation and algae, which are important for cover throughout the year. Areas with sufficient vegetation are likely to also have the following characteristics:

- **(i) Gradient less than 2.5 percent;**
- **(ii) No or very low water velocity in late spring and summer;**
- **(iii) Silty, organic substrate; and**
- **(iv) Abundant minute organisms such as rotifers, copepods, cladocerans, and chironomid larvae.**

PCE 3: Late spring and summer subsurface water temperatures between 15 and 25 °C (59 and 78 °F), with natural diurnal and seasonal variation.

PCE 4: No or negligible levels of nonnative aquatic predatory or competitive species. Negligible is defined for the purpose of this rule as a minimal level of nonnative species that will still allow the Oregon chub to continue to survive and recover.

6.3.4 Existing Condition of the PCEs in the Action Area

The PCEs have been substantially degraded in the action area as a combined result of dams, revetments, timber harvest, agriculture, residential and urban development, removal of wood, water diversions, lack of floodplain connections, and the degradation of riparian and wetland habitats. Table 4 below summarizes the existing condition of the PCEs in the action area.

Table 4. Summary of Existing Condition of the PCEs in the Action Area.

PCE	FUNCTION	EXISTING CONDITION DESCRIPTION	CAUSE OF DEGREDATION AWAY FROM PFC
Upper Willamette Chinook ESU			
1. Freshwater Spawning Sites	NPF	Spawning areas below the dams are degraded from high water temperatures and the lack of gravel recruitment from the upper watershed, bars, or floodplain. Gravel has been mined extensively both in and off channel and removed from the system.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. Dams have reduced the transport of coarse sediments and wood and reduced peak flows that would form spawning habitats. Revetments prevent recruitment of gravel from the floodplain. Non-native species have colonized bars and islands and reduced gravel recruitment. The lack of riparian zone has nearly eliminated the input of large wood further reducing the potential for habitat forming processes.

PCE	FUNCTION	EXISTING CONDITION DESCRIPTION	CAUSE OF DEGREDATION AWAY FROM PFC
2. Freshwater Rearing Sites	IC	Rearing habitats are greatly reduced in both quantity and quality due to single-thread channels and lack of connections to floodplains. Water temperatures are high and there is a distinct lack of wood, log jams, and riparian vegetation.	Dams have reduced peak flows that would form rearing habitats and reduced the sediment supply that caused channel migration. Gravel mining in the channel has contributed to incision and further disconnected the rivers from their floodplain, in addition to the revetments and flow management from the dams. Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. The lack of riparian zone has nearly eliminated the natural input of large wood and there is limited shoreline cover.
3. Freshwater Migration Corridors	IC	Migration corridor has high water temperatures and a distinct lack of cover and pools. Adult salmon reach the dams, but experience high pre-spawner mortality. Juveniles migrate downstream, but their fitness is likely reduced due to the lack of rearing habitats.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. The lack of riparian zone has nearly eliminated the natural input of large wood and there is limited habitat formation (i.e. pool scouring).
Bull Trout			
1. Springs, Seeps, Groundwater Sources	NPF	There are limited springs, seeps, groundwater recharge/discharge or hyporheic flows to cool water temperatures. Water temperatures are high.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. Reduced peak flows and revetments have reduced floodplain connections and groundwater recharge.
2: Migratory Corridor	NPF	Dams prevent passage between upper and lower watersheds. Water temperatures are high. There is a distinct lack of cover and pools.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. Reduced peak flows and reduced sediment transport have reduced habitat forming processes. The lack of riparian zone has nearly eliminated the natural input of large wood. Dams are significant fish passage barriers.
3: Forage Base	IC	Forage base reduced due to lack of riparian zone and reduced insect and detrital inputs. Dams likely reduce transport of nutrients and detritus from upper watershed.	Dams have reduced the transport of nutrients, detritus and wood. Revetments and development have reduced the riparian zone.

PCE	FUNCTION	EXISTING CONDITION DESCRIPTION	CAUSE OF DEGREDATION AWAY FROM PFC
4: Habitat Complexity	IC	Habitat complexity is greatly reduced. The lower rivers are primarily single-thread channels with limited connections to floodplains and off-channel habitats. The supply of large wood and gravel are limited and habitat forming processes have been reduced.	Dams have reduced peak flows that would form habitats and reduced the sediment supply that caused channel migration. Gravel mining in the channel has contributed to incision and further disconnected the rivers from their floodplain, in addition to the revetments and flow management from the dams. Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. The lack of riparian zone has nearly eliminated the natural input of large wood and there is limited shoreline cover.
5: Water Temperature	NPF	Water temperatures are well above bull trout preferred range, except in winter.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. There is limited riparian zone and shading, and limited input of large wood. Revetments and reduced flows have reduced floodplain connections/inundation and reduced groundwater recharge and hyporheic flows.
6. Substrate	IC	Substrate is generally of good quality, but the dams have blocked the natural recruitment of coarse sediment from the upper watersheds and revetments and non-native vegetation has reduced the recruitment of gravel from the floodplain and bars.	Dams have reduced the transport of coarse sediments and wood and reduced peak flows that would form spawning habitats. Revetments prevent recruitment of gravel from the floodplain. Non-native species have colonized bars and islands and reduced gravel recruitment. The lack of riparian zone has nearly eliminated the input of large wood further reducing the potential for habitat forming processes.
7. Natural Hydrograph	NPF	Dams have modified the natural hydrograph substantially with much reduced peak flows, but much higher low flows.	Dams have reduced peak flows and increased low flows. Revetments have reduced floodplain connections.
8: Water Quantity and Quality	NPF	Water temperatures are well above bull trout preferred range, except in winter.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. There is limited riparian zone and shading, and limited input of large wood. Revetments and reduced flows have reduced floodplain connections/inundation and reduced groundwater recharge and hyporheic flows.

PCE	FUNCTION	EXISTING CONDITION DESCRIPTION	CAUSE OF DEGREDATION AWAY FROM PFC
9. Non-native Predatory Fish	IC	Non-native fish are present throughout the action area, but are somewhat separated temporally from bull trout as they are primarily warm-water species that are inactive when water temperatures are cold.	Introduction of non-native species. Dams have modified the temperature regime providing conditions more suitable for warm-water species.
Oregon Chub			
1. Off-channel Waterbodies	IC	Off-channel habitats are greatly reduced in both quantity and quality due to single-thread channels and lack of connections to floodplains. There is a distinct lack of wood, log jams, and riparian vegetation that would further contribute to habitat formation.	Dams have reduced peak flows that form habitats and also blocked sediment and wood transport from the upper watershed that further contribute to channel migration and habitat formation. Revetments have reduced floodplain connections. Gravel mining and other land uses have degraded floodplain and off-channel habitats.
2. Aquatic Vegetation	IC	Aquatic vegetation is present in many off-channel habitats, but includes numerous non-native species and presence is reduced by steep slopes (such as in gravel mined ponds).	Introduction of non-native species. Gravel mining and other land uses that disturb off-channel habitats.
3. Water Temperature	IC	Temperature regime is modified due to dam releases of cooler water in summer.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures.
4. Non-native Predatory or Competitive Species	NPF	Non-native fish and wildlife are present throughout the action area and do well in warm waters used by Oregon chub.	Introduction of non-native species. Dams have modified the temperature regime providing conditions more suitable for warm-water species.

Notes: NA = Not Applicable, PFC = Properly Functioning Condition, IC = Impaired Condition, NPF = Not Properly Functioning.

7.0 EFFECTS OF THE ACTION

The project is intended to have long-term beneficial effects on listed species and their critical habitats and help contribute towards the recovery of these species. However, there are also likely to be temporary adverse effects associated with the construction of the project. The types of effects associated with construction of the various habitat features are described below.

Construction will have direct physical effects on the environment including vegetation clearing, development of access roads, construction staging areas, and materials storage areas; water diversion and pumping, excavation, fill, and grading; followed by site restoration such as placement of wood, revegetation, placement of topsoil and other substrates and other actions to restore habitats and ecosystem processes. These construction activities can disrupt or reduce the natural vegetative and fluvial processes at a project site, such as the recruitment of large wood, riparian shading, sediment and nutrient deposition, and groundwater recharge (NMFS 2008a). Water tables are likely to be reduced allowing an increase in dust and potential effects on remaining vegetation. During wet weather, cleared areas can erode and suspend sediments in runoff and also potentially increase the volume and frequency of runoff. This can elevate turbidity in receiving waterbodies and adversely affect spawning gravels and other habitats (i.e. by filling in pools) as well as increasing volumes into streams during runoff events. The erosion of topsoil can reduce the upland fertility. In-water work can also resuspend sediments or generate turbidity that can be transported downstream. Heavy equipment can compact soils and reduce suitability for plant growth and reduce infiltration. The use of heavy equipment also creates a risk of spills of fuels, lubricants and other contaminants. A spill into a waterbody would likely cause short-term lethal toxicity to fish and invertebrates in the vicinity.

However, these effects are likely to be short-term at any one site (few months). Turbidity from in-water excavation and installation of large wood is likely to abate very quickly (few hours). Other effects may persist for longer until riparian and floodplain vegetation is fully reestablished.

The direct physical effects of the habitat features once they are installed are generally the opposite of the construction activities that are required for installation (beneficial effects). Bare soil will be revegetated with native species by seeding, planting shrubs and trees, and mulching. This will reduce soil erosion and increase infiltration. It also will restore suitable riparian conditions to allow the natural delivery of large wood to the riparian area and rivers, improve bank stability, increase insect and detrital organic matter inputs into the river, improve sediment and nutrient deposition from flooding and runoff, and improve shading conditions. The restoration of connections between the rivers and off-channel habitats will allow frequent fish access and refuge and rearing habitat. The placement of large wood and ELJs will promote in-channel scouring of pools and deposition of bars and also promote channel migration that can form in-channel and off-channel habitats.

The effectiveness of fish habitat restoration actions is less well documented (NMFS 2008a). However, it is expected that the proposed restoration actions will contribute at least incrementally to the restoration of natural processes in the lower Coast and Middle Forks by promoting channel migration, scouring and release of gravels (to be resorted in the rivers), and natural flooding of large floodplain areas. All of the project sites in the proposed action had extensive historic channel migration and numerous side channels, bars, islands, and other geomorphic features. This project is intended to replicate some of that historic function.

The regrading and connection of gravel mined ponds to the rivers is an emerging tool for habitat restoration. Some gravel mined ponds have historically been "captured" by rivers with varying effects. On the Middle Fork near Dexter Dam, several gravel mined ponds were "captured" during the 1996 flood event. This area is now one of the more diverse and complex areas of habitat in the Middle Fork with braided channels, islands, bars, and deep pools. These ponds were typically less than 20 feet in depth and the pit capture did not appear to cause major effects on sediment transport. The ponds proposed for regrading and connection in this project are also fairly shallow (less than 25 feet in depth), and some of the ponds are already connected to the rivers at bankfull or similar flows (i.e. Sites C1C and M2A). The effect of providing more shallow water habitat and better connections to prevent stranding of fish will provide numerous benefits to listed species. All of the other gravel mined pond sites proposed in this project are all within the floodplain and are also connected periodically, including in the 1996 floods. The proposed action will provide regular connections to these ponds, which will likely reduce water temperatures by providing more flushing, increase groundwater recharge and provide extensive off-channel areas for refuge and rearing. There are non-native species within many of the ponds, but they are also all present in the Coast and Middle Forks. Providing more natural flooding and connections may reduce the suitability of the habitat for non-native warm water species by reducing water temperatures and reducing depths. There is also the potential that these ponds could trap coarse sediments from the rivers and reduce the transport of sediment to downstream areas. This potential will be significantly reduced by the design which connects most ponds only via backwater channels. There are a few high-flow connection channels proposed that would only connect at flow frequencies greater than the 2-year event. During these high flow events, there could be some movement and deposition of coarse sediment into the floodplain or ponds, but this is also a natural floodplain process that would typically occur above bankfull events. The primary mechanism for sediment deposition in the ponds will be with the initial construction (grading and placing fill in the ponds) and via the deposition of organic material and fine sediments from the floodplain (leaf litter, stormwater runoff, etc.).

The potential for process and functional recovery is affected by the watershed context. The proposed actions will occur at sites and in watersheds where natural processes and habitat functions were substantially degraded (due to dams, revetments, water diversions, agriculture, development, gravel mining, etc.). Many of the existing land uses will continue in the watershed, with likely increased population and development over time. The proposed restoration plan intentionally includes 7 large sites to attempt to reduce this issue of small and fragmented habitat restoration. Five of the seven sites are in close proximity (Coast and Middle Fork confluence) and surrounded primarily by publicly owned lands that will create a large block of complex habitat (in-channel, riparian, floodplain, and upland habitats). This will also allow the greatest possible potential for the restoration of channel migration and floodplain inundation processes as such as large block of land is now in conservation ownership.

At the more individual level, construction has direct adverse effects on individual fish when equipment is operated in the water where it can injure fish or block habitat access, when pollutants enter the waterbody, and when fish are salvaged and removed from in-water work areas. Construction specifications will include requirements for in-water work timing, sensitive area protection, fish passage, erosion and pollution control, in-water use of equipment, and work area isolation in order to avoid or minimize these adverse effects. Those measures will ensure that construction activities do not occur when adult fish are congregating for spawning or where redds are present with eggs or alevins.

It is unlikely that individual adult salmon will be adversely affected by the proposed action because all in-water construction activities will occur during the designated in-water work window which occurs after spawning season and fry emerge from the gravel. If an adult is migrating in an action area during any phase of construction, it is likely to be able to successfully avoid the area by moving laterally (NMFS 2008a). Construction activities are likely to occur when juvenile salmonids are present. The most likely potential for effects is during fish salvage and removal associated with work-area isolation. Any individual fish present in the isolated work area will be captured and released. Fish can experience trauma from handling, high water temperatures, high air temperatures, low dissolved oxygen and use of anesthetics. All fish salvage and removal activities will be conducted by trained personnel experienced in fish removal with valid collection permits and approval of the fish salvage plan by NOAA and ODFW.

The proposed action is likely to have the following effects on the PCEs of relevance in the action area (Table 5).

Table 5. Summary of the Proposed Condition of the PCEs in the Action Area.

PCE	FUNCTION	PROPOSED CONDITION DESCRIPTION	EXPLANATION
Upper Willamette Chinook ESU			
1. Freshwater Spawning Sites	Maintain NPF	Spawning areas below the dams are degraded from high water temperatures and the lack of gravel recruitment from the upper watershed. Bar and floodplain gravel recruitment and sorting is likely to occur with the installation of ELJs and the promotion of channel migration.	Spawning areas will still be affected by the operation of the upstream dams and the historic removal of gravel from the system, but currently unavailable sources in the floodplain and bars will likely be mobilized more frequently as a result of this project.
2. Freshwater Rearing Sites	Improve IC	Rearing habitats will be substantially increased both in-channel and in off-channel areas. Water temperatures will still remain high but there will be a substantial improvement in the area and quantity of wood, log jams, and riparian vegetation.	The dams will still control peak flows and release flows with high temperatures, but the proposed action will restore and connect over 800 acres of floodplain and riparian habitats as well as installing ELJs and placing large wood in floodplain areas.
3. Freshwater Migration Corridors	Improve IC	Migration corridor has high water temperatures but will experience improvements in cover and pools. Adult salmon will continue to reach the dams, but likely still experience high pre-spawner mortality. Juveniles will experience a substantial increase in refuge and rearing habitats.	Dams have modified the temperature regime causing lower summer temperatures bnt higher fall temperatures. A large area of riparian zone will be restored and significant quantities of large wood will be restored to the system. Over 800 acres of floodplain and off-channel habitats will be connected and restored.
Bull Trout			
1. Springs, Seeps, Groundwater Sources	Slightly Improve NPF	The project will promote more frequent inundation of the floodplain areas contributing to groundwater recharge. However, dam releases will limit the overall improvements in water temperatures.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. Project will improve floodplain connections and groundwater recharge.
2: Migratory Corridor	Improve NPF	Dams prevent passage between upper and lower watersheds. Water temperatures are high. Will be a substantial increase in cover and pools.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. Dams are significant fish passage barriers. Project will improve riparian conditions and large wood.
3: Forage Base	Improve IC	Dams will still reduce transport of nutrients and detritus from upper watershed. But, there will be a substantial increase in high quality riparian habitats for insect and detrital inputs to the food web.	Dams have reduced the transport of nutrients, detritus and wood. Project will restore extensive areas of riparian zone and install ELJS and place large wood.

PCE	FUNCTION	PROPOSED CONDITION DESCRIPTION	EXPLANATION
4: Habitat Complexity	Improve IC	Habitat complexity will be substantially increased on approximately 5 miles of the rivers. Significant areas of restored riparian, floodplain, off-channel habitats, ELJs, pools, and cover.	Dams have reduced peak flows that would form habitats and reduced the sediment supply that caused channel migration. Project will restore over 800 acres of riparian and floodplain habitats, regrade and enhance gravel mined ponds for off-channel rearing, connect off-channel areas, install ELJs and large wood.
5: Water Temperature	Slightly Improve NPF	Water temperatures are well above bull trout preferred range, except in winter.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. Project will increase riparian cover and shading and promote groundwater recharge during more frequent floodplain inundation.
6. Substrate	Slightly Improve IC	Substrate is generally of good quality, but the dams have blocked the natural recruitment of coarse sediment from the upper watersheds. Likely increased mobilization of floodplain and bar gravels due to installation of ELJs and floodplain connections.	Dams have reduced the transport of coarse sediments and wood and reduced peak flows that would form spawning habitats. Project will restore riparian zone, install ELJs and floodplain connections to promote channel migration and reworking of coarse sediments.
7. Natural Hydrograph	Slightly Improve NPF	Dams have modified the natural hydrograph substantially with much reduced peak flows, but much higher low flows. More natural flooding regime will be restored to project area.	Dams have reduced peak flows and increased low flows. Project will connect floodplains for more frequent connections and inundation restoring some of the historic floodplain function.
8: Water Quantity and Quality	Slightly Improve NPF	Water temperatures are well above bull trout preferred range, except in winter.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. Project will increase riparian cover and shading and promote groundwater recharge during more frequent floodplain inundation.
9. Non-native Predatory Fish	Slightly Improve IC	Non-native fish are present throughout the action area, but are somewhat separated temporally from bull trout as they are primarily warm-water species that are inactive when water temperatures are cold. Off-channel areas will experience more frequent flushing and river inputs that will likely reduce temperatures somewhat.	Dams have modified the temperature regime providing conditions more suitable for warm-water species. Project will allow more frequent flushing and connections between off-channel and riverine habitats that will likely promote lower water temperatures in off-channel areas reducing their suitability for non-native species.
Oregon Chub			

PCE	FUNCTION	PROPOSED CONDITION DESCRIPTION	EXPLANATION
1. Off-channel Waterbodies	Improve IC	Increased quantity of off-channel habitats and improved access. Restored pond areas will have increased wood, log jams, and riparian vegetation that could further contribute to habitat formation.	Dams have reduced peak flows that form habitats and also blocked sediment and wood transport from the upper watershed that contribute to channel migration and habitat formation. Project will restore connections to off-channel habitats and improve quality.
2. Aquatic Vegetation	Improve IC	Aquatic vegetation will be enhanced in the project area off-channel habitats and steep slopes will be reduced.	Project will restore and enhance off-channel habitats.
3. Water Temperature	Maintain IC	Temperature regime is modified due to dam releases of cooler water in summer.	Dams have modified the temperature regime causing lower summer temperatures but higher fall temperatures. Project will only minimally affect for Oregon chub.
4. Non-native Predatory or Competitive Species	Slightly Improve NPF	Non-native fish and wildlife are present throughout the action area and do well in warm waters used by Oregon chub.	Non-native species will still be present, but the improvement of some natural processes will likely reduce suitability for non-natives and improve conditions for Oregon chub.

7.1 Climate Change Considerations

Ongoing climate change will likely have effects on listed species in the Pacific Northwest. The Independent Scientific Advisory Board (ISAB 2007) identified potential effects of climate change in the Columbia River Basin. Changes in precipitation and temperatures are likely throughout the basin that would affect hydrology and habitats for salmonid rearing and migration. In the Coast and Middle Forks subbasins, it is likely that there will be an increasing proportion of rainfall versus snowpack, which could lead to less water available for storage in reservoirs and less water available during the summer and fall months. Water temperatures are likely to increase during low flow periods due to lesser proportions of snowmelt runoff and lesser quantities of water. More intense rain storms may also occur, which would cause more intense runoff and associated flooding. The potential increases in water temperatures will most adversely affect bull trout that are dependent on cold waters, but could also exacerbate pre-spawning mortality, egg incubation, and rearing for Chinook. More intense runoff and flooding events could cause scour of redds/eggs and flush juvenile salmonids downstream.

The proposed project will actually help reduce some of the potential adverse effects of climate change by conserving and restoring floodplain habitats that will provide refuge and rearing habitats and help mitigate peak flows by allowing natural floodplain inundation. The project will also restore riparian and floodplain vegetation to provide more shade and thermal refugia. In the 2008 Biological Opinion (NMFS 2008c) recommended that areas sensitive to climate change with potential for high ecological value be preserved through land purchases and easements and also protect and restore wetlands and floodplains to store water for declining summer flows. This project aims to protect and restore exactly these types of features that will contribute to the resiliency of the watershed and help it adapt to a changing hydrologic regime.

7.2 Marbled Murrelet, Threatened

Because marbled murrelets are not known to occur in the action area and there is no suitable old growth or late-successional forest present within more than 20 miles of the site there would not likely be any effects to marbled murrelet from the project.

7.2.1 Effect Determination

The proposed project will likely have *no effect* on marbled murrelet because they are not expected to be found in the action area. There is no designated critical habitat within the action area for marbled murrelet, thus there will also be *no effect* on critical habitat.

7.3 Northern Spotted Owl, Threatened

Because Northern spotted owl are not known to occur at the project site and there is no suitable old growth or late-successional forest present within more than 20 miles of any of the project sites there would not likely be any effects to Northern spotted owl from the project.

7.3.1 Effect Determination

The proposed project will likely have *no effect* on Northern spotted owl because they are not expected to be found in the action area. There is no designated critical habitat within the action area for Northern spotted owl, thus there will also be *no effect* on critical habitat.

7.4 Upper Willamette River Chinook Salmon, Threatened

The proposed project will have long-term beneficial effects on Chinook salmon. The project will restore a more natural hydrologic connection between the Coast and Middle Forks of the Willamette River and their floodplains. The project will provide an increased area of freshwater off-channel and floodplain rearing and refuge habitat. The project will restore large wood, riparian and floodplain vegetation and contribute to restoration of natural processes.

Short-term adverse effects are likely during construction. In-water work areas will need to be isolated and fish salvage and removal will occur. Temporary increases in turbidity are likely. Non-native vegetation species will be removed and native species will be replanted, but will take several years to provide sufficient cover. Pile driving may be necessary for the installation of ELJs and there will be other general disturbance to the species. In order to reduce these effects, all construction activities will occur during the designated in-water work period determined by ODFW in order to minimize effects on salmonids. Additionally, the contractor will be required to isolate the work area from the river and to infiltrate or otherwise treat any water pumped from the work zone so that turbidity standards are met throughout the construction duration.

7.4.1. Effect Determination

The proposed project *may affect, and is likely to adversely affect* Chinook salmon. The proposed project *may affect, but is not likely to adversely affect* critical habitat designated for Chinook salmon. The proposed project will restore freshwater rearing sites that are considered primary constituent elements for the recovery of Chinook salmon.

7.5 Oregon Chub, Threatened

The proposed project will have long-term beneficial effects on Oregon chub. The proposed project will restore a more natural hydrologic connection between the Coast and Middle Forks of the Willamette River and their floodplains. The project will provide an increased area of freshwater off-channel and floodplain habitats.

Short-term adverse effects are likely during construction. In-water work areas will need to be isolated and fish salvage and removal will occur. Temporary increases in turbidity are likely. Non-native vegetation species will be removed and native species will be replanted, but will take several years to provide sufficient cover. In order to reduce these effects, all construction activities will occur during the designated in-water work period determined by ODFW in order to minimize effects on species. Additionally, the contractor will be required to isolate the work area from the river and to infiltrate or otherwise treat any water pumped from the work zone so that turbidity standards are met throughout the construction duration.

7.5.1 Effect Determination

The proposed project *may affect, and is likely to adversely affect* Oregon chub. The project is predicted to provide increased areas of off-channel habitat preferred by Oregon chub. Since Oregon chub are known to be present at Site M2A, they may need to be salvaged and removed from the work area, thus experiencing adverse effects during construction. The proposed project will have *no effect* on critical habitat designated for Oregon chub as there is none present in the action area. The proposed project will restore floodplain habitats that were historically widespread in the Upper Willamette River but are currently rare that may allow Oregon chub to colonize new locations.

7.6 Bull Trout, Threatened

The proposed project will have long-term beneficial effects on bull trout. The project will restore a more natural hydrologic connection between the Coast and Middle Forks of the Willamette River and their floodplains. The project will provide an increased area of freshwater off-channel and floodplain rearing and refuge habitat and will increase groundwater recharge that may help reduce water temperatures in the rivers. The project will restore large wood, riparian and floodplain vegetation and contribute to restoration of natural processes.

Short-term adverse effects are likely during construction. In-water work areas will need to be isolated and fish salvage and removal will occur. Temporary increases in turbidity are likely. Non-native vegetation species will be removed and native species will be replanted, but will take several years to provide sufficient cover. Pile driving may be necessary for the installation of ELJs and there will be other general disturbance to the species. In order to reduce these effects, all construction activities will occur during the designated in-water work period determined by ODFW in order to minimize effects on salmonids. Additionally, the contractor will be required to isolate the work area from the river and to infiltrate or otherwise treat any water pumped from the work zone so that turbidity standards are met throughout the construction duration.

7.6.1 Effect Determination

The proposed project *may affect, but is not likely to adversely affect* bull trout. The project is predicted to provide rearing and refuge habitat for juvenile bull trout. It is not expected that the construction activities would adversely affect bull trout because they are unlikely to be present in the action area during construction. The proposed project *may affect, but is not likely to adversely affect* critical habitat designated for bull trout. The proposed project will restore freshwater spawning sites and freshwater rearing sites that are considered primary constituent elements for the recovery of bull trout.

7.7 Fender's Blue Butterfly, Endangered

The proposed project will likely have *no effect* on Fender's blue butterfly because they are not likely to occur in the action area. There is no designated critical habitat within the action area for Fender's blue butterfly, thus there will also be *no effect* on critical habitat.

7.8 Willamette Daisy, Endangered

Because the Willamette daisy is not likely to occur in the project vicinity, it is likely there will be *no effect* on Willamette daisy from the proposed project. Likewise, there is no designated critical habitat for Willamette daisy in the project area; thus, the proposed action will have *no effect* on critical habitat for Willamette daisy.

7.9 Bradshaw's Desert Parsley, Endangered

The proposed project will restore a more natural hydrologic connection between the Coast and Middle Forks of the Willamette River and their floodplains allowing for more natural flooding patterns that may increase the wet, open habitats required by Bradshaw's desert parsley. Before construction at each individual project location, a site survey will be conducted to determine the presence of the species. If it is found to be present, then the individual plants and/or areas of occurrence will be protected during construction by signage and flagging/fencing to keep equipment and personnel out of the area.

7.9. Effect Determination

The proposed project *may affect, but is not likely to adversely affect* Bradshaw's desert parsley, due to its known historical occurrence in the project vicinity. It is not expected that the construction activities would adversely affect Bradshaw's desert parsley.

7.10 Kincaid's Lupine, Threatened

Because Kincaid's lupine is not known to occur in the project vicinity, it is likely there will be *no effect* on Kincaid's lupine from the proposed project. Likewise, there is no designated critical habitat for Kincaid's lupine in the action area; thus, the proposed action will have *no effect* on critical habitat for Kincaid's lupine.

7.11 Bald Eagle, Delisted

Few or no habitat features important for bald eagles, such as large trees or snags will be removed as part of this project to the extent possible. The project will improve and create riparian habitat conditions that would benefit the bald eagle. The majority of the construction work will minimize bald eagle disturbance, by minimizing or limiting construction during the bald eagle nesting period between January 1 and August 15. Since construction activities might be performed during some of this nesting period, construction periods will be limited to daylight hours to minimize disturbance to nests, and behavior will be monitored to ensure disruption is avoided or minimized.

8.0 CUMULATIVE EFFECTS

The population of the southern Willamette Valley region is projected to nearly double in the next 50 years, from 297,811 to 515,000 in the year 2050. For the most part, these new residents will reside in cities. The urban growth areas of Eugene and Springfield contain the largest share of the region's undeveloped residential land, about 48% and 30%, respectively, followed to a lesser extent by Veneta, Cottage Grove, and Oakridge. New residents also will live on rural residential lands; there are as many as 3,000 undeveloped residential parcels in the region outside of the metro area, based on a tax lot analysis and current zoning (LCOG 2001).

As the population grows, the increased pressure to develop floodplain lands will likely place more infrastructure at risk from flooding. Increased development of tributary watersheds could increase peak flows and volume of runoff to the floodplain areas of the Coast Fork and Middle Fork Willamette, as well as to the floodplain on the mainstem Willamette River. Flood damages would likely increase. Climate change scenarios with increased rainfall predictions could also cause flood damages to increase.

Urban growth also will likely result in significant potential for increased point and non-point water quality impacts. TMDLs have been developed for the subbasins to address the worst water quality problems and it is likely that there will be improvements in water quality, although may not be able to achieve the standards.

Population pressures will increase demand for water for drinking, irrigated agriculture, recreation uses, and other demands affecting flow quantity and therefore quality, particularly during low-flow (summer) periods. At the same time, it is likely that community concern to protect and restore indigenous wildlife habitat, and to be able to enjoy high-quality native landscapes from an aesthetic and recreational viewpoint, would increase.

All of this combined expected development and population growth would likely reduce the availability of habitats for listed species and also contribute to adverse effects on the hydrologic regime and water quality. This would result in the further degradation of the PCEs of critical habitats.

Watershed councils, municipalities, counties, and the State of Oregon are likely to continue to undertake restoration measures to improve habitats for listed species. These effects will result in small improvements to fish population abundance, productivity, and spatial structure and result in some improvement to the condition of critical habitat PCEs. When considered together, these cumulative effects are likely to have essentially a balancing effect on listed species and their critical habitats – some degradation and some improvement.

9.0 MATRIX OF PATHWAYS AND INDICATORS

Table 6 summarizes the likely effects of the project using the matrix of pathways and indicators (NMFS 1996).

Table 6. Matrix of Pathways and Indicators

Pathways	Indicators	Environmental Baseline			Effects of the Action		
		Properly Functioning	**At Risk**	**Not Properly Functioning**	**Restore**	**Maintain**	**Degrade**
Water Quality	Temperature			X	x	X	
	Sediment		X		x	X	
	Chemical Contamination/ Nutrients		X		x	X	
Habitat Access	Physical Barriers		X		X		
Habitat Elements	Substrate	X				X	
	Large Woody Debris			X	X		
	Pool Frequency			X	x		
	Pool Quality			X	X		
	Off-channel Habitat			X	X		
	Refugia			X	X		
Channel Condition & Dynamics	Width/Depth Ratio	X				X	
	Streambank Condition			X	X		
	Floodplain Connectivity			X	X		
Flow/ Hydrology:	Peak/Base Flows		X			X	
	Increase in Drainage Network			X		X	
Watershed Conditions	Road Density & Location			X		X	
	Disturbance History			X		X	
	Riparian Reserves			X	X		

10.0 ESSENTIAL FISH HABITAT

The objective of this Essential Fish Habitat assessment is to determine whether or not the proposed action(s) "may adversely affect" designated EFH for relevant commercially, federally-managed fisheries species within the proposed action area. This report provides a description and assessment of EFH in the project area; a description of the project and its potential impacts on these habitats; and describes conservation and mitigation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed action.

10.1 EFH Background

The Sustainable Fisheries Act of 1996 (Public Law 104-297) amended the Magnuson-Stevens Fishery Conservation and Management Act (now called the Magnuson-Stevens Act) to require federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH. The EFH guidelines (50 CFR §600.05-600.930) outline the process for federal agencies, NOAA Fisheries, and the Fishery Management Councils to satisfy the EFH consultation requirement under Section 305(b(2)-(4)) of the Magnuson-Stevens Act. As part of the EFH consultation process, the guidelines require federal action agencies to prepare a written EFH Assessment describing the effects of that action on EFH (50 CFR §600.920(e)(1)). This document has been prepared to satisfy that requirement.

EFH is defined as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C §1802(10). For the purpose of interpreting this definition of EFH: "*waters* include aquatic areas (marine waters, intertidal habitats, and freshwater streams) and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; *substrate* includes sediment, hard bottom, structures underlying the waters, and associated biological communities; *necessary* means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and *spawning, breeding, feeding, or growth to maturity* covers a species' full life cycle (50 CFR §600.10); *Adverse effect* means any impact that reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions" (50 CFR §600.810). The Magnuson-Stevens Act promotes the protection of these habitats through review, assessment, and mitigation of activities that may adversely affect these habitats.

The EFH mandate applies to all species managed under a Fishery Management Plan (FMP). In Washington, Oregon, and California, there are three FMPs covering groundfish, coastal pelagic species, and Pacific salmon. Federal agencies must consider the impact of a proposed action on all three types of EFH. This project includes freshwater Pacific salmon EFH.

Pacific salmon EFH for the Pacific Coast Salmon FMP includes all streams, lakes, ponds, wetlands, and other water bodies currently and historically utilized by Pacific salmon within Washington, Oregon, Idaho, and California within the USGS HUC. Excluded are some areas upstream of certain impassable man-made barriers (e.g., dams as identified by the Pacific Fishery Management Council in Appendix A of Amendment 14 to the Pacific Coast Salmon Plan), and longstanding, naturally-impassable barriers (e.g., natural waterfalls in existence for several hundred years) (PFMC 2000).

Based on the available life history information, freshwater EFH for Pacific salmon consists of four major components: 1) spawning and incubation, 2) juvenile rearing, 3) juvenile migration corridors, and 4) adult migration corridors and adult holding habitat (Roni *et al.* 1999). Important features of essential habitat for spawning, rearing, and migration include adequate: 1) substrate composition; 2) water quality (dissolved oxygen, nutrients, temperature, etc.); 3) water quantity, depth, and velocity; 4) channel gradient and stability; 5) food availability; 6) cover and habitat complexity (e.g., large woody debris, pools, channel complexity, aquatic vegetation, etc.); 7) space (habitat area); 8) access and passage; and 9) floodplain and habitat complexity. Potential threats to these habitat features and life history components include 1) direct (hydrologic modifications); 2) indirect (loss of prey or reduction of species diversity); 3) site-specific; or 4) habitat-wide impacts that are chemical, biological, and physical in nature and may result in individual, cumulative, or synergistic consequences (Wilbur and Pentony 1999).

10.2 Potential Adverse Effects of the Proposed Project

The definition of "adverse effect" is "any impact that reduces quality and/or quantity of EFH, including direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions" (50 CFR §600.810). The significance of small-scale projects lies in the cumulative and synergistic effects resulting from a large number of these activities occurring in a single watershed.

For this project, all of the effects of the action have already been discussed in the ESA effects analysis on Chinook salmon and their critical habitat and collectively these would apply to EFH. The effects of the action are short term and temporary turbidity increases during construction. The proposed action will restore EFH components for juvenile rearing and potentially for adult holding habitat by reconnecting off-channel and floodplain habitats and installing large wood and ELJs in the main channels that will create pools and cover. No long term adverse effects to EFH are expected to result from the action.

11.0 CONCLUSIONS

Table 7 summarizes the effect determinations made for each of the species potentially occurring in the project vicinity.

Table 7. Determination of Effects Summary Table

Species	Effect Determination	Critical Habitat Determination
Marbled murrelet	No effect	No effect
Northern spotted owl	No effect	No effect
Oregon chub	May affect, likely to adversely affect	No effect
Bull trout	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Upper Willamette River Chinook salmon	May affect, likely to adversely affect	May affect, not likely to adversely affect
Fender's blue butterfly	No effect	No effect
Willamette daisy	No effect	No effect
Bradshaw's desert parsley	May affect, not likely to adversely affect	N/A
Kincaid's lupine	No effect	No effect

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APPENDIX E: Hydrology and Hydraulics

November 2013

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Hydrology and Hydraulics Appendix

1. INTRODUCTION

The U.S. Army Corps of Engineers, Portland District (Corps), the Nature Conservancy, the Willamette Partnership, Middle and Coast Fork watershed councils, Oregon Department of Fish and Wildlife, and Bonneville Power Administration are collaborating to evaluate floodplain restoration opportunities in the lower Coast and Middle Forks of the Willamette River and the Row River. The goal is to develop potential floodplain restoration projects for select restoration sites on the three rivers. The work is being conducted as part of the feasibility phase of a Congressionally-approved General Investigations Study. The project vicinity and location are shown in Figure 1.

As described in Chapter 5 of the main report, forty-three (43) restoration sites were initially identified throughout the lower Coast and Middle Forks of the Willamette River and the lower Row River. Habitat benefits and project cost estimates were evaluated using a Cost Effectiveness and Incremental Cost Analysis (CEICA). The results of this analysis resulted in a recommended restoration plan that is comprised of five (5) restoration sites on the lower Coast and Middle Forks of the Willamette River (see Figure 1).

This appendix therefore covers preliminary results of hydrologic (quantification of flow) and hydraulic (characterization of flow) data acquisition efforts and analyses in support of the five restoration projects on the Middle and Coast Forks of the Willamette River.

Hydrologic efforts focused on obtaining and analyzing streamflow data recorded at five USGS recording stations in the watershed. Flow exceedance and flood frequency analyses were conducted for each of the five gaging stations.

Hydraulic efforts focused on the development and calibration of a combined 1-dimensional steady state flow hydraulic model for the Willamette River (River Mile (RM) 184.5 to RM 186.6); the Middle Fork Willamette River (RM 186.6 to RM 203.7); the Coast Fork Willamette River (RM 0.0 to RM 20.7); and the Row River (RM 0.0 to RM 2.9). The development of the hydraulic model built upon previous work efforts as summarized in USACE – Portland District (2009).

The purpose of the hydrologic and hydraulic analyses is threefold – (1) to determine the baseline hydrologic and hydraulic conditions in the Middle Fork Willamette River, Coast Fork Willamette River and the Row River to support preliminary restoration design efforts; (2) to determine with project hydraulic conditions at the five recommended restoration sites; and (3) to evaluate the effect of the restoration projects on 2-yr, 5-yr, 10-yr, 20-yr and 100-yr return period flood elevations.

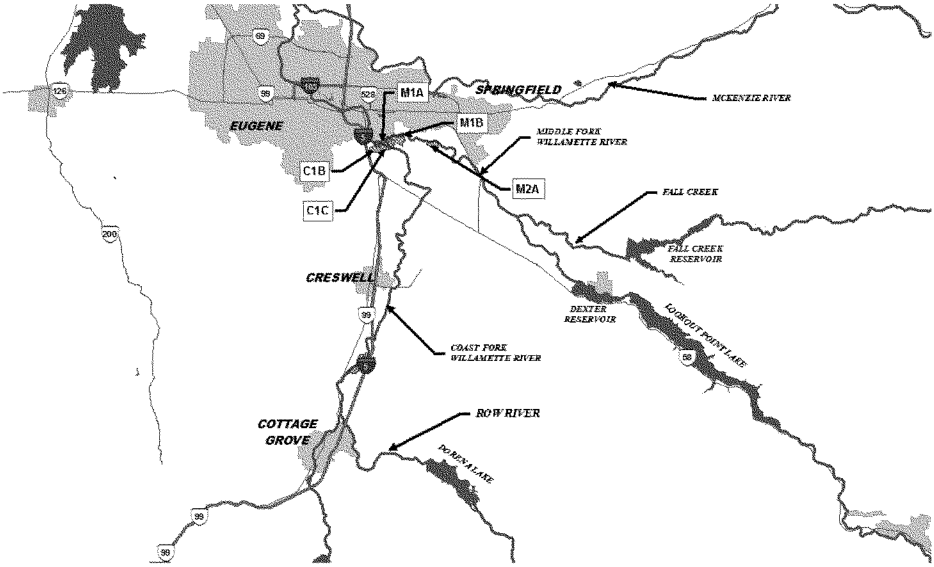


Figure 1. Project Site Vicinity Map.

2. WATERSHED DESCRIPTION

This restoration study focuses on the floodplain functions of the lower Coast Fork Willamette River, the lower Middle Fork Willamette River and the lower Row River, since it is in these areas where the greatest opportunity for floodplain restoration exists. However, this section presents a brief description of the entire contributing basins to these rivers. More detailed description of the contributing basins is provided in the main body of this report.

2.1. Coast Fork Willamette River Basin

The Coast Fork Willamette River Basin, as shown in Figure 2, covers an area of about 665 square miles within the Calapooya Mountains (Western Cascades province) and the floor of the Willamette Valley. The mainstem river is 40 miles long and joins the Middle Fork Willamette near Eugene to form the mainstem Willamette River. Big River and Saroute Creek in the Calapooya Mountains join to form the Coast Fork Willamette River. About 96% of the Coast Fork basin is in Lane County, with the remainder of its southern extremity in Douglas County.

About 64% of land in the basin is privately owned with the balance under federal ownership. Management of federal lands is almost equally divided between the Forest Service and the Bureau of Land Management (BLM). Ninety percent of the basin is forested. Commercial forestry is the major land use in the basin, but mining and agricultural resources are also significant. The communities of Creswell, Cottage Grove, Goshen, London, and Dorena are located in the basin.

The Row River, the largest tributary to the Coast Fork Willamette River, drains nearly 60% of the Coast Fork basin and joins the Coast Fork Willamette River just below the City of Cottage Grove. Sharps and Mosby Creeks are important tributaries to the Row River, which flows through a complex mixture of sedimentary and volcanic rocks. Mineral bearing layers intrude into bedrock in the headwaters of the Row River, and the area continues to be mined both commercially and recreationally. Bedrock in the western portion of the basin, including the majority of the Coast Fork Willamette and Mosby Creek drainages, is composed of marine sands and siltstones of the Eugene Formation.

There are two federally owned and operated dams located within in the Coast Fork basin - Cottage Grove Dam on the Coast Fork Willamette and Dorena Dam on the Row River. The Row and Coast Fork Willamette Rivers downstream of these dams flow through narrow valleys filled with erodible alluvial sediments with a stream gradient that is less than 0.2%. The valley widens considerably downstream of the Row River and Coast Fork Willamette River confluence. Sand and gravel are mined in the lower basin, and much of the area is farmed and developed for agriculture.

The upper basin drains the lower elevations of the western Cascade Range and the Calapooya Mountains. Headwater elevations in the Coast Fork are lower than in the Middle Fork and the Coast Fork hydrograph does not exhibit a spring snowmelt runoff. As a result of the basin's low elevations, summer stream flows are not supplemented by large amounts of snowmelt or numerous spring-fed sources.

2.2. Middle Fork Willamette River Basin

The Middle Fork Willamette River basin, as shown in Figure 2, covers an area of approximately 1,360 square miles on the western slope of the Cascade Mountains and the floor of the Willamette Valley. The river is 84 miles long and joins the Coast Fork Willamette River near Eugene to form the mainstem

Willamette River. The Middle Fork Willamette River originates in two connecting lakes formed by lava flows; Opal and Timpanogas Lakes in the Willamette National Forest.

About 94% of the Middle Fork basin is in Lane County, with the remainder of its southern extremity in Douglas County. About 75% of the land in the upper basin (above Dexter Dam) is publicly owned, most of which is managed by the U.S. Forest Service (Forest Service). The majority of the land below Dexter is privately owned, although there are a few large publicly owned sites, including Elijah Bristow State Park and Howard Buford Regional Recreation Area. The communities of Oakridge, Westfir, Lowell, Dexter, Fall Creek, Jasper and portions of south Springfield and Pleasant Hill all lie within the Middle Fork basin.

The Lookout Point/Dexter Projects divide the Middle Fork basin, limiting upstream fish passage. The North Fork of the Middle Fork Willamette River and Salt and Salmon Creeks are major tributaries in the upper basin that historically supported anadromous fish populations. The North Fork of the Middle Fork Willamette River is a designated National Wild and Scenic River. The upper Middle Fork Willamette River flows through a narrow, steep forested canyon. Hills Creek Dam further divides the upper basin. The river's gradient decreases from 2.6% upstream of Hills Creek Reservoir to approximately 0.5% between Hills Creek Dam and Lookout Point Reservoir.

Below Dexter Dam, the Middle Fork Willamette River flows into the wide, alluvial Willamette Valley. Fall, Little Fall, and Lost Creeks are major tributaries in the lower basin. Below Dexter, the river is very low gradient (less than 0.2%) and flows through a relatively wide valley with an extensive floodplain.

As the leading land use in the basin, commercial forestry has contributed to degradation of fish habitat by modifying hydrology and increasing sediment inputs and water temperatures (NPCC 2004). Mature and old-growth forest currently occupy about 36% of the Hills Creek Reservoir drainage, which has been estimated to be a loss of 55% from historic conditions (NPCC 2004). The lower basin is dominated by agricultural and urban land uses that constrain the river's ability to meander and have resulted in the removal of much of the riparian gallery forest.

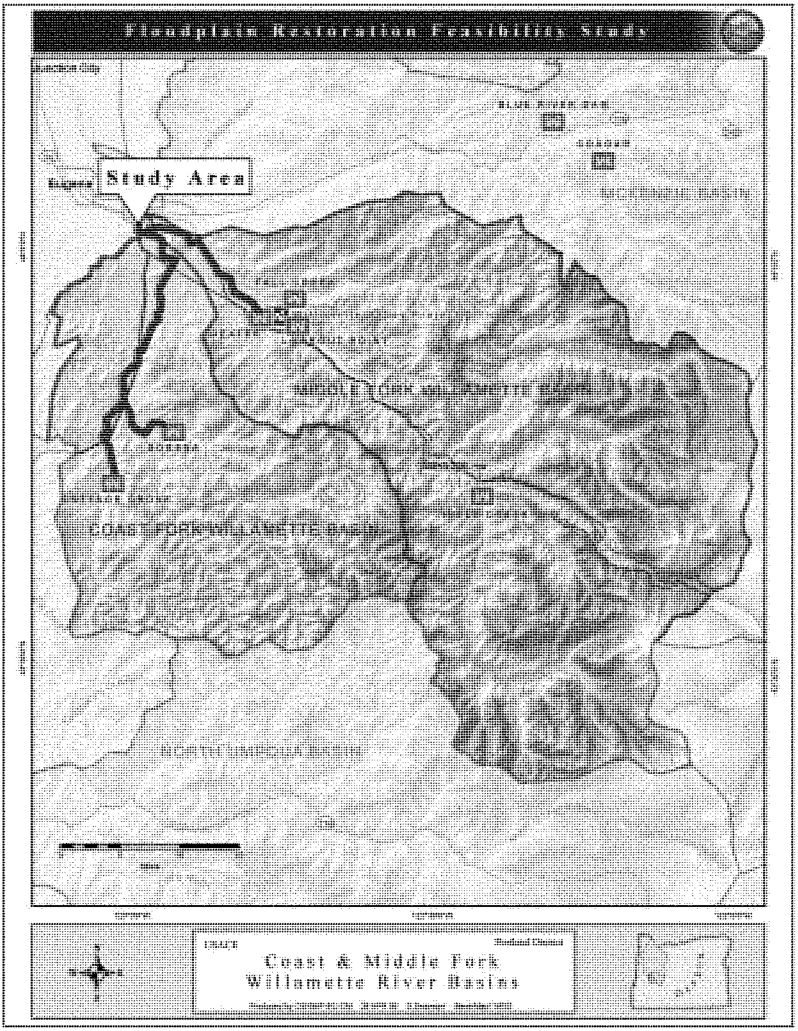


Figure 2. Coast and Middle Forks Willamette River Basins.

3. EXISTING AND FUTURE CONDITIONS HYDROLOGY

Characterization of the existing hydrologic conditions of the Coast Fork Willamette and Middle Fork Willamette Rivers was based on analysis of data from four USGS gaging stations located in the lower reaches of the watershed in addition to hydrologic data provide by the Corps for Dexter Dam on the Middle Fork Willamette River. Table 1 presents a summary of the locations at which data were analyzed and used as the basis of the hydrologic characterization. Figure 3 illustrates the locations of the stations.

Table 1. Streamflow Gaging Stations used in Hydrologic Characterization of Existing Conditions.

Gage Name	USGS Gage Number	River Mile Location	Drainage Area (sq. mi.)	Period of Record
Middle Fork Willamette River at Jasper, OR [a]	14152000	195.0	1340	Sept 1905 – Feb 1912 Jul 1913 – Mar 1917 Oct 1952 – present
Dexter Dam Outflows [b]	n/a	203.9	991	Jan 1955 – Mar 2010
Lookout Point Dam Outflows	n/a	n/a	991	1924 - 1974
Coast Fork Willamette River near Goshen, OR [c]	14157500	6.4	642	Aug 1905 – Feb 1912 Oct 1950 – present
Coast Fork Willamette River below Cottage Grove Dam [d]	14153500	29.4	104	Jan 1939 – present
Row River near Cottage Grove, OR [e]	14155500	5.5	270	Jan 1939 – present

Notes:

a. Flow regulated since 1953 by Lookout Point Lake (USGS 14149000), since 1961 by Hills Creek Lake (USGS 14151000) and since 1966 by Fall Creek Lake (USGS 14150900)
b. Mean daily flows provided by USACE – Portland District for January 1955 to March 2010
c. Flow regulated since 1942 by Cottage Grove Lake (USGS 14153000) and since 1949 by Dorena Lake (USGS 14155000)
d. Flow regulated since 1942 by Cottage Grove Lake (USGS 14153000). Small diversions for irrigation upstream of diversion
e. Flow regulated since October 1949 by Dorena Lake (USGS 14155000). No diversions upstream from station.

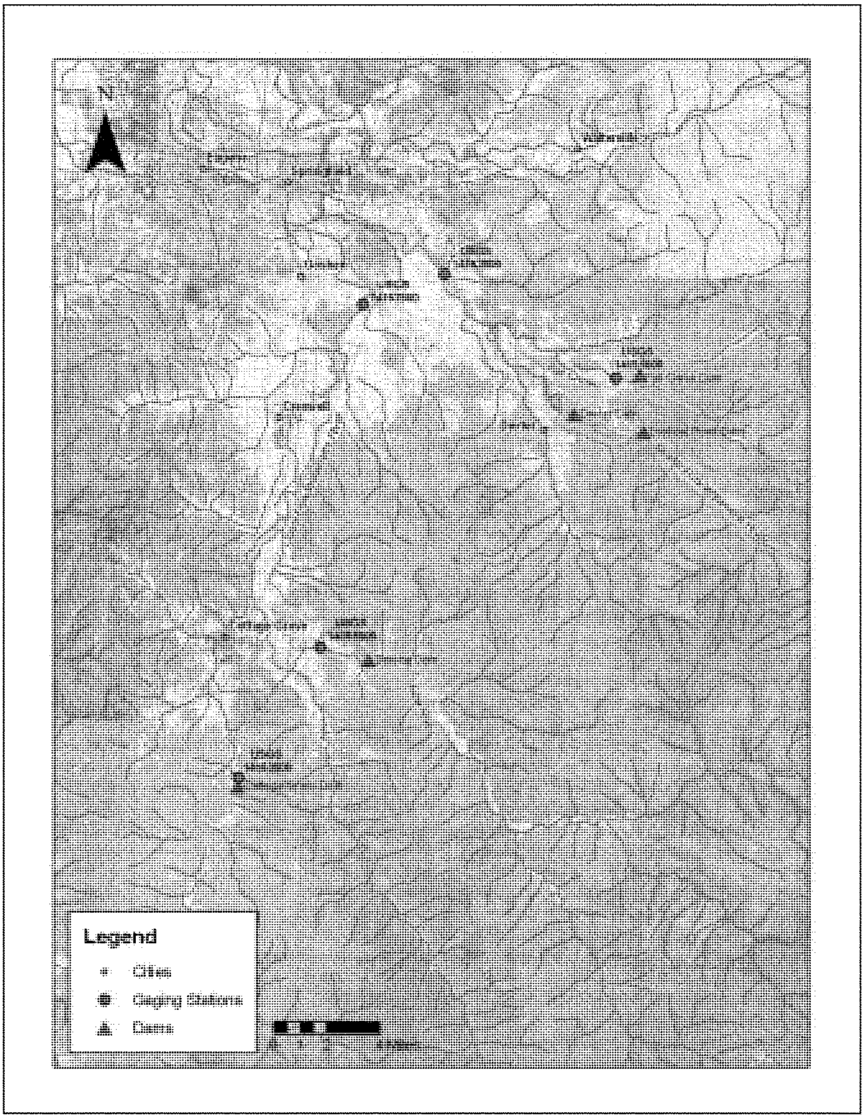


Figure 3. Streamflow Gaging Stations used for Hydrologic Characterization.

3.1. Coast Fork Willamette River Basin – Existing Conditions

The Coast Fork Willamette River drains an area of approximately 642 square miles. Flow rates in the Coast Fork reflect the seasonality of rainfall, with the majority of runoff occurring during the winter and spring and low flows occurring during July and August. However, headwater elevations in the Coast Fork are not in the high Cascades and are fairly low elevation, thus, the Coast Fork's annual hydrograph does not exhibit a spring snowmelt runoff period. The mean elevation in the basin is 1,920 feet (USGS Oregon StreamStats Program) and the maximum elevation in the basin is approximately 5,100 feet. It is noted that the annual runoff hydrograph has been significantly altered from natural conditions (CFWWC 2005).

Flows in the lower Coast Fork Willamette River have been controlled by Dorena and Cottage Grove dams since 1949 and 1943, respectively. The dams have substantially decreased the magnitude and frequency of extreme high flow events in the Coast Fork Willamette and Row Rivers. Additionally, the dams have decreased the magnitude of lower return period channel forming flood events (USACE 2000). Flood frequency analysis conducted by the USACE-Portland District for the USGS Gage at Goshen (USGS 14157500) has shown that the 2-year return period flood event is 15,800 cfs for the regulated condition, as compared to 26,700 cfs for the unregulated condition (OSU 2007).

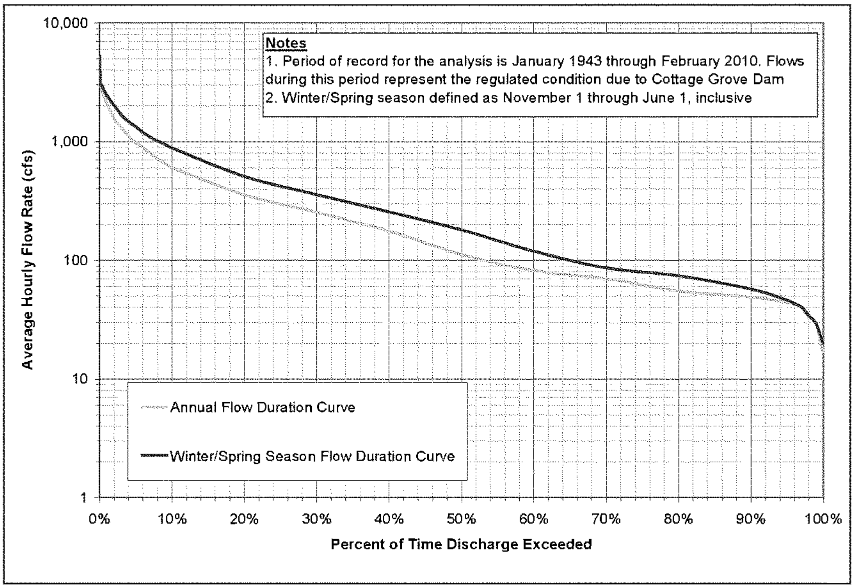
In support of the analysis and design of the restoration projects, hydrologic data for three flow monitoring stations on the lower Coast Fork were compiled and analyzed, as summarized below:

- Coast Fork Willamette River near Goshen, OR (USGS Gage 14157500)
- Coast Fork Willamette River below Cottage Grove Dam (USGS Gage 14153500)
- Row River near Cottage Grove, OR (USGS Gage 14155500)

Flood frequency analysis of the data at each of the three gages was conducted by the USACE-Portland District, and the graphical results are included as Attachment A (Flood Frequency Curves). The flood frequency analysis for USGS Gage 14157500 was the most current and included data through Water Year (WY) 2004 (OSU 2007). The flood frequency analysis for the other two stations was conducted in 1982 and was provided to Tetra Tech by the USACE-Portland District.

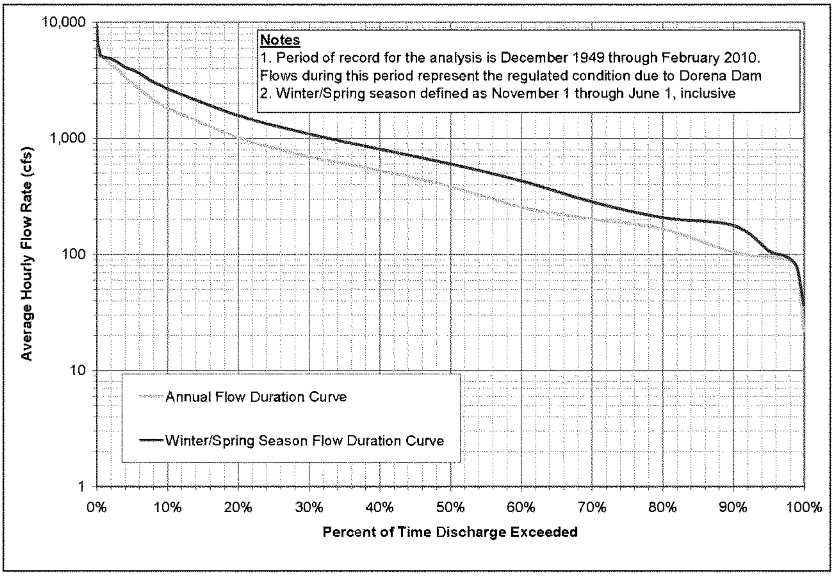
A flow duration analysis was conducted by Tetra Tech for each of the three gages to illustrate the percent of time that specific magnitudes of flow are equaled or exceeded. The analysis was conducted using mean daily flow data for the post-dam time period only. The flow duration curves are included as Figures 4 through 6. At each site, two flow duration curves were developed. An annual flow duration curve was developed from the entire data set of mean daily flow data. A separate winter/spring period flow duration curve was developed from the data for the months of November through May, inclusive. The winter/spring flow duration curve was of primary interest to the floodplain restoration efforts as this is the period of the year when flows are large enough to provide connection to the floodplain and floodplain channel features.

Table 2 presents a summary of key values from the flow duration curves and the flood frequency curves for the three gaging stations in the Coast Fork Willamette River basin.



Notes
1. Period of record for the analysis is January 1943 through February 2010. Flows during this period represent the regulated condition due to Cottage Grove Dam
2. Winter/Spring season defined as November 1 through June 1, inclusive

Figure 4. Flow Duration Curve: Coast Fork Willamette River below Cottage Grove (USGS 14153500).



Notes
1. Period of record for the analysis is December 1949 through February 2010. Flows during this period represent the regulated condition due to Dorena Dam
2. Winter/Spring season defined as November 1 through June 1, inclusive

Figure 5. Flow Duration Curve: Row River near Cottage Grove (USGS 14155500).

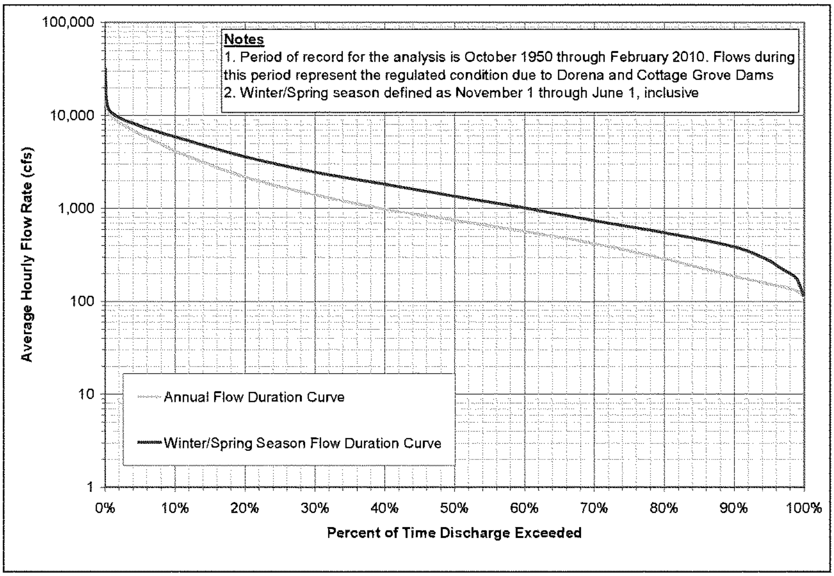


Figure 6. Flow Duration Curve: Coast Fork Willamette River near Goshen (USGS 14157500).

Table 2. Coast Fork Willamette River Flow Rates for Range of Exceedance Values and Return Periods.

Flow Duration and Flood Frequency Ordinate	Flow Rate by Location (cfs)		
	Coast Fork below Cottage Grove USGS Gage 14153500	Row River near Cottage Grove USGS Gage 14155500	Coast Fork near Goshen USGS Gage 14157500
95% Exceedance [a]	46	107	274
90% Exceedance [a]	57	177	386
75% Exceedance [a]	78	221	632
50% Exceedance [a]	180	600	1,350
25% Exceedance [a]	425	1,300	2,920
10% Exceedance [a]	883	2,660	5,890
5% Exceedance [a]	1,330	3,900	7,686
1.5-year Return Period [b]	2,500 [c]	4,000 [c]	11,000 [c]
2-year Return Period [b]	2,500 [c]	4,000 [c]	15,800
5-year Return Period [b]	2,500 [c]	5,500 [c]	20,000 [c]
10-year Return Period [b]	2,900	7,700	25,500
20-year Return Period [b]	3,600 [c]	10,500 [c]	31,500 [c]
100-year Return Period [b]	8,400	19,300	48,000

Notes:
a. Flow Exceedance Values from Winter/Spring Season Flow Duration Curve
b. Flood Frequency Values are for the Regulated Condition
c. Value Interpolated from USACE-Portland District Flood Frequency Curve

3.2. Middle Fork Willamette River Basin – Existing Conditions

The Middle Fork Willamette River drains an area of approximately 1,360 square miles. As was the case with the Coast Fork basin, the hydrograph in the Middle Fork basin also reflects the seasonality of rainfall, with the majority of runoff occurring during the winter and low flows occurring during July and August. Typically a smaller, secondary peak occurs in May and June because headwater elevations are high enough to develop a seasonal snowpack and subsequent snowmelt runoff period (MFWWC 2002). The mean elevation in the basin is 3,270 feet (USGS Oregon StreamStats Program) and the maximum elevation is approximately 8,100 feet.

Flows in the Middle Fork have been controlled by the Lookout Point-Dexter, Hills Creek, and Fall Creek projects since 1954, 1961, and 1965, respectively. Flood control operations at the dams have substantially decreased the magnitude and frequency of extreme high flow events in the lower Middle Fork Willamette River. Additionally, the dams have decreased the magnitude of channel forming flood events (USACE 2000). Flood frequency analysis conducted by the USACE-Portland District for the USGS Gage near Jasper (USGS 14152000) has shown that the 2-year return period flood event is 20,000 cfs for the regulated condition, as compared to 39,900 cfs for the unregulated condition (OSU 2007).

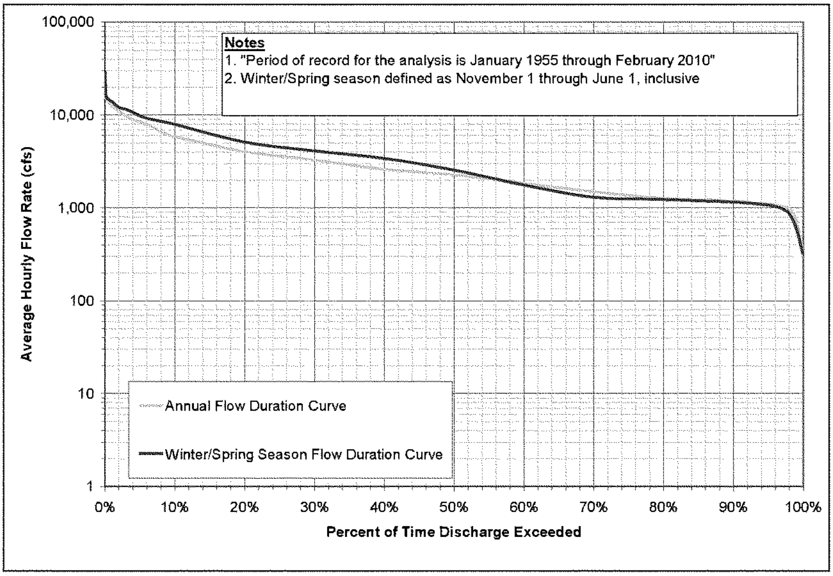
In support of the analysis and design of the restoration projects, hydrologic data for two flow monitoring stations on the lower Middle Fork Willamette were compiled and analyzed, as summarized below:

- Dexter Dam Outflows
- Middle Fork Willamette River near Jasper (USGS Gage 14152000)

Flood frequency analysis of the data at each of the two gages was conducted by the USACE-Portland District, and the graphical results are included as Attachment A (Flood Frequency Curves). Of the two, the flood frequency analysis for USGS Gage 14152000 was the most current and included data through Water Year (WY) 2004 (OSU 2007). The flood frequency analysis for Dexter Dam outflows was conducted in 1982 using Lookout Point Dam outflows and was provided to Tetra Tech by the USACE-Portland District.

Flow duration analysis was conducted by Tetra Tech for each of the two gages to illustrate the average percent of time that specific magnitudes of flow are equaled or exceeded. The analysis was conducted using mean daily flow data for the post-dam time period only. The flow duration curves are included as Figures 7 and 8. As was done for the Coast Fork Willamette River gages, two flow duration curves were developed at each station - an annual flow duration curve and a separate winter/spring period flow duration curve.

Table 3 presents a summary of key values from the flow duration curves and the flood frequency curves for the two gaging stations in the Middle Fork Willamette River basin.



Notes
1. "Period of record for the analysis is January 1955 through February 2010"
2. Winter/Spring season defined as November 1 through June 1, inclusive

Figure 7. Flow Duration Curve: Dexter Dam Outflows.

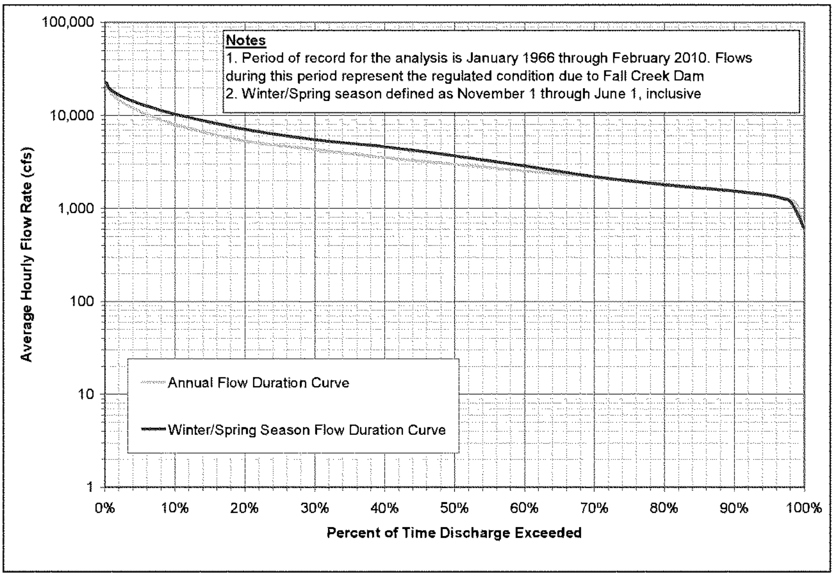


Figure 8. Flow Duration Curve: Middle Fork Willamette near Jasper (USGS 14152000).

Table 3. Middle Fork Willamette River Flow Rates for Range of Exceedance Values and Return Periods.

Flow Duration and Flood Frequency Ordinate	Flow Rate by Location (cfs)	
	Dexter Dam Outflows	Middle Fork near Jasper USGS Gage 14152000
95% Exceedance [a]	1,070	1,380
90% Exceedance [a]	1,150	1,530
75% Exceedance [a]	1,250	1,970
50% Exceedance [a]	2,550	3,670
25% Exceedance [a]	4,350	6,140
10% Exceedance [a]	7,930	10,300
5% Exceedance [a]	9,824	13,300
1.5-year Return Period [b]	12,000 [c]	20,000 [c]
2-year Return Period [b]	12,000 [c]	20,000
5-year Return Period [b]	12,000 [c]	20,000 [c]
10-year Return Period [b]	12,000	20,000
20-year Return Period [b]	12,000 [c]	20,000 [c]
100-year Return Period [b]	20,300	35,500

Notes:

a. Flow Exceedance Values from Winter/Spring Season Flow Exceedance Curve
b. Flood Frequency Values are for the Regulated Condition
c. Value Interpolated from USACE-Portland District Flood Frequency Curve

3.3. Willamette River Basin – Future Conditions

Some changes in the operation of the dams on the Coast Fork and Middle Fork are anticipated in the future. Since the 1999 listing of salmon and steelhead as threatened under the ESA, the Corps has made adjustments in the operation of the dams on the tributaries of the Willamette River to better meet the needs of aquatic species. In particular, the Corps is working collaboratively with The Nature Conservancy (TNC) of Oregon under the Willamette River Flow Project. This project is part of the Sustainable Rivers Project (SRP), which is a national partnership between TNC and the USACE. One of the purposes of the partnership is to assess opportunities to modify existing flow conditions in the Willamette River and its tributaries to restore natural ecological processes, meet habitat requirements and water quality requirements for native species, reduce flood damages and restore natural wetlands.

In January 2007, an "Environmental Flows Workshop" was held in Salem, Oregon which brought together 43 people from 14 government and non-governmental organizations. The overall objective of the workshop was to develop scientifically based environmental flow recommendations for the Middle Fork Willamette River that would form the basis for recommended changes in dam operations moving forward. The recommendations were compiled in a summary report entitled "*Summary Report: Environmental Flows Workshop for the Middle Fork and Coast Fork of the Willamette River, Oregon*" (Gregory, Ashkenas and Nygaard, 2007).

The results of the workshop were integrated into a hypothetical annual hydrograph for the Middle Fork Willamette River at Jasper, which is referred to as the "unified ecosystem flow recommendation". A figure from the summary report illustrating this hypothetical hydrograph is presented as Figure 9. The hydrograph is intended to provide the annual hydrologic flow regimes necessary to meet the various natural ecosystem functions in the Middle Fork Willamette River. Some key components of this hypothetical hydrograph include:

- **Small fall pulses** with peak magnitudes ranging from 1,500 cfs to 3,000 cfs with an annual frequency of occurrence of one to four per year depending upon precipitation events. Recommended time period is September 1 through October 1.
- **Winter bankfull flow pulses** with peak magnitudes ranging from 19,000 cfs to 25,000 cfs with an annual frequency of one to five per year depending upon precipitation events. Recommended time period is November 15 through March 15.
- **Large winter flood** with peak magnitude ranging from 40,000 cfs to 80,000 cfs. Recommended time period is November 15 through March 15.
- **Spring pulse flows** with peak magnitudes ranging from 4,000 cfs to 15,000 cfs with an annual frequency of occurrence of one to five per year depending upon precipitation events. Recommended time period is March 1 through July 1.

It is noted that there was no consensus recommendation from the working group on the large winter flood component of the "unified ecosystem flow recommendation", due partly to the fact that releasing flows of this magnitude is not feasible on account of infrastructure and development in the Middle Fork floodplain.

The workshop did not allocate sufficient time to discuss management of the Coast Fork. Several participants suggested that the flow regimes in the Coast Fork have not been modified as extensively as has been the case for the Middle Fork. However, several participants from the Coast Fork watershed did not agree and indicated that more focused attention should be devoted to flow management in the Coast Fork (Gregory, Ashkenas and Nygaard, 2007).

Starting in 2008/2009, the USACE began implementation of the recommendations from the 2007 workshop. To date, the USACE is not operating the Middle Fork Willamette Dams to strictly meet the recommendations outlined in the 2007 summary report and is instead taking advantage of those opportunities where fall, winter and spring pulses can be made while still meeting all of the other federally authorized functions of the dams. As part of the SRP, there are no changes to the USACE rule curves for the Middle Fork Willamette River dams. To date, the USACE has operated the Middle Fork Willamette River dams to provide two winter bankfull pulses.

3.3.1. Conclusions

Since one of the stated goals of the SRP is to modify existing flow conditions in the Willamette River and its tributaries to restore natural ecological processes, it is recognized that characterization of future without project hydrology will be different than that of existing without project hydrology. Since most of the flow changes will be the frequency and duration of occurrence of bankfull flow events (19,000 to 25,000 cfs peak magnitude), it is not expected that the SRP would affect the regulated flood frequency curves. However, the frequency and duration of flows less than approximately 20,000 cfs would be changed. Bankfull flow rates and near bankfull flow rates would theoretically occur more often and for longer duration than under existing conditions.

Since the future condition hydrology cannot be characterized at this time, only the existing condition hydrology was used in the hydraulic modeling for this feasibility study. The implication for this on the restoration designs as presented in this feasibility study is that the restoration project features would potentially be hydraulically connected to the river more often and for longer durations since they were designed based on existing condition hydrologic conditions.

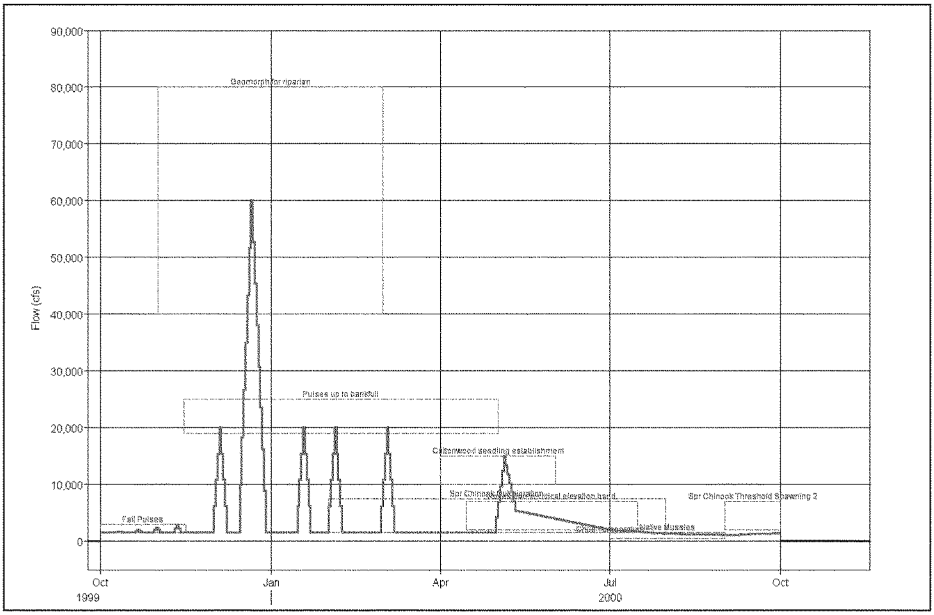


Figure 9. Unified Ecosystem Flow Recommendation for the Middle Fork Willamette River

4. HYDRAULIC MODEL

This section documents the development of the combined hydraulic model for the Coast Fork Willamette River and Middle Fork Willamette River as well as the calibration efforts conducted to date for the combined model.

The primary end use of the combined Middle Fork-Coast Fork steady-state HEC-RAS model was estimating main channel water surface elevations for flow conditions up to and including bankfull and near-bankfull conditions. The model was used to support identification of floodplain areas and side channels that have potential for reconnection to the main channel. In order to complete the feasibility study, the HEC-RAS model was used to understand the connectivity with the side channels as well as determine water surface elevations necessary for the feasibility level design.

4.1. Background of Hydraulic Model Development

Between 2004 and 2008, the USACE-Portland District developed a one-dimensional steady state hydraulic model for a portion of the Middle Fork Willamette River and Coast Fork Willamette River systems. The portion of the model that the USACE-Portland District developed was for Study Reaches M1 through M5 on the Middle Fork Willamette River and Study Reach C1 and a portion of Study Reach C2 on the Coast Fork Willamette River (see Figure 10). Only the portion of Study Reach C2 between State Highway 58 and a point approximately three miles downstream of Interstate 5 was included in the model originally developed by the USACE-Portland District. For the purposes of the discussion of model development and calibration in the context of this appendix, this originally developed portion of the model will be referred to as the "Original Middle-Coast Fork Willamette River HEC-RAS Model".

Subsequent to the development of the "Original Middle-Coast Fork Willamette River HEC-RAS Model", Tetra Tech, Inc. was contracted by The Nature Conservancy to update the model to include the remainder of Study Reach C2 and Study Reach C3 on the Coast Fork Willamette River and Study Reach R1 on the Row River. For the purposes of the discussion of model development and calibration in this appendix, this updated hydraulic model will be referred to as the "Updated Middle-Coast Fork Willamette River HEC-RAS Model". The "Updated Middle-Coast Fork Willamette River HEC-RAS Model" is the comprehensive HEC-RAS model that includes Study Reaches M1 through M5, Study Reaches C1 through C3 and Study Reach R1.

Unrelated to the model development described in the previous two paragraphs, between November 1980 and September 1983 a detailed hydrologic and hydraulic modeling study was conducted for the Coast Fork Willamette River and the Middle Fork Willamette River as part of the Lane County Flood Insurance Study (FIS) (FEMA 1999). For the FIS, the detailed hydraulic modeling was conducted using the USACE HEC-2 computer program.

4.2. Hydraulic Model Development

Version 4.1 of the Hydrologic Engineering Center's River Analysis System (HEC-RAS) (USACE-HEC 2010) was used to develop the hydraulic model of the Coast Fork Willamette River and Middle Fork Willamette River systems. HEC-RAS is a one-dimensional hydraulic model software that models hydraulic parameters such as velocity and water depth. It can be used to model either steady-state or unsteady state flow conditions. For this study, the model was used exclusively in a steady state mode.

The development of the "Original Middle-Coast Fork Willamette River HEC-RAS Model" is documented in a summary write-up prepared by the USACE-Portland District in April 2009 (USACE-Portland District

2009). This summary write-up is included as Attachment B to this appendix and will be cited throughout this chapter. As appropriate, portions of this write-up will be included in this chapter. According to (USACE-Portland District 2009), the model was not intended to be a flood model capable of accurately modeling the large out-of-bank events and would require significant alteration to do so. The model is intended to determine floodplain areas along the modeled reaches that have potential for reconnection to the main channel (USACE-Portland District 2009).

The development of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" is described in detail in this chapter, and includes development of the cross section location and geometry and calibration of the updated portions of the model.

Given that the model development occurred incrementally for the individual study reaches of the Coast and Middle Fork Willamette Rivers (see Figure 10), Table 4 provides the River Miles (RMs) associated with the endpoints of the study reaches and a general summary of the topographic data sources for the cross section geometry of the model, by reach.

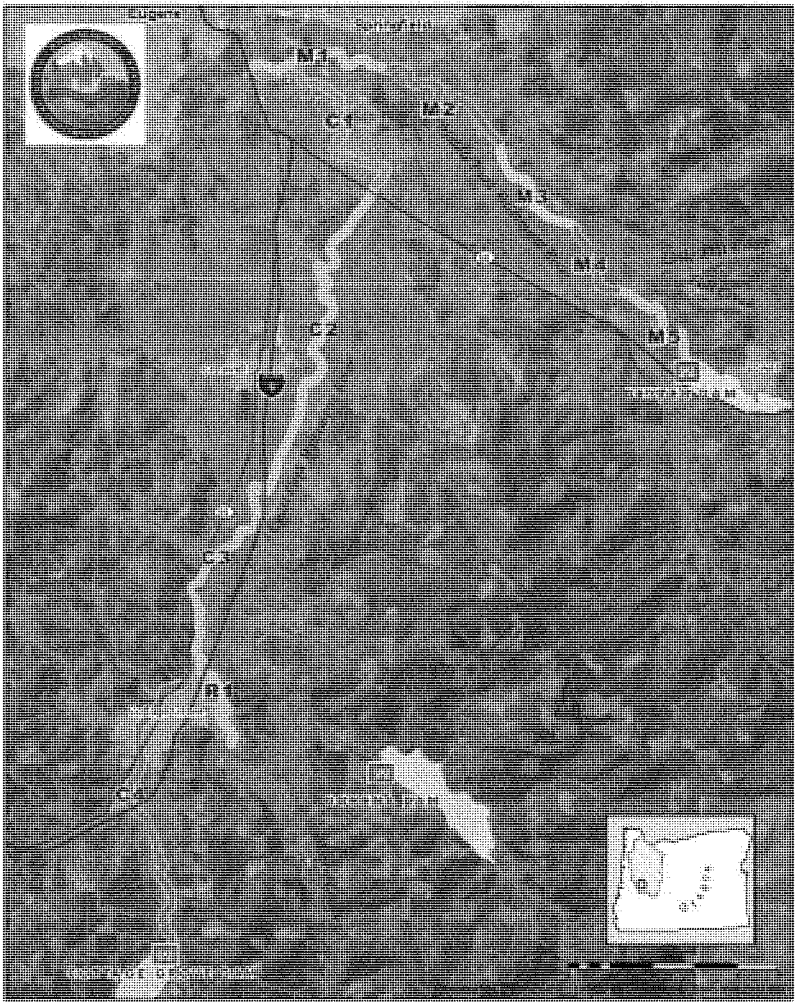


Figure 10. Coast and Middle Fork Willamette River Study Reach Delineation.

Table 4. Sources of Topographic Data for Hydraulic Model Development, by Reach.

Reach	D/S River Mile	U/S River Mile	Source of Channel Geometry	Source of Floodplain Geometry
M1	187	191	2007 Hydrographic Survey (USACE)	2004 LCOG Digital Terrain Model [g]
M2	191	195.2	2007 Hydrographic Survey (USACE) [a]	2004 LCOG Digital Terrain Model [g]
M3	195.2	198.3	---- [b]	2004 LCOG Digital Terrain Model [g]
M4	198.3	200.6	2005 Hydrographic Survey (Parametrix)	2004 LCOG Digital Terrain Model [g]
M5	200.6	203.8	2005 Hydrographic Survey (Parametrix)	2004 LCOG Digital Terrain Model [g]
C1	0	6.4	2007 Hydrographic Survey (USACE) [c] 2008 Hydrographic Survey (Thomas Wright & Assoc) [c]	2004 LCOG Digital Terrain Model [g]
C2	6.4	15.6	2005 Hydrographic Survey (Parametrix) [d,e] 2009 Hydrographic Survey (Tetra Tech) [f]	2004 LCOG Digital Terrain Model [g]
C3	15.6	21	2009 Hydrographic Survey (Tetra Tech)	2004 LCOG Digital Terrain Model [g]
R1	0	2.8	2009 Hydrographic Survey (Tetra Tech)	2004 LCOG Digital Terrain Model [g]

Notes:

a. Used FEMA Flood Insurance Study HEC-2 hydraulic model geometry for RM 193.935 to RM 194.710, inclusive
b. Trapezoidal channel geometry assumed for all of Reach M3
c. Used 2007 hydrographic survey up to approximately RM 4.5 and 2008 hydrographic survey between RM 4.5 and RM 6.4
d. Only the portion of Reach C2 downstream of RM12.113 was included in the 2005 hydrographic survey
e. Channel geometry between RM 12.297 and RM 14.499, inclusive was interpolated
f. Used 2009 hydrographic survey between RM 14.683 and RM 15.579, inclusive
g. Lane Council of Government (LCOG).

4.2.1. Cross Section Location and Geometry - Middle Fork Willamette River

The entire Middle Fork Willamette River was included in the development of the "Original Middle-Coast Fork Willamette River HEC-RAS Model". Documentation of the cross section location and geometry development is included in USACE-Portland District (2009); however, this documentation is briefly summarized in the following paragraphs.

In general the Middle Fork Willamette River cross section geometry for the HEC-RAS hydraulic model was developed by combining in-channel hydrographic survey data with digital terrain data, in the form of a Digital Terrain Model (DTM), for the floodplain and overbank areas. Cross sections were drawn valley-wise in order to demonstrate the potential for hydraulic connection at bankfull flows. At each of the hydrographic survey transects, cross sections were cut through the DTM across the valley. The source of the floodplain and overbank portions of the cross sections were obtained from the 2004 orthophotography and aerial survey products produced by the Lane Council of Governments (LCOG) 2004 Orthophotography Extension Project. As summarized in Table 4 above, there were multiple sources for the channel geometry portions of the cross sections.

Most recently, the channel geometry for the cross sections located in Reaches M1 and M2 of the Middle Fork Willamette portion of the HEC-RAS model were based on a 2007 hydrographic survey. The channel geometry for Reaches M4 and M5 were based on 2005 hydrographic surveys. Channel geometry for Reach M3 was originally based on a 2005 hydrographic survey; however, the 2005 hydrographic survey was determined to be unusable between RM 195.155 and 198.685. Therefore, throughout this 3.5 mile section of Reach M3, the USACE-Portland District assumed a trapezoidal cross section geometry.

Flow splits were not included in the Middle Fork Willamette River. For example, there is one significant flow split that occurs on the Middle Fork Willamette River, the upstream end of which is located at approximately RM 193.5 in Reach M2. The flow split potentially occurs near bankfull flow conditions. The current FEMA FIS HEC-2 hydraulic model accounts for this flow split by modeling the overflow channel as a separate hydraulic feature from the main channel (FEMA 1999).

Bridge geometry was not included in the combined Middle Fork-Coast Fork HEC-RAS hydraulic model. For flow rates up to approximately the bankfull flow rate, it was felt that the bridges on the Middle Fork Willamette would not have significant effect on the water surface profile.

Figure 1 and Figures 5 through 8 in Attachment C show the hydraulic model cross section locations for the Middle Fork Willamette River reaches.

4.2.2. Cross Section Location and Geometry - Coast Fork Willamette River

The lower 12 miles of the Coast Fork Willamette River (all of Study Reach C1 and the lower 5.7 miles of Study Reach C2) were included in the development of the "Original Middle-Coast Fork Willamette River HEC-RAS Model". Documentation of the cross section location and geometry development is included in USACE-Portland District (2009). Portions of this documentation are briefly summarized in this section. The remainder of Study Reach C2 and all of Study Reach C3 were included as part of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model". Cross section location and the development of the cross section geometry for the updated portions of the model are described in detail in this section.

Study Reach C1 and the lower 5.7 miles of Study Reach C2 of the Coast Fork River were included in the development of the "Original Middle-Coast Fork Willamette River HEC-RAS Model" (USACE-Portland District 2009). Cross section geometry was developed by combining in-channel hydrographic survey data with digital terrain data, in the form of a Digital Terrain Model (DTM), for the floodplain and overbank areas. Cross sections were drawn valley-wise in order to demonstrate the potential for hydraulic connection of floodplain features at bankfull flows. At each of the hydrographic survey transects, cross sections were cut through the DTM across the valley. The source of the floodplain and overbank portions of the cross sections were obtained from the 2004 orthophotography and aerial survey products produced by the Lane Council of Governments (LCOG) 2004 Orthophotography Extension Project. As summarized in Table 4 above, there were multiple sources for the channel geometry portions of the cross sections. The channel geometry for the cross sections located in Reach C1 of the Coast Fork Willamette portion of the HEC-RAS model were based on two separate hydrographic surveys, one conducted in 2007 and one conducted in 2008. A 2005 hydrographic survey was used for the channel geometry in Reach C2, but only up to RM 12.113.

Bridge geometry was not included on the Coast Fork Willamette River as part of the "Original Middle-Coast Fork Willamette River HEC-RAS Model". Also, flow splits were not included in the "Original

Middle-Coast Fork Willamette River HEC-RAS Model". For example, there is a significant flow split that occurs on the "Coast Fork Left Bank upstream of Highway 58" (USACE-Portland District 2009). The current FEMA FIS HEC-2 hydraulic model accounts for this flow split by modeling the overflow channel as a separate hydraulic feature from the main channel (FEMA 1999).

Tetra Tech was contracted to update the "Original Middle-Coast Fork Willamette River HEC-RAS Model" to include the remainder of Study Reach C2 and all of Study Reach C3. In 2009, a hydrographic survey was conducted in Study Reaches C2 and C3 by Pacific Geomatic Services (PGS) as a subconsultant to Tetra Tech. Three cross sections were surveyed in the upstream portion of Study Reach C2 and twenty-five cross sections were surveyed within Study Reach C3. The downstream extent of the 2009 hydrographic survey was RM 14.658 of the Coast Fork Willamette River. Therefore, there was an approximately 2.5 mile gap in Reach C2 where there was no source for the channel geometry. The interpolation routine in HEC-RAS was therefore used to interpolate the cross section geometry between RM 12.113 and RM 14.658.

Since no priority restoration sites were located in Study Reach C4, this study reach was not included in the scope to extend the "Original Middle-Coast Fork Willamette River HEC-RAS Model".

Figures 1 through 3 in Attachment C show the hydraulic model cross section locations for the Coast Fork Willamette River reaches.

4.2.3. Cross Section Location and Geometry - Row River

The lower 2.9 miles of the Row River were included as part of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model". The Row River cross section geometry for the HEC-RAS hydraulic model was developed by combining in-channel hydrographic survey data with digital terrain data, in the form of a Digital Terrain Model (DTM), for the floodplain and overbank areas. Cross sections were generally located at each of the hydrographic survey transects. At each of the hydrographic survey transects, cross sections were cut through the DTM across the valley. Cross section endpoints were generally located at elevations high enough to contain the 100-year flood. The source of the floodplain and overbank portions of the cross sections were obtained from the 2004 orthophotography and aerial survey products produced by the Lane Council of Governments (LCOG) 2004 Orthophotography Extension Project.

The channel geometry for the cross sections located in Reach R1 of the Row River portion of the HEC-RAS model were based on a hydrographic survey conducted in 2009 by Pacific Geomatic Services (PGS) as a subconsultant to Tetra Tech. Due to budgetary constraints, only five cross sections were included in the survey effort, with the upstream cross section located at RM 1.074. Due to the fact that a top ranked restoration site (Site R1C) is located approximately 1 mile upstream, there was the need to extend the HEC-RAS model upstream. In March 2010, Tetra Tech surveyed three additional below water cross sections in the vicinity of Site R1C, which were then used as the basis to extend the model up to, but just downstream of Row River Road Bridge.

Bridge geometry was not included in the Row River portion of the combined Middle Fork-Coast Fork HEC-RAS hydraulic model.

Figure 4 in Attachment C shows the hydraulic model cross section locations for the Row River reaches.

4.2.4. Ineffective Flow Areas

In the development of the "Original Middle-Coast Fork Willamette River HEC-RAS Model", the USACE-Portland District used ineffective flow areas to limit conveyance to the main channel and to exclude overbank areas and floodplain areas in most of the cross sections. The use of ineffective flow areas was chosen over utilizing levees or blocked obstructions. This was done to facilitate mapping of the potential areas for floodplain reconnection and to aid in the selection of restoration alternatives. Since the model is considered as a bankfull model, channels that would become active only at larger flood flows were permanently blocked with ineffective areas (USACE-Portland District 2009).

In developing the "Updated Middle-Coast Fork Willamette River HEC-RAS Model", the ineffective flow area option was also used for many of the cross sections in Study Reaches C2 and C3 and Study Reach R1 for consistency with the "Original Middle-Coast Fork Willamette River HEC-RAS Model". The ineffective flow area option was used to limit conveyance to the main channel. Ineffective flow areas were defined for many of the cross sections to prohibit inclusion of floodplain terrain features such as relic side channels, floodplain overflow areas and abandoned gravel pits in the calculation of active conveyance.

4.2.5. Boundary Conditions

Boundary conditions for the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" were defined at the downstream end of the model and at the upstream ends of the model. The downstream end of the model is located approximately 2 miles downstream of the confluence of the Coast Fork and Middle Forks. The downstream boundary condition of the model was defined using the normal depth option. This option establishes the downstream water surface elevation in the model as the normal depth for a given slope of the hydraulic grade line.

Inflows are specified at three upstream locations in the model and include (1) the Middle Fork Willamette River at RM 203.710, (2) the Coast Fork Willamette River immediately upstream of the confluence with the Row River, and (3) the Row River at RM 2.935. The specific flow rates used for the boundary conditions are described later in Section 5 of this appendix.

4.2.6. Manning's Roughness Coefficients

In the development of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model", initial estimates for Manning's roughness coefficients were made for the main channel and the floodplain overbank areas for the cross sections in Study Reach C3 of the Coast Fork Willamette River and Study Reach R1 of the Row River. The initial estimate of main channel Manning's roughness coefficient for the cross sections in these reaches was based on guidance presented in (Arcement and Schneider 1989), which recommended that base values for main channel Manning's roughness coefficients for gravel bedded channels range between 0.028 and 0.035. An initial estimate of 0.030 was chosen for main channel of the Coast Fork Study Reach C3 and the Row River Study Reach R1. Guidance presented in Arcement and Schneider (1989) was also used to guide the initial selection of the floodplain Manning's roughness coefficient of 0.070 for the floodplains portions of the cross sections in Study Reach C3 of the Coast Fork Willamette River and Study Reach R1 of the Row River.

USACE-Portland District (2009) provides no discussion for the selection of the initial Manning's roughness coefficients for the "Original Middle-Coast Fork Willamette River HEC-RAS Model".

The magnitudes of the initially estimated Manning's roughness coefficients are summarized in Table 5.

Table 5. Initial Estimates of Manning's Roughness Coefficients.

Reach	D/S River Mile	U/S River Mile	Initial Range for Channel Roughness Coefficient	Initial Range for Floodplain Roughness Coefficient
M1	187.0	191.0	0.018 – 0.055	0.050 – 0.080
M2	191.0	195.2	0.030 – 0.058	0.060 – 0.080
M3	195.2	198.3	0.030	0.060
M4	198.3	200.6	0.030	0.060
M5	200.6	203.8	0.030	0.060- 0.080
C1	0.0	6.4	0.030 – 0.045	0.070 – 0.010
C2	6.4	15.6	0.030 – 0.040	0.070
C3 [a]	15.6	21.0	0.030	0.070
R1 [a]	0.0	2.8	0.030	0.070

Notes:
a. Study Reach included as part of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model"

4.3. Hydraulic Model Calibration

Prior to the development of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model", there had been no calibration of the source HEC-RAS model (i.e. the "Original Middle-Coast Fork Willamette River HEC-RAS Model") (USACE-Portland 2009).

As part of the development of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model", model calibration was completed for Study Reaches C2 and C3 of the Coast Fork Willamette River and Study Reach R1 using data from a large number of monitoring stations and data collection locations and a wide range of flow rates. A more limited calibration effort was completed for Study Reach C1 using data collected from two locations.

Under a separate contract with The Nature Conservancy (TNC), Tetra Tech conducted a calibration of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" for Study Reaches M1, M2, M3, M4 and M5 of the Middle Fork Willamette River. The calibration approach and results are described in detail in Tetra Tech (2010). The calibration documented in Tetra Tech (2010) was however slightly modified as part of the calibration conducted for this current report. The calibration effort originally documented in Tetra Tech (2010), as well as the slight modification to this calibration, is described in this section. Reference should be made to Tetra Tech (2010) for more information.

This section therefore documents the calibration efforts completed for the three Coast Fork Willamette River study reaches (C1, C2 and C3) and the Row River study reach (R1) of the hydraulic model. This section also summarizes the calibration effort completed for the five Middle Fork Willamette River study reaches (M1, M2, M3, M4 and M5), the details of which are fully documented in Tetra Tech (2010).

4.3.1. Calibration Data

The data available for calibration of the Coast Fork, Row River and Middle Fork reaches of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" are summarized in Table 6. The locations where these data were monitored and collected are shown in Figures 1 through 8 in Attachment C.

The USACE-Portland District installed five water level recording gages at locations on the Coast Fork Willamette River. Four of these gages (CFWILL1, CFWILL2, CFWILL3 and CFWILL4) were crest-stage type gages that record the maximum water surface elevation associated with a flood event using a floating cork inside of a vertical piece of galvanized pipe and were installed as part of the crest gage program in effect under the Corps Floodplain Management Services. The Coast Fork Willamette River crest gages were installed on 9/14/05, and were all installed within Reach C2 as shown in Figure 2 of Attachment C. Stage crest readings were subsequently obtained on 11/17/05 and 3/23/06. As shown in Figure 11, these two stage crest readings were likely associated with flood events which occurred on 11/6/05 and 1/18/06, respectively. The other water level recording station that was installed on the Coast Fork Willamette River by the USACE-Portland District (CFWILL01) was a Sutron Digital Water Level Monitoring System installed on 5/9/08 and is located within Reach C1.

Also in September 2005, the USACE-Portland District installed seven crest gages on the Middle Fork Willamette River for flood monitoring (MFWILL1 through MFWILL7). These seven gages were replaced by HOBO data loggers in November 2007, and two additional HOBO gages (MFWILL8 and MFWILL9) were installed at the same time, for a total of nine HOBO data loggers. In May of 2008, two Sutron gages were installed - one near the confluence of the Middle Fork and Coast Fork (MFWILL10), and one on the Middle Fork near Dexter Dam, which replaced the HOBO logger at that location (MFWILL1).

In December 2009, two continuous level loggers were installed by Tetra Tech, Inc under contract with the Nature Conservancy. The installations were both on the left bank of the Coast Fork Willamette River, upstream of Interstate 5 and within Reach C3 (see Figure 3 of Attachment C).The upstream-most installation (103227901) had software problems and the data it provided was erroneous. However, the downstream-most installation (103188601) has provided data at 30-minute intervals since installation.

During the 2009/2010 hydrographic survey efforts on the Coast Fork Willamette River and the Row River, water surface elevations were surveyed at each transect location. These water surface elevations were compiled into a water surface profile that was used to calibrate portions of Study Reaches C2 and C3 and R1 of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model".

Finally, stage data from three USGS Gages – two on the Middle Fork Willamette River and one on the Coast Fork Willamette River - was also available for use in the model calibration.

4.3.2. Flood Events used in Model Calibration

The data available for model calibration, as presented in Table 6, were reviewed and specific flood events were then chosen for use in calibrating the Coast Fork Willamette River and Row River portions of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model". Eight separate flood events, exhibiting a wide range of flow rate magnitudes, were identified. A ninth flood event was also identified and was reserved as a flood event to be used to verify the calibration (verification event). Table 7 summarizes the characteristics of this set of calibration flood events, along with the specific calibration data used for each.

As seen in Table 7, with the exception of Calibration Event 8, the flow rates associated with each of the calibration events were less than the flow rate for the 2-year return period flood event at the USGS Gage on the Coast Fork Willamette River near Goshen (see Table 2). This was appropriate given the fact that the primary use of the hydraulic model will be for flow rates less than approximately bankfull conditions.

As described in Tetra Tech (2010), calibration of the Middle Fork Willamette River portion of the HEC-RAS model was conducted using the flood event that occurred in January 2009. During this event, flow rates as recorded at USGS Gage 14152000 (Middle Fork Willamette River near Jasper) were approximately equal to the 2-year return period regulated flow rate for this gage location (see Table 3). Given the fact that the primary use of the hydraulic model will be for flow rates less than approximately bankfull conditions, this flood event was an appropriate event to use in the calibration of the Middle Fork portion of the hydraulic model. For more information regarding the details of this flood event, refer to Tetra Tech (2010).

Table 6. Data Available for Calibration of the Hydraulic Model, by Reach.

Reach	Type of Data	Identifier	Latitude	Longitude	Dates for which Data Are Available [a]
M1	Continuous Stage	MFWILL10	44.023830	123.025900	5/9/08 – present
	Continuous Stage	MFWILL9	44.023590	123.008100	Nov 2007 - present
	Continuous Stage	MFWILL8	44.028550	122.991950	Nov 2007 - present
	Continuous Stage	MFWILL7	44.022390	122.964260	Nov 2007 - present
M2	Continuous Stage	MFWILL6	44.014340	122.925540	Nov 2007 - present
	Continuous Stage	USGS 14152000	43.998333	122.904722	10/1/52 - present
M3	Continuous Stage	MFWILL5	43.976867	122.886283	Nov 2007 - present
	Continuous Stage	MFWILL4	43.971467	122.869450	Nov 2007 - present
M4	Continuous Stage	MFWILL3	43.959883	122.862200	Nov 2007 - present
	Continuous Stage	MFWILL2	43.949183	122.849317	Nov 2007 - present
M5	Continuous Stage	MFWILL1	43.934617	122.827000	Nov 2007 – present
	Continuous Stage	USGS 14150000	43.945833	122.836111	10/1/46 - present
C1	Continuous Stage	CFWILL01	44.012280	122.983750	5/9/08 – present
	Continuous Stage	USGS 14157500	43.980556	122.965278	10/1/50 - present
C2	Crest Gage	CFWILL4	43.96252	122.9848	11/17/05 & 3/23/06
	Crest Gage	CFWILL3	43.95383	122.9914	11/17/05 & 3/23/06
	Crest Gage	CFWILL2	43.93907	122.9834	11/17/05 & 3/23/06
	Crest Gage	CFWILL1	43.92053	122.9870	11/17/05 & 3/23/06
C3	Continuous Stage	103188601	43.853717	123.03650	12/30/09 - present
	Water Surface Profile	n/a	n/a	n/a	12/18/09 – 12/22/09 1/11/10 – 1/14/10
R1	Water Surface Profile	n/a	n/a	n/a	1/12/10

Notes:

a. Dates for crest gages are dates when the crest gages were read. The flood event for which the crest gage recorded peak stage occurred prior to the indicated dates.

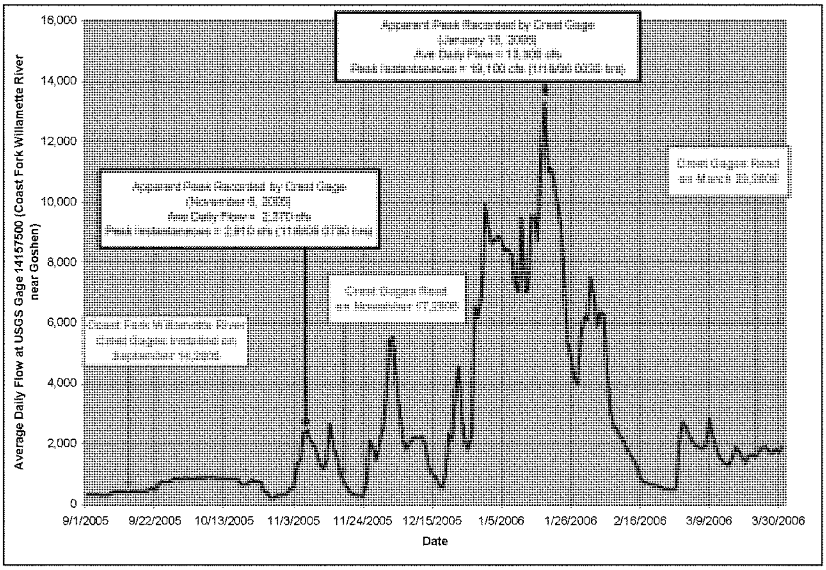


Figure 11. Flood Events Associated with Crest-Stage Readings on Coast Fork Willamette River Crest Gages.

Table 7. Flood Events used for Calibration of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model".

Flood Event ID	Date of Event	Flow Rate (cfs)	Reaches	Data Used in Calibration
1	11/6/05	2,910[a]	C1 & C2	• Stage data from USGS Gage 14157500 • Crest gage data from four crest gages
2	6/5/08	2,480[a]	C1	• Stage data from USGS Gage 14157500 • Stage data from CFWILL01
3	12/18/09	2,256[c]	C1 & C3	• Stage data from USGS Gage 14157500 • Water surface profile from hydrographic survey
4	12/20/09 – 12/21/09	1,551[c]	C1 & C3	• Stage data from USGS Gage 14157500 • Water surface profile from hydrographic survey
5	1/1/10	6,550[a]	C1 & C3	• Stage data from USGS Gage 14157500 • Stage data from Level Logger 103188601
6	1/6/10	5,100[a]	C1 & C3	• Stage data from USGS Gage 14157500 • Stage data from Level Logger 103188601
7	1/12/10 – 1/14/10	1,883[c]	C1, C3 & R1	• Stage data from USGS Gage 14157500 • Water surface profile from hydrographic survey
8	1/18/06	19,100[a]	C1 & C2	• Stage data from USGS Gage 14157500 • Crest gage data from four crest gages
9[b]	1/11/10	2,263[c]	C3	• Stage data from Level Logger 103188601 • Water surface profile from hydrographic survey
Middle Fork	1/10/09	20,100[d]	M1, M2, M3, M4 & M5	• Stage data from MFWILL1 through MFWILL4 • Stage data from MFWILL6 through MFWILL9

Notes

a. Peak flow rate associated with flood event as measured at USGS Gage 14157500 (Coast Fork Willamette River near Goshen)
b. Verification flood event
c. Flow rate represents the average flow rate, as measured at USGS Gage 14157500 (Coast Fork Willamette River near Goshen), for the period when the water surface profile was surveyed during the hydrographic survey.
d. Average flow rate for January 10, 2009 between 1100 and 1700 hours as measured at USGS Gage 14152000 (Middle Fork Willamette River near Jasper)

4.3.3. Calibration Parameters

The model parameters used as calibration parameters during the calibration process included:

- Channel and floodplain Manning's roughness coefficients
- Expansion and contraction loss coefficients
- Ineffective flow areas

4.3.4. Calibration Procedure and Calibration Results

Model calibration for the Coast Fork Willamette River and the Row River portions of the hydraulic model was accomplished by adjusting the Manning's roughness coefficients, the expansion and contraction loss coefficients and the extents of the ineffective flow area boundaries for each of the eight calibration flood events until the model predicted water surface elevations were within reason of the observed water surface elevations. During the calibration procedure, the eight events were calibrated together as a group. What this means is that when adjustments were made to the model, the model was run for all eight calibration events, and the model predicted water surface elevations were compared to the observed water surface elevations for the group of eight calibration events.

At the onset of the calibration procedure, a criterion was established that was used to guide the calibration and to determine when a successful calibration had been attained., The magnitudes of the calibration parameters were iteratively adjusted, within physically acceptable ranges, until the difference between the modeled water surface elevation and the observed water surface elevation was less than 0.5 feet for each calibration data point for each calibration flood event. This criterion proved to be challenging to meet for several of the calibration data points. This was felt to be due to one or more of the following: (1) uncertainty in the measured/surveyed water surface elevations; (2) uncertainty in the flow rate that produced the observed/measured water surface elevation, specifically for the crest gage data; (3) omission of a localized hydraulic control in the hydraulic model, such as a riffle or other bed control feature, which affected the ability replicate the observed/measured water surface elevation for lower flow calibration events; or (4) the potential for the Manning's roughness coefficient value to vary with stage or flow.

However, it was possible to successfully calibrate the hydraulic model to within the 0.5 foot criterion for 37 out of the 47 calibration data points (79%) and to within a 1.0 foot criterion for 41 out of the 48 calibration data points (85%). Tables 8 through 15 summarize the results of the calibration for each calibration event.

Once the calibration process was completed for the group of eight calibration events, the calibrated model was then run for the verification event. The model predicted water surface elevations were compared with the observed water surface elevations and it was found that the model replicated the three observed elevations to within 1.0 feet. All observed water surface elevations for the verification event were located within Study Reach C3. Table 16 summarizes the results.

As described in Tetra Tech (2010), a similar procedure was used to calibrate the Middle Fork Willamette River portion of the hydraulic model. Model output was compared to the USACE installed gages MFWILL1, MFWILL2, MFWILL3, MFWILL4, MFWILL6, MFWILL7, MFWILL8, and MFWILL9 at the cross sections that are nearest to these gages. The main channel roughness coefficient was used as the calibration parameter to force the model to meet the observed elevations at the measured flows within 0.1 ft. It was however necessary to revisit the calibration of the Middle Fork Willamette River documented in Tetra Tech (2010), as part of this study. The successful calibration presented in Tetra Tech (2010) was attained using a main channel roughness coefficient of 0.018 for the six cross sections between RM 187.176 and RM 187.882, inclusive. This was an unreasonably low value, and therefore, it was felt necessary to revisit the calibration of the Middle Fork Willamette River portion of the hydraulic so that the calibrated main channel roughness coefficients were more reasonable. Table 17 summarizes the results of the revised calibration of the Middle Fork Willamette River portion of the hydraulic model.

In summary, based on the calibration results presented in Tables 8 through 16, successful calibration of the Coast Fork Willamette River and Row River portions of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" was attained. Eight separate flood events, with peak flow rates ranging between 1,551 cfs and 19,000 cfs (as recorded at USGS Gage 14157500) were used in the calibration. These flow rates range between a 30% exceedance flow rate (see Figure 6) and 5-year return period flow (see Table 2) and are appropriate flow magnitudes for calibration of this bankfull hydraulic model. Calibration of the model was attained through iterative adjustments of hydraulic parameters such as the Manning's roughness coefficient, expansion and contraction loss coefficients and definition of ineffective flow areas.

Based on the calibration results presented in Table 17, successful calibration of the Middle Fork Willamette River portion of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" was also attained. The flow rate associated with the calibration event was approximately the 2-year return period flow rate for the regulated condition and was therefore an appropriate flood event to use in calibrating this bankfull hydraulic model.

The final calibrated Manning's roughness coefficients, organized by Study Reach, are presented in Table 18. It is emphasized that since the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" is considered a bankfull model, and since all of the calibration events were for flow rates less than or equal to bankfull conditions, the Manning's roughness coefficients for the channel were varied more so than those for the floodplain during model calibration

As seen in this table, the magnitude of the final calibrated Manning's roughness coefficient varied between each of the study reaches and varied within the study reaches themselves. Within the overall model, the Manning's roughness coefficients for the channel ranged between 0.025 and 0.065. As per the published literature (Barnes 1967, Arcement and Schneider 1989), this range of values is physically reasonable for gravel/cobble bed rivers. For example, in Arcement and Schneider (1989), the base value for Manning's roughness coefficient for gravel/cobble bed rivers ranges between 0.028 and 0.050. This base value is representative of "straight channels of nearly uniform cross section" and does not account for channel irregularities, obstructions, vegetation, variability in channel cross section, and channel meandering, all of which increase the roughness of a channel.

The cross sections with in-channel Manning's roughness coefficients greater than 0.050 included Cross Sections 24403, 25936, and 27070 in Study Reach C3; the seventeen cross sections between 190.718 and 193.360, inclusive, in Study Reaches M1 and M2; and Cross Sections 1074 and 1524 in Study Reach R1. All other cross sections in the model had final calibrated in-channel Manning's Roughness coefficients less than 0.050. At the three cross sections in Study Reach C3, the Coast Fork Willamette River is braided with several densely vegetated islands, thus contributing to the high roughness coefficient. Between RM 190.718 and RM 193.360 on the Middle Fork Willamette River, the ratio of channel length to valley length (sinuosity) is greater than 1.50, which according to Arcement and Schneider (1987) would be characterized as a severe degree of meandering. This contributes to the relatively high roughness coefficient in this reach. Finally, immediately upstream of the confluence with the Coast Fork Willamette River, the Row River is braided with several densely vegetated islands, thus contributing to the high roughness coefficients at Cross Sections 1074 and 1524.

Table 8. Calibration Results for Calibration Event 1 for Coast Fork Willamette River.

Model Cross Section	Reach	Modeled WSEL[a] (ft NAVD88)	Observed WSEL[a] (ft NAVD88)	Delta (ft)[b]	Source of Calibration Data Point and ID
5.908	C1	482.91	n/a [d]	**n/a [d]**	USGS Gage 14157500
7.453 / 7.583	C2	491.69[c]	493.05	**-1.4**	Crest Gage CFWILL4
8.691 / 8.808	C2	504.22[c]	504.65	**-0.4**	Crest Gage CFWILL3
9.941 / 9.988	C2	515.49[c]	515.94	**-0.5**	Crest Gage CFWILL2
11.536	C2	527.28	527.80	**-0.5**	Crest Gage CFWILL1

Notes:

a. WSEL – Water Surface Elevation
b. Delta is computed as modeled water surface elevation minus observed water surface elevation
c. Modeled water surface elevation is interpolated between indicated model cross sections to the location of the observed calibration data point
d. n/a= observed data not available

Table 9. Calibration Results for Calibration Even 2 for Coast Fork Willamette River.

Model Cross Section	Reach	Modeled WSEL[a] (ft NAVD88)	Observed WSEL[a] (ft NAVD88)	Delta (ft)[b]	Source of Calibration Data Point and ID
2.493	C1	458.76	458.26	**+0.5**	Level Logger CFWILL01
5.908	C1	482.47	482.23	**+0.2**	USGS Gage 14157500

Notes:

a. WSEL – Water Surface Elevation
b. Delta is computed as modeled water surface elevation minus observed water surface elevation

Table 10. Calibration Results for Calibration Event 3 for Coast Fork Willamette River.

Model Cross Section	Reach	Modeled WSEL[a] (ft NAVD88)	Observed WSEL[a] (ft NAVD88)	Delta (ft)[b]	Source of Calibration Data Point and ID
5.908	C1	482.22	482.03	**+0.2**	USGS Gage 14157500
27361 (RM 17.332)	C3	581.13	581.65	**-0.5**	Water Surface Survey of Transect CF16
28353 (RM 17.520)	C3	581.75	581.84	**-0.1**	Water Surface Survey of Transect CF15
29555 (RM 17.748)	C3	582.43	582.65	**-0.2**	Water Surface Survey of Transect CF14
30591 (RM 17.944)	C3	582.76	583.17	**-0.4**	Water Surface Survey of Transect CF13
31871 (RM 18.186)	C3	584.60	584.96	**-0.4**	Water Surface Survey of Transect CF12
32921 (RM 18.385)	C3	586.72	589.36	**-2.6**	Water Surface Survey of Transect CF11

Notes:
a. WSEL – Water Surface Elevation
b. Delta is computed as modeled water surface elevation minus observed water surface elevation

Table 11. Calibration Results for Calibration Event 4 for Coast Fork Willamette River.

Model Cross Section	Reach	Modeled WSEL[a] (ft NAVD88)	Observed WSEL[a] (ft NAVD88)	Delta (ft)[b]	Source of Calibration Data Point and ID
5.908	C1	481.23	481.18	**+0.1**	USGS Gage 14157500
15447 (RM 15.075)	C3	556.83	556.38	**+0.4**	Water Surface Survey of Transect CF26
16807 (RM 15.333)	C3	559.84	560.13	**-0.3**	Water Surface Survey of Transect CF25
18103 (RM 15.579)	C3	561.53	561.44	**+0.1**	Water Surface Survey of Transect CF24
19537 (RM 15.850)	C3	562.79	563.30	**-0.5**	Water Surface Survey of Transect CF23
20549 (RM 16.042)	C3	565.31	565.15	**+0.2**	Water Surface Survey of Transect CF22
21510 (RM 16.224)	C3	565.85	565.56	**+0.3**	Water Surface Survey of Transect CF21
22543 (RM 16.420)	C3	566.98	568.05	**-1.1**	Water Surface Survey of Transect CF20
23468 (RM 16.595)	C3	570.75	570.30	**+0.4**	Water Surface Survey of Transect CF19

Notes:
a. WSEL – Water Surface Elevation
b. Delta is computed as modeled water surface elevation minus observed water surface elevation

Table 12. Calibration Results for Calibration Event 5 for Coast Fork Willamette River.

Model Cross Section	Reach	Modeled WSEL[a] (ft NAVD88)	Observed WSEL[a] (ft NAVD88)	Delta (ft)[b]	Source of Calibration Data Point and ID
5.908	C1	485.96	485.76	**+0.2**	USGS Gage 14157500
23056 (RM 16.517)	C3	572.70	572.06	**+0.6**	Level Logger 103188601

Notes:
a. WSEL – Water Surface Elevation
b. Delta is computed as modeled water surface elevation minus observed water surface elevation

Table 13. Calibration Results for Calibration Event 6 for Coast Fork Willamette River.

Model Cross Section	Reach	Modeled WSEL[a] (ft NAVD88)	Observed WSEL[a] (ft NAVD88)	Delta (ft)[b]	Source of Calibration Data Point and ID
5.908	C1	485.15	484.67	**+0.5**	USGS Gage 14157500
23056 (RM 16.517)	C3	572.35	571.28	**+1.1**	Level Logger 103188601

Notes:
a. WSEL – Water Surface Elevation
b. Delta is computed as modeled water surface elevation minus observed water surface elevation

Table 14. Calibration Results for Calibration Event 7 for Coast Fork Willamette River.

Model Cross Section	Reach	Modeled WSEL[a] (ft NAVD88)	Observed WSEL[a] (ft NAVD88)	Delta (ft)[b]	Source of Calibration Data Point and ID
5.908	C1	481.75	481.59	**+0.2**	USGS Gage 14157500
34425 (RM 18.670)	C3	595.55	595.22	**+0.3**	Water Surface Survey of Transect CF10
36036 (RM 18.975)	C3	596.46	595.54	**+0.9**	Water Surface Survey of Transect CF9
37577 (RM 19.267)	C3	596.72	598.00	**-1.3**	Water Surface Survey of Transect CF8
38178 (RM 19.381)	C3	597.10	598.45	**-1.4**	Water Surface Survey of Transect CF7
39170 (RM 19.568)	C3	598.00	598.70	**-0.7**	Water Surface Survey of Transect CF6
40224 (RM 19.768)	C3	602.59	602.91	**-0.3**	Water Surface Survey of Transect CF5
41090 (RM 19.932)	C3	603.28	603.57	**-0.3**	Water Surface Survey of Transect CF4
41566 (RM 20.022)	C3	603.59	603.56	**0.0**	Water Surface Survey of Transect CF3
42449 (RM 20.190)	C3	607.41	607.04	**+0.4**	Water Surface Survey of Transect CF2
43075 (RM 20.308)	C3	608.62	608.09	**+0.5**	Water Surface Survey of Transect CF1
1524 (RM 0.289)	R1	613.14	612.86	**+0.3**	Water Surface Survey of Transect R5
2666 (RM 0.505)	R1	614.74	614.40	**+0.3**	Water Surface Survey of Transect R4
3644 (RM 0.690)	R1	617.11	617.42	**-0.3**	Water Surface Survey of Transect R3
4842 (RM 0.917)	R1	620.32	620.84	**-0.5**	Water Surface Survey of Transect R2
5673 (RM 1.074)	R1	623.22	622.69	**+0.5**	Water Surface Survey of Transect R1

Notes:

a. WSEL – Water Surface Elevation

b. Delta is computed as modeled water surface elevation minus observed water surface elevation

Table 15. Calibration Results for Calibration Event 8 for Coast Fork Willamette River.

Model Cross Section	Reach	Modeled WSEL[a] (ft NAVD88)	Observed WSEL[a] (ft NAVD88)	Delta (ft)[b]	Source of Calibration Data Point and ID
5.908	C1	491.41	491.82	**-0.4**	USGS Gage 14157500
7.453 / 7.583	C2	501.75[c]	500.71	**+1.0**	Crest Gage CFWILL4
8.691 / 8.808	C2	510.12[c]	510.53	**-0.4**	Crest Gage CFWILL3
9.941 / 9.988	C2	520.62[c]	520.48	**+0.1**	Crest Gage CFWILL2
11.536	C2	534.85	534.89	**0.0**	Crest Gage CFWILL1

Notes:

a. WSEL – Water Surface Elevation
b. Delta is computed as modeled water surface elevation minus observed water surface elevation
c. Modeled water surface elevation is interpolated between indicated model cross sections to the location of the observed calibration data point

Table 16. Verification Results for Calibration Event 9 for Coast Fork Willamette River.

Model Cross Section	Reach	Modeled WSEL[a] (ft NAVD88)	Observed WSEL[a] (ft NAVD88)	Delta (ft)[b]	Source of Calibration Data Point and ID
23056 (RM 16.517)	C3	570.26	569.23	**+1.0**	Level Logger 103188601
24403 (RM 16.772)	C3	572.95	573.22	**-0.3**	Water Surface Survey of Transect CF18
25936 (RM 17.062)	C3	578.25	577.77	**+0.5**	Water Surface Survey of Transect CF17

Notes:

a. WSEL – Water Surface Elevation
b. Delta is computed as modeled water surface elevation minus observed water surface elevation

Table 17. Calibration Results for Calibration of Middle Fork Willamette River.

Model Cross Section	Reach	Modeled WSEL[a] (ft NAVD88)	Observed WSEL[a] (ft NAVD88)	Delta (ft)[b]	Source of Calibration Data Point and ID
187.458 / 187.882	M1	454.39	454.34	**+0.1**	USACE Gage MFWILL9
188.571 / 188.712	M1	461.62	461.59	**0.0**	USACE Gage MFWILL8
190.309 / 190.530	M1	481.20	481.18	**0.0**	USACE Gage MFWILL7
193.564 / 193.935	M2	515.13	515.13	**0.0**	USACE Gage MFWILL6
198.012 / 198.145	M3	561.45	561.52	**-0.1**	USACE Gage MFWILL4
198.955 / 199.075	M4	577.28	577.22	**+0.1**	USACE Gage MFWILL3
200.160 / 200.264	M4	594.72	594.71	**0.0**	USACE Gage MFWILL2
202.105 / 202.195	M5	623.51	623.56	**-0.1**	USACE Gage MFWILL1

Notes:

a. WSEL – Water Surface Elevation
b. Delta is computed as modeled water surface elevation minus observed water surface elevation
c. Modeled water surface elevation is interpolated between indicated model cross sections to the location of the observed calibration data point

Table 18. Final Calibrated Manning's Roughness Coefficients for Combined Middle Fork-Coast Fork Willamette River Model.

Reach	D/S River Mile	U/S River Mile	Range of Final Calibrated Channel Roughness Coefficient	Range of Selected Floodplain Roughness Coefficient
M1	187.0	191.0	0.029 – 0.055	0.050 – 0.080
M2	191.0	195.2	0.025 – 0.057	0.060 – 0.080
M3	195.2	198.3	0.025	0.060
M4	198.3	200.6	0.030 – 0.035	0.060
M5	200.6	203.8	0.030 – 0.038	0.060 – 0.080
C1	0.0	6.4	0.031 – 0.044	0.070 – 0.100
C2	6.4	15.6	0.035 – 0.055	0.070 – 0.120
C3	15.6	21.0	0.030 – 0.065	0.070 – 0.120
R1	0.0	2.8	0.046 – 0.065	0.12

5. WITHOUT PROJECT CONDITIONS HYDRAULIC MODELING

With the completion of the calibration of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model", the model was then run for a range of design flow rates to support the preliminary design of the restoration sites and to establish without project hydraulic conditions throughout the study area.

As described in Section 3.3, it is not possible at this time to adequately characterize the future without condition hydrology. Therefore, only the existing without project condition hydrology was used in the existing without project hydraulic modeling.

Table 19 summarizes the input hydrology for the existing without project conditions HEC-RAS model runs. The flow magnitudes presented in Table 19 are based on the results of the current condition hydrologic analysis that was summarized in Section 3 (Current Conditions Hydrology) of this appendix.

In support of the preliminary design efforts for the restoration sites, the following flow rates were the primary flow rates used to support the hydraulic design:

- **90% Exceedance Flow** – the 90% exceedance flow rate for the winter/spring period (defined as November 1 through June 1, inclusive) was used as a design flow in support of the backwater channel features. The water surface elevation associated with this flow rate was used to establish the thalweg elevations of the backwater channels at the connection with the main channel of the Coast Fork, Middle Fork or Row River. This ensured that these channel features are wetted for flows as low as the 90% exceedance.
- **2-year return period flood flows** – this flow rate was used in general to establish an estimated top elevation for the in-channel engineered log jam features (i.e. the river-type ELJs). This flow rate was also used as the design flow in support of the flow through side channel features such as the side channel at Site M1A. The water surface elevation associated with this flow rate was used to establish the thalweg elevations of the upstream end of these features to ensure that these channels were actively conveying flow for flood events equal to or larger than the 2-year return period flood event.
- **100-year return period flood flows** – this flow rate was used to estimate conservatively high values for general contraction scour for the in-channel engineered log jam features.

Figures 12 through 13 present existing without project condition water surface profiles for the Coast Fork Willamette River, the Middle Fork Willamette River and the Row River, respectively. Water surface profiles for the 90% exceedance flow (winter/spring period) and the 2-year return period flow are shown in each figure.

Tables 20 and 21 present select existing without project hydraulic model output, organized by restoration site, for the 90% exceedance flow rate and the 2-year return period flow rate, respectively. Tables 20 and 21 include model output from only those hydraulic model cross sections in the immediate vicinity of the recommended restoration sites. The figures in Attachment C of this appendix include the locations of the HEC-RAS cross sections relative to the recommended restoration sites.

One of the overall objectives of this feasibility study is to restore natural floodplain ecosystem function and condition at specific priority restoration sites (see Section 1.6 of the main report). To attain this objective, proposed restoration measures at the five priority restoration sites partially include reconnection of remnant side-channels, backwater features and oxbows that are currently disconnected from the river; excavation of new side channels in geomorphically appropriate areas; and reconnection of gravel mined ponds as backwater features. Under existing conditions, the floodplain areas defined by the restoration site boundaries are disconnected from the river until the flow rate is such that the water surface elevation exceeds the adjacent bank elevation, which may be a natural elevation or an artificially raised elevation. Generally, there are no floodplain features that can be considered to be hydraulically connected to the river at each priority restoration site

The results of the existing without project condition hydraulic modeling found that that the inundation of the floodplain areas at each of the priority restoration sites would be initiated at a range of flow magnitudes, most of which were at or above bankfull flow conditions. A specific discussion of the flow magnitudes necessary to initiate inundation under existing conditions at each of the five priority restoration sites is provided in the following paragraphs.

Site C1B. The site borders approximately 1,600 lineal feet of the Coast Fork Willamette River. As part of the restoration plan, approximately six gravel mined ponds would be hydraulically connected to the river. **Under without project conditions, inundation of the site would begin at approximately the 5% exceedance flow rate for the winter/spring period (7,686 cfs).**

Site M1A. The site borders approximately 3,000 lineal feet of the Middle Fork Willamette River on the north side and approximately 5,200 lineal feet of the Coast Fork Willamette River on the south side. As part of the restoration plan, the two large gravel ponds would be hydraulically connected to both the Coast Fork and Middle Fork. **Under existing without project conditions, the existing berms surrounding the ponds would prevent floodplain flows from entering the ponds for all flood events up to the 100-year flood.**

Site M1B. The site borders approximately 5,300 lineal feet of the Middle Fork Willamette River and the site footprint is comprised mostly of gravel mined ponds. As part of the restoration plan, the gravel mined ponds would be restored and hydraulically connected to the Middle Fork. **Under without project conditions, the existing road/berm along the northern boundary of the site would prevent the Middle Fork from connecting to the ponds for all flood events up to the 100-year flood.**

Site C1C. The site borders approximately 4,700 lineal feet of the Coast Fork Willamette River and contains one large gravel mined pond and several smaller ponds. Along the eastern (upstream) end of the site, there are a few relic side channels in the floodplain. As part of the restoration plan, the large pond would be hydraulically connected to the Coast Fork with a flow through channel and the two smaller ponds would be connected as backwater features. **Under without project conditions, inundation of the ponds at the downstream end of the site would begin to occur at roughly the 10% exceedance flow rate for the winter/spring period (5,890 cfs).**

Site M2A. The site borders approximately 3,500 lineal feet of the Middle Fork Willamette River and the site has two large gravel mined ponds and one smaller pond. As part of the restoration plan, the ponds would be restored and hydraulically connected to the Middle Fork. **Under without project conditions, inundation of the two ponds at the western (downstream) side of the site would begin to occur at roughly the 10% exceedance flow rate for the winter/spring period (10,300 cfs).**

Table 19. Input Hydrology for Existing without Project Conditions Hydraulic Model.

Flow Duration and Flood Frequency Ordinate	Discharge at Flow Change Location in HEC-RAS Model (cfs)						
	Middle Fork Willamette River			Coast Fork Willamette River			Row River
	XS 186.566	XS 198.145	XS 203.71	XS 8.466	XS 43075 (RM 20.308)	XS 500 (RM 21.100)	XS 15496 (RM 2.935)
95% Exceedance [a]	1,654	1,380	1,070	274	232	68	154
90% Exceedance [a]	1,916	1,530	1,150	386	333	85	237
75% Exceedance [a]	2,602	1,970	1,250	632	516	139	351
50% Exceedance [a]	5,020	3,670	2,550	1,350	1,152	284	823
25% Exceedance [a]	9,060	6,140	4,350	2,920	2,505	643	1,768
10% Exceedance [a]	16,190	10,300	7,930	5,890	5,076	1,312	3,580
5% Exceedance [a]	20,986	13,300	9,824	7,686	6,834	1,779	4,862
2-year Return Period	35,800	20,000	12,000	15,800	12,573	4,200	7,644
5-year Return Period	40,000	20,000	12,000	20,000	15,836	4,694	10,201
10-year Return Period	45,500	20,000	12,000	25,500	20,329	5,624	13,538
20-year Return Period	51,500	20,000	12,000	31,500	25,462	6,781	17,317
100-year Return Period	83,500	35,500	20,300	48,000	40,956	12,112	27,253

Notes:
a. Flow exceedance values from Winter/Spring Season Flow Duration Curve

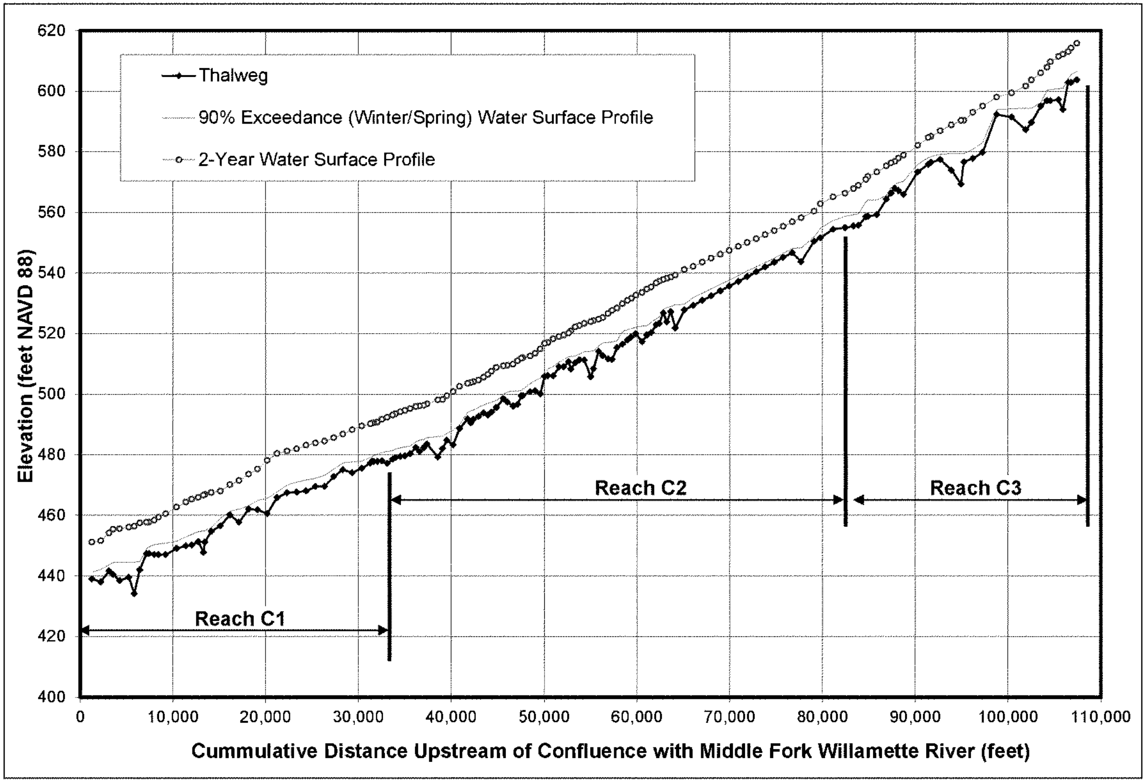


Figure 12. Existing Without Project Conditions Water Surface Profiles for the Coast Fork Willamette River.

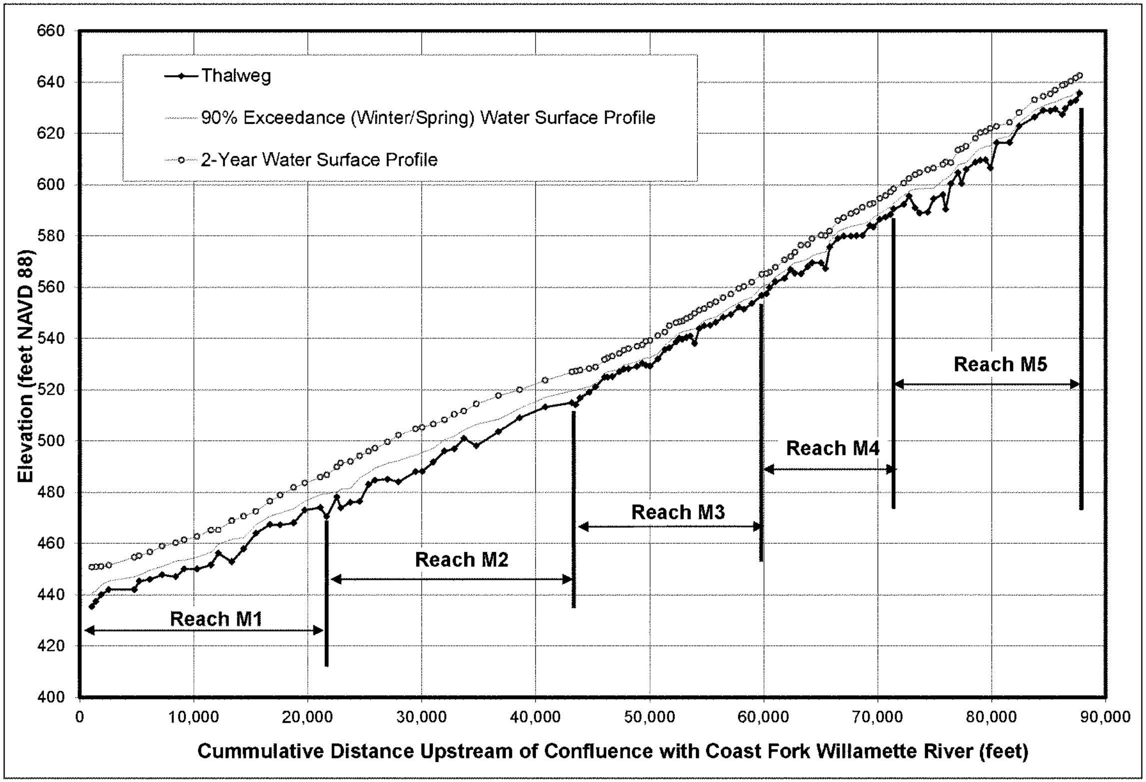


Figure 13. Existing Without Project Conditions Water Surface Profiles for the Middle Fork Willamette River.

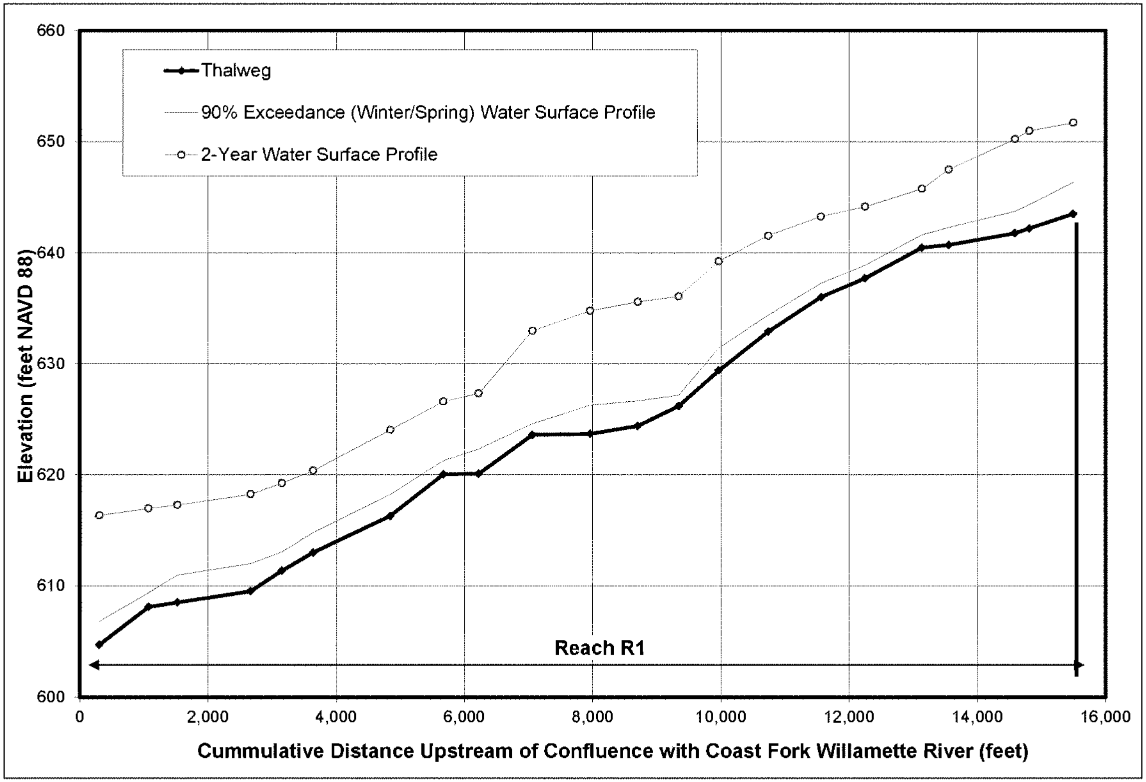


Figure 14. Existing Without Project Conditions Water Surface Profiles for the Row River..

Table 20. Select Existing without Project Hydraulic Model Output by Restoration Site for 90% Exceedance Design Flow.

HEC-RAS Cross Section	Adjacent Restoration Site(s)	Cumulative Channel Distance Upstream of Confluence (feet)	Flow Rate (cfs)	W.S. Elev. (feet NAVD88)	E.G. Slope (ft/ft)	Channel Velocity (ft/s)	Channel Froude No.
187.458	M1A	2,561	1,530	445.23	0.000742	2.39	0.28
187.882	M1A	4,795	1,530	447.01	0.000881	2.85	0.31
187.964	M1A / M1B	5,228	1,530	447.60	0.011276	6.50	1.00
188.142	M1A / M1B	6,169	1,530	449.67	0.000582	2.49	0.26
188.346	M1A / M1B	7,247	1,530	450.99	0.011513	7.70	1.00
188.571	M1B	8,437	1,530	453.13	0.000345	2.01	0.19
188.712	M1B	9,179	1,530	453.48	0.000873	2.59	0.27
188.922	M1B	10,288	1,530	454.64	0.001327	3.06	0.32
189.154	M1B	11,514	1,530	456.53	0.001842	3.20	0.37
189.279	-	12,169	1,530	459.76	0.011944	7.31	0.91
189.502	-	13,348	1,530	461.61	0.000326	1.83	0.17
189.701	-	14,398	1,530	462.32	0.007028	4.85	0.68
189.905	-	15,477	1,530	467.36	0.003191	4.00	0.48
190.135	-	16,689	1,530	470.63	0.002249	3.63	0.41
190.309	-	17,608	1,530	471.93	0.000829	2.39	0.23
190.530	M2A	18,776	1,530	473.54	0.002889	2.98	0.39
190.718	M2A	19,767	1,530	476.49	0.002985	2.64	0.30
190.972	M2A	21,109	1,530	479.07	0.001306	2.14	0.21
191.080	M2A	21,677	1,530	479.40	0.000258	1.31	0.10
191.248	M2A	22,566	1,530	480.09	0.039456	6.84	1.00
191.311	M2A	22,898	1,530	481.18	0.000277	1.24	0.10
191.471	-	23,744	1,530	481.54	0.009560	5.59	0.56
0.391	C1B	2,233	386	442.15	0.000876	1.95	0.21
0.559	C1B	3,120	386	443.70	0.006501	3.84	0.52
0.643	C1B / M1A	3,562	386	444.45	0.000477	1.07	0.14
0.777	C1B / C1C / M1A	4,271	386	444.53	0.000038	0.48	0.04
0.970	C1B / C1C / M1A	5,266	386	444.57	0.000045	0.55	0.05
1.076	C1C / M1A	5,845	386	444.60	0.000042	0.65	0.05
1.187	C1C / M1A	6,433	386	444.61	0.028233	5.89	1.00

HEC-RAS Cross Section	**Adjacent Restoration Site(s)**	**Cumulative Channel Distance Upstream of Confluence (feet)**	**Flow Rate (cfs)**	**W.S. Elev. (feet NAVD88)**	**E.G. Slope (ft/ft)**	**Channel Velocity (ft/s)**	**Channel Froude No.**
1.325	C1C / M1A	7,150	386	448.92	0.00212	1.33	0.26
1.379	C1C / M1A	7,436	386	449.57	0.002867	2.61	0.35
1.484	C1C / M1A	8,001	386	450.29	0.000595	1.23	0.16
1.571	M1A	8,462	386	450.52	0.000407	1.09	0.13
1.717	-	9,232	386	450.78	0.000295	1.03	0.12
21510	-	85,842	333	564.13	0.000139	0.71	0.07
22543	-	86,875	333	565.71	0.040850	4.84	1.00
23056	-	87,388	333	568.30	0.001553	1.69	0.27
23468	-	87,800	333	569.36	0.005497	2.40	0.47
23841	-	88,173	333	569.80	0.000379	0.89	0.11
24403	-	88,735	333	570.27	0.004926	2.80	0.34
25936	-	90,268	333	575.87	0.002902	1.28	0.22
27070	-	91,401	333	578.09	0.001608	1.50	0.21
27361	-	91,692	333	578.39	0.000597	0.96	0.15
28353	-	92,685	333	579.17	0.001117	1.26	0.20
29555	-	93,887	333	579.39	0.000065	0.65	0.06
30591	-	94,923	333	579.45	0.000043	0.61	0.05

Table 21. Select Existing without Project Hydraulic Model Output by Restoration Site for 90% Design Flow.

HEC-RAS Cross Section	Adjacent Restoration Site(s)	Cumulative Channel Distance Upstream of Confluence (feet)	Flow Rate (cfs)	W.S. Elev. (feet NAVD88)	E.G. Slope (ft/ft)	Channel Velocity (ft/s)	Channel Froude No.
187.458	M1A	2,561	20,000	451.45	0.001432	7.85	0.48
187.882	M1A	4,795	20,000	454.58	0.001335	7.60	0.46
187.964	M1A / M1B	5,228	20,000	455.13	0.001887	8.36	0.54
188.142	M1A / M1B	6,169	20,000	456.65	0.001680	9.17	0.53
188.346	M1A / M1B	7,247	20,000	458.98	0.001138	5.82	0.39
188.571	M1B	8,437	20,000	460.17	0.00122	7.41	0.42
188.712	M1B	9,179	20,000	461.36	0.00125	6.63	0.39
188.922	M1B	10,288	20,000	462.66	0.002579	9.75	0.55
189.154	M1B	11,514	20,000	465.21	0.000500	3.85	0.24
189.279	-	12,169	20,000	465.28	0.006347	12.12	0.81
189.502	-	13,348	20,000	468.82	0.001506	7.95	0.43
189.701	-	14,398	20,000	470.61	0.000687	4.24	0.27
189.905	-	15,477	20,000	472.55	0.003978	9.25	0.64
190.135	-	16,689	20,000	476.48	0.002933	8.03	0.55
190.309	-	17,608	20,000	478.85	0.002905	9.38	0.52
190.530	M2A	18,776	20,000	481.81	0.001251	5.86	0.33
190.718	M2A	19,767	20,000	483.54	0.001758	4.89	0.29
190.972	M2A	21,109	20,000	485.84	0.001686	4.31	0.27
191.080	M2A	21,677	20,000	486.69	0.002672	6.68	0.36
191.248	M2A	22,566	20,000	489.80	0.006018	8.58	0.52
191.311	M2A	22,898	20,000	491.33	0.000589	3.34	0.17
191.471	-	23,744	20,000	491.94	0.003209	7.45	0.39
0.391	C1B	2,233	15,800	451.60	0.002514	6.51	0.42
0.559	C1B	3,120	15,800	454.18	0.004402	8.35	0.55
0.643	C1B / M1A	3,562	15,800	455.43	0.000218	2.25	0.13
0.777	C1B / C1C / M1A	4,271	15,800	455.58	0.000563	3.45	0.20
0.970	C1B / C1C / M1A	5,266	15,800	456.07	0.000703	5.03	0.24
1.076	C1C / M1A	5,845	15,800	456.35	0.001522	7.22	0.35
1.187	C1C / M1A	6,433	15,800	457.47	0.000298	2.46	0.15
1.325	C1C / M1A	7,150	15,800	457.69	0.000217	1.98	0.12
1.379	C1C / M1A	7,436	15,800	457.72	0.001112	3.41	0.26

HEC-RAS Cross Section	Adjacent Restoration Site(s)	Cumulative Channel Distance Upstream of Confluence (feet)	Flow Rate (cfs)	W.S. Elev. (feet NAVD88)	E.G. Slope (ft/ft)	Channel Velocity (ft/s)	Channel Froude No.
1.484	C1C / M1A	8,001	15,800	458.37	0.002412	5.87	0.40
1.571	M1A	8,462	15,800	459.38	0.001475	5.05	0.32
1.717	-	9,232	15,800	460.49	0.002013	6.66	0.38
21510	-	85,842	12,573	573.34	0.001502	6.06	0.31
22543	-	86,875	12,573	575.31	0.002352	6.57	0.37
23056	-	87,388	12,573	576.29	0.001371	5.98	0.35
23468	-	87,800	12,573	576.83	0.002186	7.03	0.43
23841	-	88,173	12,573	577.87	0.001329	4.79	0.28
24403	-	88,735	12,573	578.84	0.001564	3.37	0.20
25936	-	90,268	12,573	582.12	0.003799	3.39	0.25
27070	-	91,401	12,573	584.66	0.001762	4.10	0.28
27361	-	91,692	12,573	585.05	0.001933	5.57	0.36
28353	-	92,685	12,573	586.92	0.001963	6.12	0.37
29555	-	93,887	12,573	588.88	0.001488	6.63	0.33
30591	-	94,923	12,573	590.30	0.001111	6.24	0.29

6. WITH PROJECT CONDITIONS HYDRAULIC MODELING

The cross section geometry of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" model was modified to represent the implementation of the restoration designs at the five recommended restoration sites and therefore the with project conditions. It was assumed that with project conditions are represented by the construction of all five restoration sites and not of staged construction of individual sites.

One of the primary objectives of the with-project hydraulic analysis was to determine the potential for the implemented projects to increase the 100-year water surface elevation. Evaluation of with project conditions for the 100-year flood event is necessary to illustrate that there will be a "no-rise" effect due to the implementation of the restoration projects. All five restoration sites are located within a Federal Emergency Management Agency (FEMA) regulated floodway, meaning a detailed hydraulic study must be completed to confirm that implementation of the projects will not increase flood heights for the 100-year return period flood event. Figures 15 through 18 show the footprints of the five restoration sites overlaid on the FEMA floodplain. As seen in these figures, with the exception of Sites M1A and M1B, the other restoration site footprints are located entirely within Special Hazard Area Zone AE of the effective Flood Insurance Rate Maps (FIRMS). More importantly, these other restoration site footprints are located within the floodway area of Zone AE. The floodway is the portion of the channel plus any adjacent floodplain area that must be kept free of encroachment so that the 1% annual chance flood event (100-year flood event) can be carried without substantial increases in flood heights. Only portions of Sites M1A and M1B are located within FEMA Zone AE. A small sliver of Site M1A is located with the Coast Fork floodway and the entire northern portion of Site M1B is located within the Middle Fork floodway.

However, given the current limitations of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" as a bankfull condition hydraulic model, the traditional no-rise evaluation could not be conducted with the "Updated Middle-Coast Fork Willamette River HEC-RAS Model". The HEC-2 model that was developed for the Lane County Flood Insurance Study (FEMA 1999) is a flood model that is appropriate for modeling flood events in excess of bankfull conditions; however, the cross section spacing and the resolution of the model is too coarse to be used to model the with project conditions for the proposed restoration sites.

Therefore, the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" was used to evaluate the with project conditions for a bankfull flow rate, which was assumed to be approximated by the 2-year return period flood event. Modeling of this flood event was used to show that implementation of the five restoration projects will not increase flood heights for the bankfull condition, or would at most increase them by a nominally small magnitude. During final design, it will be necessary that site specific hydraulic modeling be conducted, in which case, the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" would be revised to include more detail and include the 100-year return period flows to confirm these results. See Section 7 (Limitations and Recommendations) for more discussion of future recommended actions for the hydraulic analysis.

6.1. With Project Hydraulic Connection to Restoration Features

With the implementation of the recommended restoration measures, floodplain features at each restoration site will be hydraulically connected to the main stem river during flow rates that are less than those that would be required under existing without project conditions. Section 5 of this appendix provided a discussion of the hydraulic modeling results for the existing without project condition. This section describes the hydrologic conditions that would result in hydraulic connection to the river at each site for the with project condition. Refer to the design drawings for any specific references to the site specific restoration features and their associated design elevations.

Site C1B. Pond 1 would be hydraulically connected to the Coast Fork starting at approximately the 90% exceedance flow rate for the winter/spring period (386 cfs). All of the other gravel mined ponds at the site would be hydraulically connected to the Coast Fork starting at approximately the 75% exceedance flow rate for the winter/spring period (632 cfs).

Site M1A. The proposed high flow connection channel between the Coast Fork and the smaller of the two gravel mined ponds would be hydraulically connected to the river starting at approximately the 5% exceedance flow rate for the winter/spring period (7,686 cfs). Starting at approximately the 2-year flood event (15,800 cfs), the entire channel and the smaller of the two gravel mined ponds would then be connected to the Coast Fork. The larger of the two gravel minded ponds would be hydraulically connected to the Middle Fork starting at approximately the 75% exceedance flow rate for the winter/spring period (1,530 cfs).

Site M1B. The two notches that are proposed to be cut in the existing berm would allow for a hydraulic connection between the Middle Fork and the gravel mined ponds starting at approximately the 90% exceedance flow rate for the winter/spring period (1,530 cfs). At this flow rate, the water surface elevation at the upstream end of the site will be sufficient to allow for a hydraulic connection between the river and all of the ponds on the site.

Site C1C. The proposed high flow channel at the upstream end of the site would allow for a hydraulic connection between the Middle Fork and the large gravel mined pond starting at approximately the 25% exceedance flow rate for the winter/spring period (2,920 cfs). The proposed backwater channel further downstream would allow connection between the Middle Fork and the gravel mined pond starting at approximately the 95% exceedance flow rate for the winter/spring period (274 cfs).

Site M2A. The proposed high flow channel (Channel Connection 1) at the upstream of the site would allow for hydraulic connection between the Middle Fork and the eastern-most gravel mined pond starting at approximately the 2-year flood event (20,000 cfs), The proposed backwater channel (Channel Connection 3) at the downstream end of the site would allow for hydraulic connection between the Middle Fork and the western-most gravel mined pond starting at approximately the 25% exceedance flow rate for the winter/spring period (6,140 cfs). At the 2-year flood event (20,000 cfs), all ponds on the site would be connected to the Middle Fork.

6.2. No-Rise Analysis and Results

The no-rise analysis for the with-project analysis was conducted for the 2-year return period flood event. The objective was to illustrate that implementation of the five restoration projects would not increase flood heights for this bankfull flood event, or would at most increase them by no more than a nominal magnitude of 0.2 feet (less than 3 inches). Based on the results of this 2-year with project analysis, it is reasonable to assume that during the design phase when the 100-year flood is analyzed, the modeling would also show a no-rise situation for the with project condition. A hydraulic model more suitable to analyzing out of bank flow conditions would account for the hydraulic conveyance afforded by the extensive floodplains and relic floodplain channels adjacent to the Coast and Middle Fork Willamette

River when flows are out of bank. The current "Updated Middle-Coast Fork Willamette River HEC-RAS Model" does not have this capability.

At each of the five recommended restoration sites, the cross section geometry of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" was modified to represent the implementation of the restoration features. Specific restoration features, such as main-channel engineered log jams (ELJ's) and main channel levee/berm modifications, were easily represented in the one-dimensional hydraulic model and were therefore included in the with project conditions analysis. The main-channel ELJ's were represented in the model as individual blocked obstructions in the closest model cross section to each ELJ site.

Other restoration features, such as floodplain side channels, gravel pit bank-modifications and connector channels between gravel pits were more difficult to represent in the one-dimensional hydraulic model as it is currently configured. As was described in Section 4.2.4 (Ineffective Flow Areas) of this appendix, the ineffective flow area option in HEC-RAS was used throughout the "Updated Middle-Coast Fork Willamette River HEC-RAS Model to limit effective conveyance to within the banks of the main channel and to exclude the floodplain and features in the floodplain such as side channels and gravel pits. The floodplain side channels, gravel pit bank-modifications and connector channels between gravel pits that were proposed at the restoration sites were therefore included in the with project hydraulic model by editing the ineffective flow areas at the project sites. Where a restoration feature such as a flow through side channel was proposed, the ineffective flow areas that were originally defined in the HEC-RAS model were revised to allow for a width of effective flow in the floodplain, commensurate with the expected active flow width attributed to the side channel.

Finally, implementation features such as backwater channels would have no effect on main-channel water surface elevations due to the fact that they would not be effective flow conveyance features. Therefore, they were not included in the with project hydraulic analysis.

Figures 18 through 20 present the comparison of with project and without project water surface elevations for the 2-year flood event. To provide a point of reference, these figures also include the without project water surface profiles for the 90% winter/spring exceedance flow. As described in Section 5, this particular flow was one of the hydrologic conditions used in the restoration design. Individual restoration sites were grouped together as appropriate for the presentation of the comparisons. For example, Figure 19 presents the water surface profiles for the portion of the Coast Fork Willamette River adjacent to Restoration Sites C1B, C1C and M1A.

Tables 22 and 23 present the same information as Figures 18 through 20, but in a tabular format. Table 22 presents the comparison of with project and without project hydraulic modeling for the 2-year flood event for the Coast Fork Willamette River. Table 23 presents these same results, but for the Middle Fork Willamette River. Both of these tables include model output from only those hydraulic model cross sections in the immediate vicinity of the recommended restoration sites. The figures in Attachment C of this appendix include the locations of the HEC-RAS cross sections relative to the recommended restoration sites.

As seen in these tables, hydraulic modeling of the with project conditions shows both increases and decreases in water surface elevation relative to the without project condition. Decreases in water surface elevation are generally attributed to the increased conveyance provided by flow through side channel features; the most significant example of which is the 0.6 foot reduction in water surface elevation in the vicinity of Restoration Site C1C (see Table 22). Increases in water surface elevation are generally attributed to loss of main channel conveyance from placement of ELJ features; the most significant example of which is the 0.2 foot increase in water surface elevation in the vicinity of Restoration Site

M2A (see Table 23). At most of the restoration sites, the net decrease or increase in the water surface elevations shown in these tables is the result of the combined effect of those restoration features that decrease main channel conveyance and those restoration features that increase off channel or floodplain conveyance.

It is noted that this analysis is based on the bankfull flow conditions that are approximated by the 2-year return period flood event. Those minor increases in water surface elevation shown in Tables 22 and 23 would not be expected when the hydraulic analysis of the 100-year flood event is conducted during the design phase with a hydraulic model that is capable of accurately modeling large out-of-bank flood events.

6.3. Conclusions

The water surface profiles shown in Figures 18 through 20 and the tabular results presented in Tables 22 and 23 illustrate that the implementation of the restoration projects would have a minimal effect on water surface elevations associated with the 2-year return period flood event. At all cross sections in the model, predicted increases are less than 0.2 feet.

In lieu of the ability to conduct a detailed evaluation of the with-project and without project conditions under 100-year flood flows, the results of the modeling of the 2-year flood can be used as a conservatively high estimate of with project conditions. It is likely that the implementation of the restoration projects will have less effect on the 100-year water surface elevations than they do on the 2-year water surface elevations due to the fact that active conveyance in the floodplain would be included in a 100-year flood model. As the priority restoration projects proceed through the final design phase it is recommended that the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" be used as the basis for developing a flood model capable of accurately modeling flow rates in excess of bankfull conditions. See Section 7 for more discussion of this need.

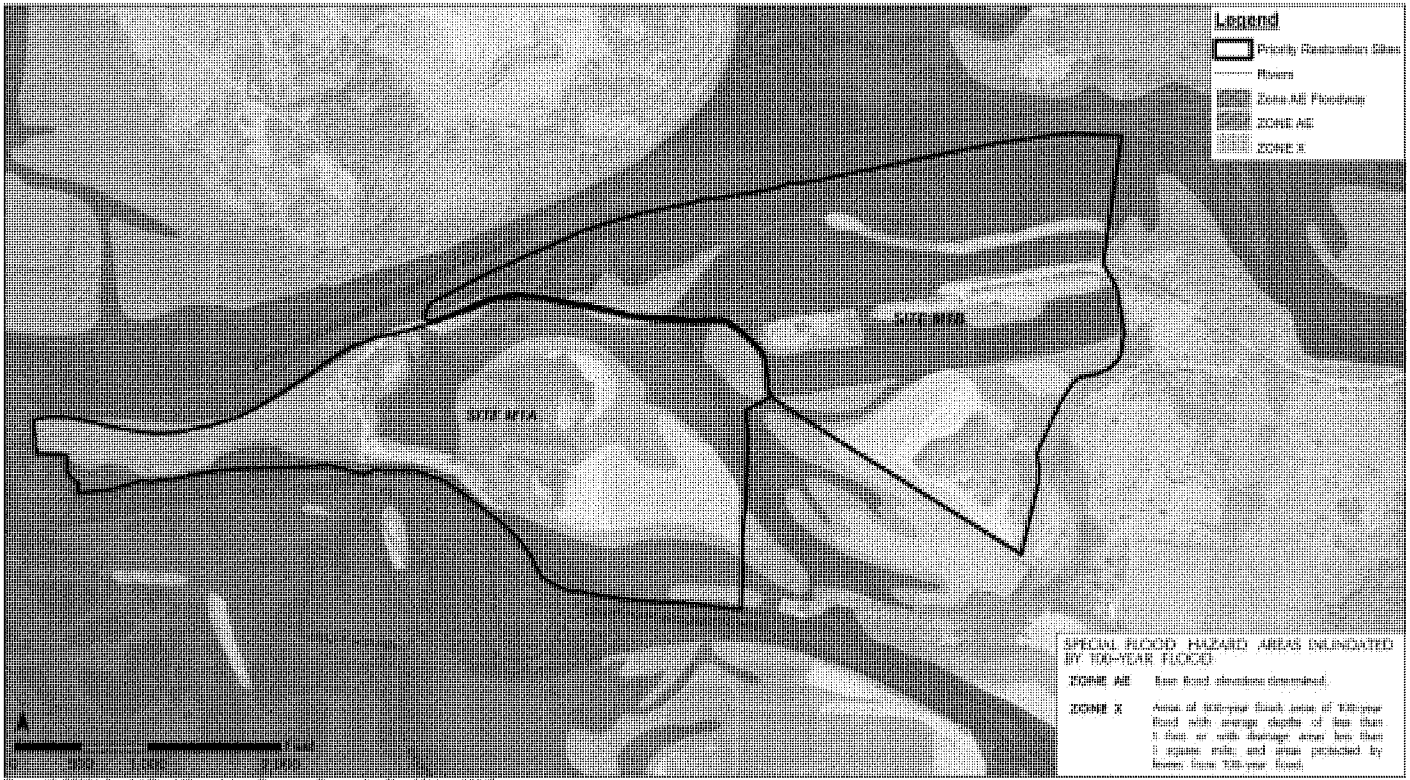


Figure 15. FEMA Special Flood Hazard Area Extents at Restoration Sites M1A and M1B.

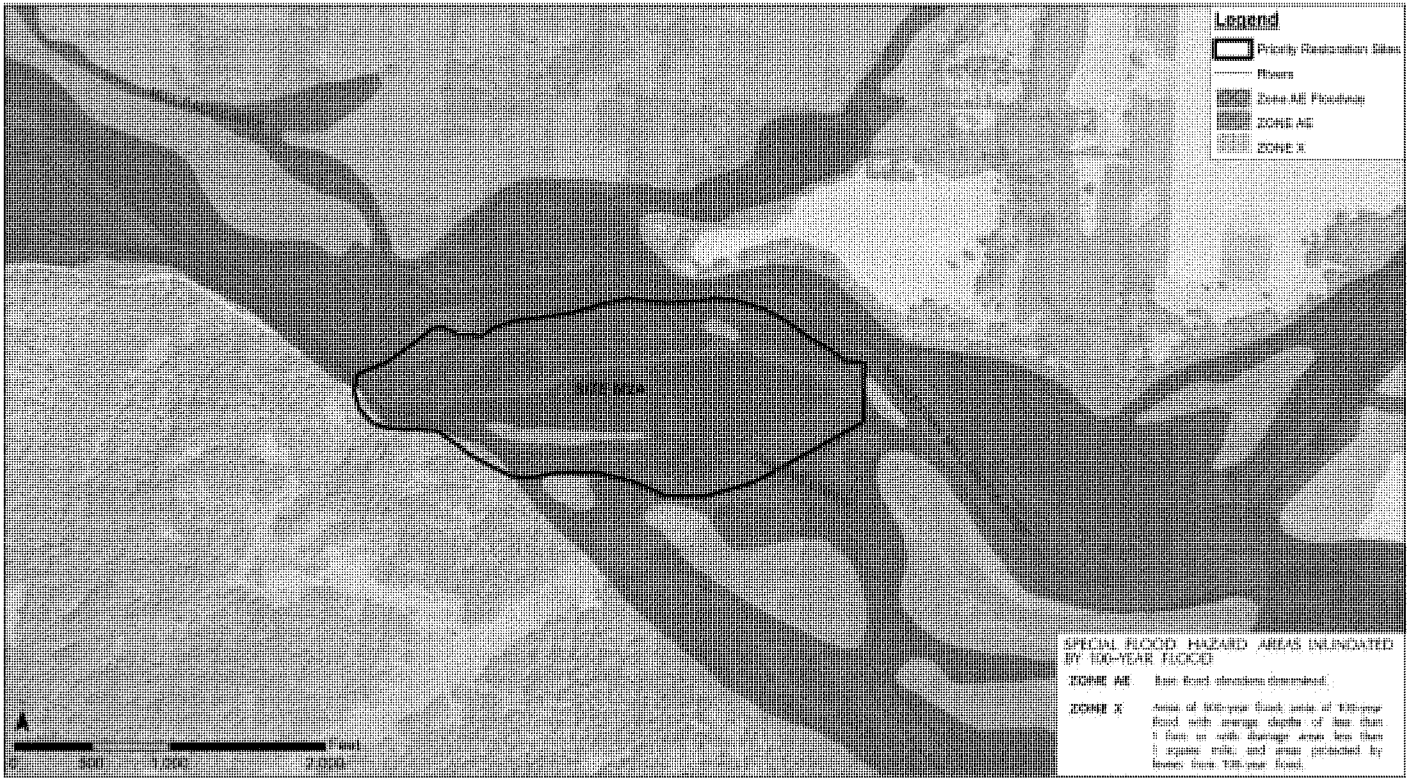


Figure 16. FEMA Special Flood Hazard Area Extents at Restoration Site M1A.

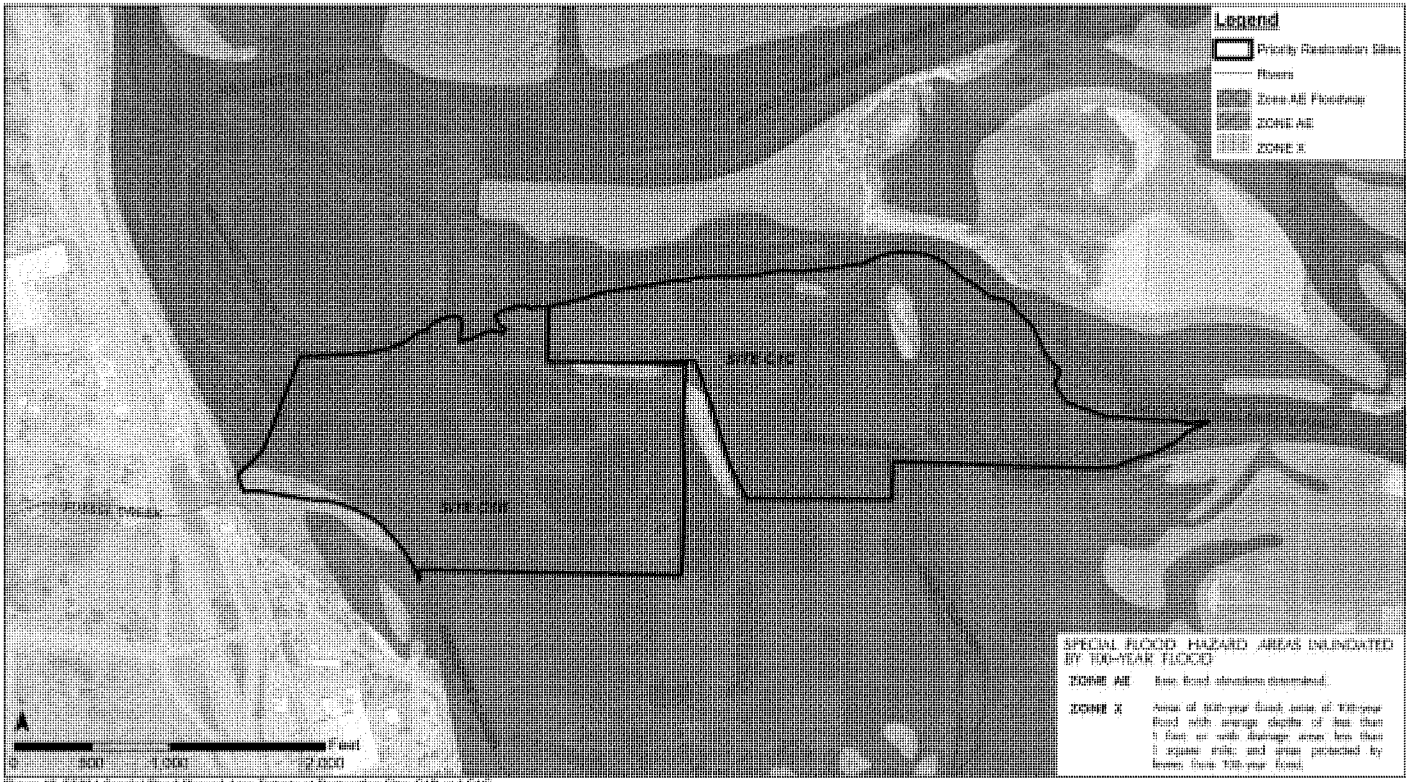


Figure 17. FEMA Special Flood Hazard Area Extents at Restoration Sites C1B and C1C.

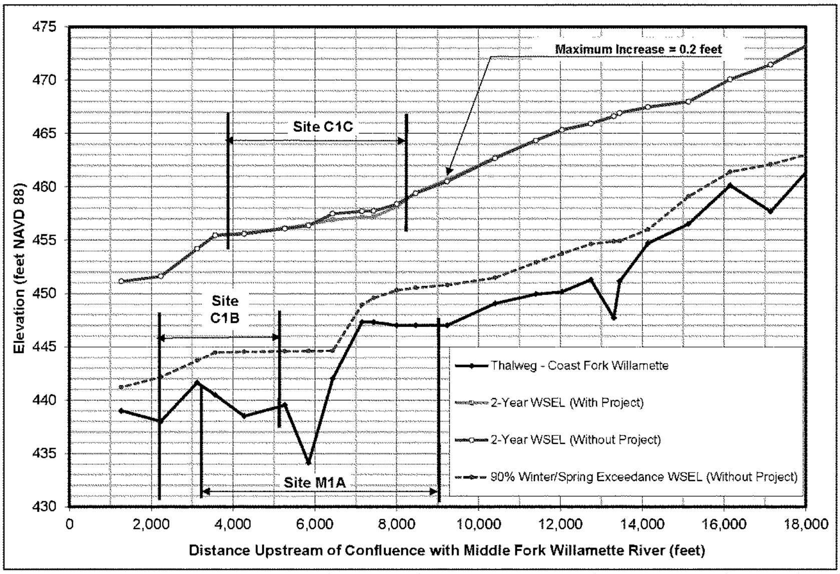


Figure 18. Coast Fork Willamette River without Project versus with Project Water Surface Profiles for 2-Year Return Period Flood for Sites C1B, C1C and M1A.

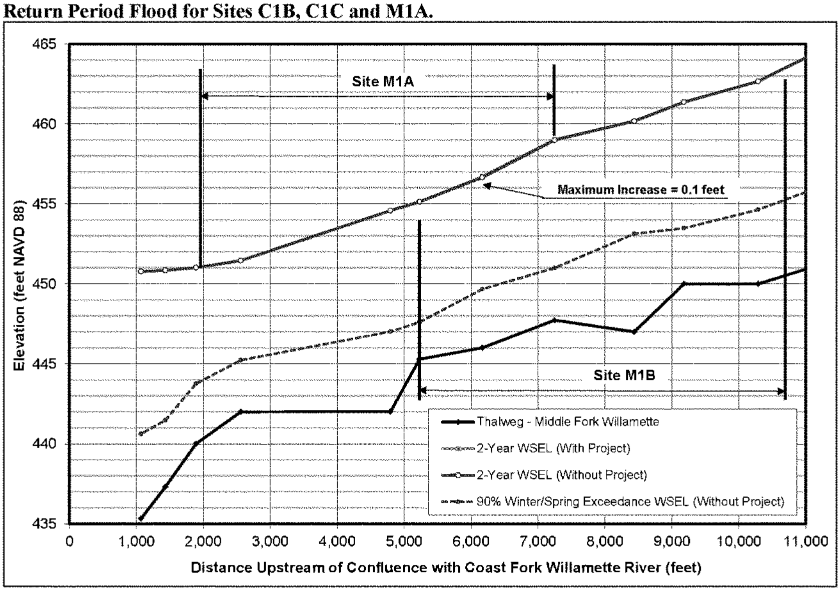


Figure 19. Middle Fork Willamette River without Project versus with Project Water Surface Profiles for 2-Year Return Period Flood for Sites M1A and M1B.

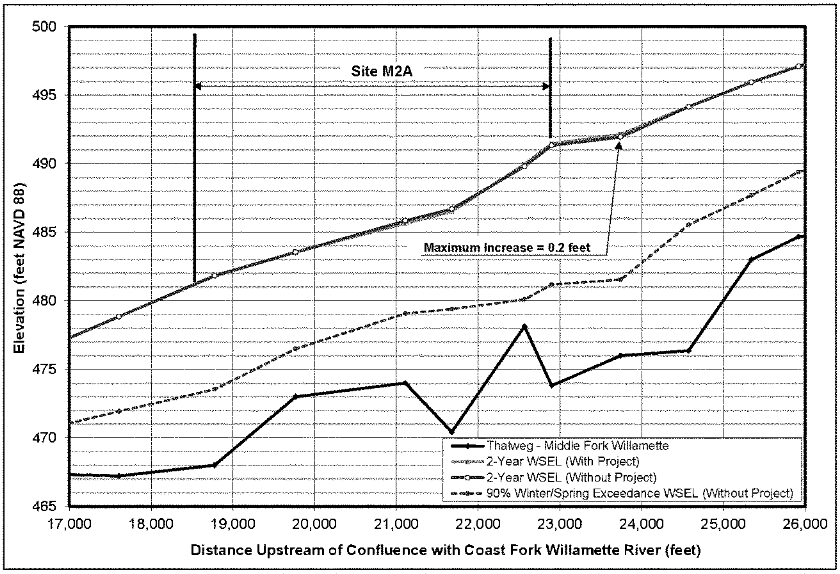


Figure 20. Middle Fork Willamette River without Project versus with Project Water Surface Profiles for 2-Year Return Period Flood for Site M2A.

Table 22. Coast Fork Willamette River without Project versus with Project Water Surface Elevations for the 2-Year Return Period Flood Event.

HEC-RAS Cross Section	Adjacent Restoration Site(s)	Cumulative Channel Distance Upstream of Confluence (feet)	Without Project W.S. Elev. (ft NAVD88)	With Project W.S. Elev. (ft NAVD88)	Difference[a] (feet)
0.209	-	1,270	451.12	451.12	0.0
0.391	C1B	2,233	451.60	451.60	0.0
0.559	C1B	3,120	454.18	454.18	0.0
0.643	C1B / M1A	3,562	455.43	455.47	0.0
0.777	C1B / C1C / M1A	4,271	455.58	455.65	+ 0.1
0.970	C1B / C1C / M1A	5,266	456.07	456.14	+ 0.1
1.076	C1C / M1A	5,845	456.35	456.44	+ 0.1
1.187	C1C / M1A	6,433	457.47	456.90	- 0.6
1.325	C1C / M1A	7,150	457.69	457.14	- 0.6
1.379	C1C / M1A	7,436	457.72	457.16	- 0.6
1.484	C1C / M1A	8,002	458.37	458.13	- 0.2
1.571	M1A	8,462	459.38	459.45	+ 0.1
1.717	-	9,233	460.49	460.64	+ 0.1
1.946	-	10,403	462.67	462.73	+ 0.1
2.128	-	11,399	464.33	464.37	0.0
2.247	-	12,039	465.32	465.35	0.0
2.382	-	12,745	465.91	465.93	0.0
2.493	-	13,308	466.60	466.62	0.0
2.509	-	13,449	466.91	466.93	0.0
2.644	-	14,144	467.47	467.49	0.0
2.837	-	15,128	467.97	467.98	0.0
3.026	-	16,148	470.07	470.08	0.0
3.216	-	17,138	471.44	471.44	0.0

Notes:

a. Difference is calculated as with project water surface elevation minus without project water surface elevation and then rounded to nearest tenth of a foot.

Table 23. Middle Fork Willamette River without Project versus with Project Water Surface Elevations for the 2-Year Return Period Flood Event.

HEC-RAS Cross Section	Adjacent Restoration Site(s)	Cumulative Channel Distance Upstream of Confluence (feet)	Without Project W.S. Elev. (ft NAVD88)	With Project W.S. Elev. (ft NAVD88)	Difference[a] (feet)
187.176	-	1,070	450.77	450.77	0.0
187.242	-	1,434	450.84	450.84	0.0
187.331	-	1,890	451.01	451.01	0.0
187.458	M1A	2,561	451.45	451.45	0.0
187.882	M1A	4,795	454.58	454.58	0.0
187.964	M1A / M1B	5,228	455.13	455.11	0.0
188.142	M1A / M1B	6,169	456.65	456.71	0.1
188.346	M1A / M1B	7,247	458.98	459.01	0.0
188.571	M1B	8,437	460.17	460.18	0.0
188.712	M1B	9,179	461.36	461.37	0.0
188.922	M1B	10,288	462.66	462.66	0.0
189.154	M1B	11,514	465.21	465.22	0.0
189.279	-	12,169	465.28	465.28	0.0
189.502	-	13,348	468.82	468.82	0.0
189.701	-	14,398	470.61	470.61	0.0
189.905	-	15,477	472.55	472.55	0.0
190.135	-	16,689	476.48	476.48	0.0
190.309	-	17,608	478.85	478.85	0.0
190.530	M2A	18,776	481.81	481.84	0.0
190.718	M2A	19,767	483.54	483.55	0.0
190.972	M2A	21,109	485.84	485.65	- 0.2
191.080	M2A	21,677	486.69	486.50	- 0.2
191.248	M2A	22,566	489.80	489.95	+ 0.1
191.311	M2A	22,898	491.33	491.45	+ 0.1
191.471	-	23,744	491.94	492.13	+ 0.2
191.628	-	24,573	494.15	494.16	0.0
191.774	-	25,342	495.93	495.93	0.0

Notes:

a. Difference is calculated as with project water surface elevation minus without project water surface elevation and then rounded to nearest tenth of a foot.

7. LIMITATIONS AND RECOMMENDATIONS

The purpose of this section is to describe the limitations of the HEC-RAS model used in this feasibility study and to address those limitations as it pertains to the habitat restoration study, particularly the next phase – design plans & specifications. A more robust model is recommended for application in the next phase of the project.

Many of the limitations of the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" arise from the fact that the model as originally constructed was intended to "accurately estimate water surface profiles in the channel for bankfull and near-bankfull conditions and was not intended to be a flood model capable of accurately modeling large out-of-bank events" (USACE-Portland District 2009). It is these lower flows that are of most interest to restoration efforts; therefore, the model was a useful tool in evaluating potential restoration sites and in performing feasibility level designs.

The design phase of this project will require an updated tool and additional analysis for determining hydraulic characteristics at the proposed restoration sites in the Coast Fork Middle Fork Willamette River. The design tool will necessarily include the modeling of flows in the overbank and floodplain areas at all discharges. This will require a model that can accurately predict hydraulic conditions for flows up to and including the 100-year flood.

One of the reasons that a model capable of simulating the 100-year flood is necessary is many of the restoration alternatives are located in FEMA floodplains and floodways. FEMA requires any land alterations that occur in regulatory floodways to not impart a rise in water surface elevations at the 100-year flood event. In order to evaluate the effects of the restoration alternatives on the FEMA floodplain and floodway, the water surface elevation output of a With-Project Model will need to be compared to those of a Without-Project Model. In addition to the need to comply with floodplain regulations, the hydraulic conditions for larger event need to be known so that features can be designed to withstand the forces and scour associated with these less common events.

The following recommendations are made for future hydraulic modeling needs in support of the Middle Fork and Coast Fork Willamette Restoration Study:

- Conduct hydrographic surveys to fill in missing channel geometry data in the "Updated Middle-Coast Fork Willamette River HEC-RAS Model" for the following reaches:
    - Between RM 12.113 and RM 14.658 on the Coast Fork within Study Reach C2. This 2.5 mile data gap for channel geometry is documented in Section 4 of this appendix and is a result of the lack of overlap between the two hydrographic surveys that were conducted in 2005 and 2009 (see Table 4 in Section 4.2). Since there are no priority restoration sites in this area, this could be considered a low priority action item.
    - Between RM 195.155 and RM 198.685 in Study Reach M3 of the Middle Fork Willamette River. This 3.5 mile data gap for channel geometry is documented in Section 4.2 of this appendix and in USACE-Portland District (2009).
- Develop a HEC-RAS model that can be used to conduct accurate and detailed hydraulic modeling of flow rates in excess of the bankfull flow conditions. The "Updated Middle-Coast Fork Willamette River HEC-RAS Model" should still be the model used to model flow rates less than or equal to bankfull flows, but a separate high flow HEC-RAS model should be developed. The "Updated Middle-Coast Fork Willamette River HEC-RAS Model" should be used as the starting point for development of this high flow model.

- Conduct a detailed hydraulic modeling study of the with-project and without project conditions under 100-year flood flows using the new high flow model. The results of this study would be used to accurately determine the effect of the priority restoration projects on 100-year water surface elevations and compliance with FEMA floodplain regulations.

8. REFERENCES

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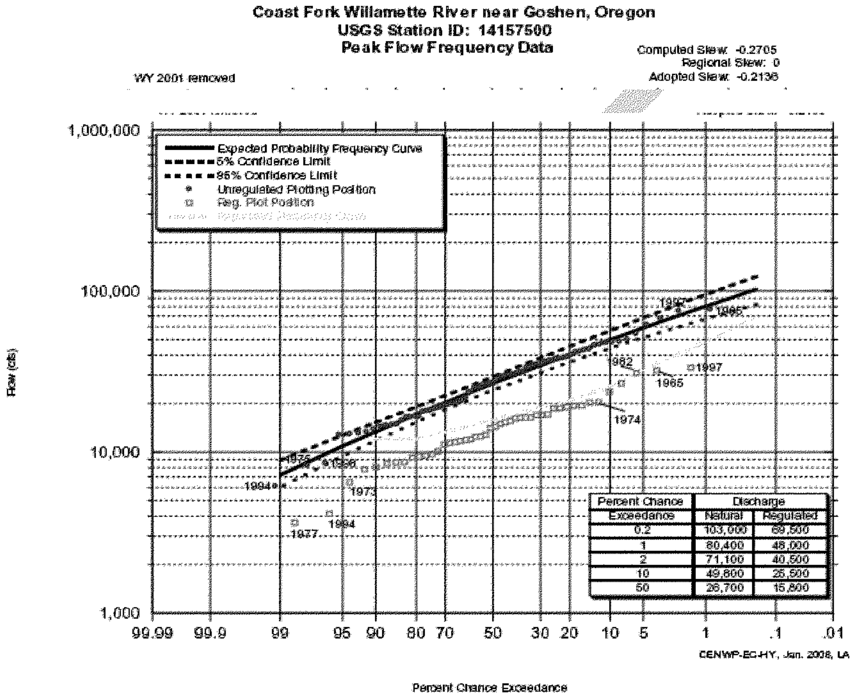
ATTACHMENT A

Flood Frequency Curves

- Coast Fork Willamette River near Goshen (USGS Gage 14157500)
- Middle Fork Willamette River at Jasper (USGS Gage 14152000)
- Coast Fork Willamette River below Cottage Grove (USGS Gage14153500)
- Row River near Cottage Grove (USGS Gage 14155500)
- Middle Fork Willamette River at Lookout Point Dam (USGS Gage 14149000)

Flood Frequency Curve

Coast Fork Willamette River near Goshen
USGS Gage (14157500)

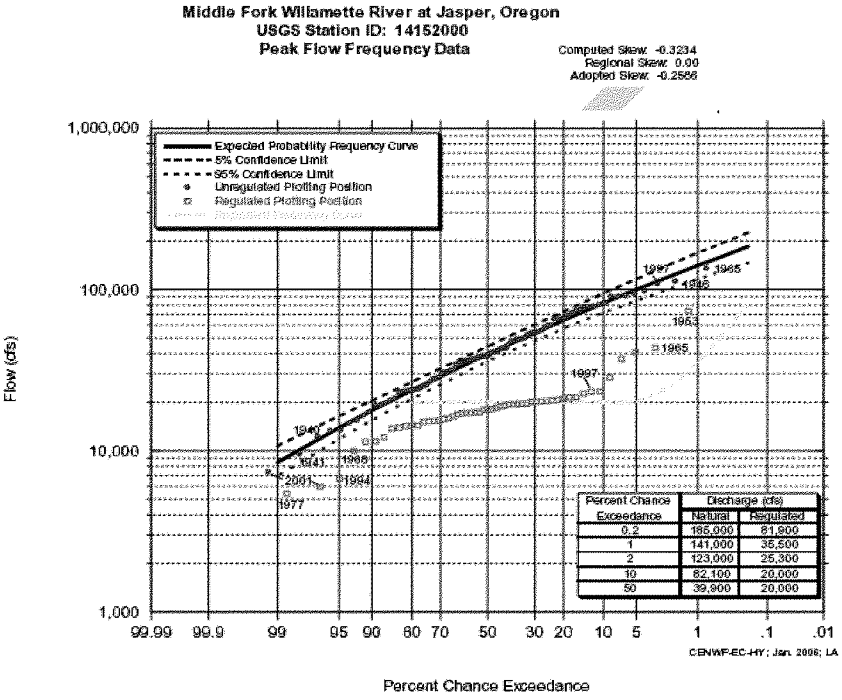


Percent Chance	Discharge	
Exceedance	Natural	Regulated
0.2	103,000	69,500
1	80,400	48,000
2	71,100	40,500
10	49,800	25,500
50	26,700	15,800

Figure 28. Flood frequency (exceedance curves) for the Coast Fork Willamette River at Goshen. Figure courtesy of Chris Nygaard, USACE, Portland, OR.

Flood Frequency Curve

Middle Fork Willamette River at Jasper
USGS Gage (14152000)



Percent Chance Exceedance	Discharge (cfs)	
	Natural	Regulated
0.2	185,000	81,900
1	141,000	35,500
2	123,000	25,300
10	82,100	20,000
50	39,900	20,000

Figure 16. Flood frequency (exceedance curves) for the Middle Fork Willamette River at Jasper. Figure courtesy of Chris Nygaard, USACE, Portland, OR.

Flood Frequency Curves

Coast Fork Willamette River below Cottage Grove
USGS Gage (14153500)

Row River near Cottage Grove
USGS Gage (14155500)

Middle Fork Willamette River at Lookout Point Dam
USGS Gage (14149000)

Coast River Basin

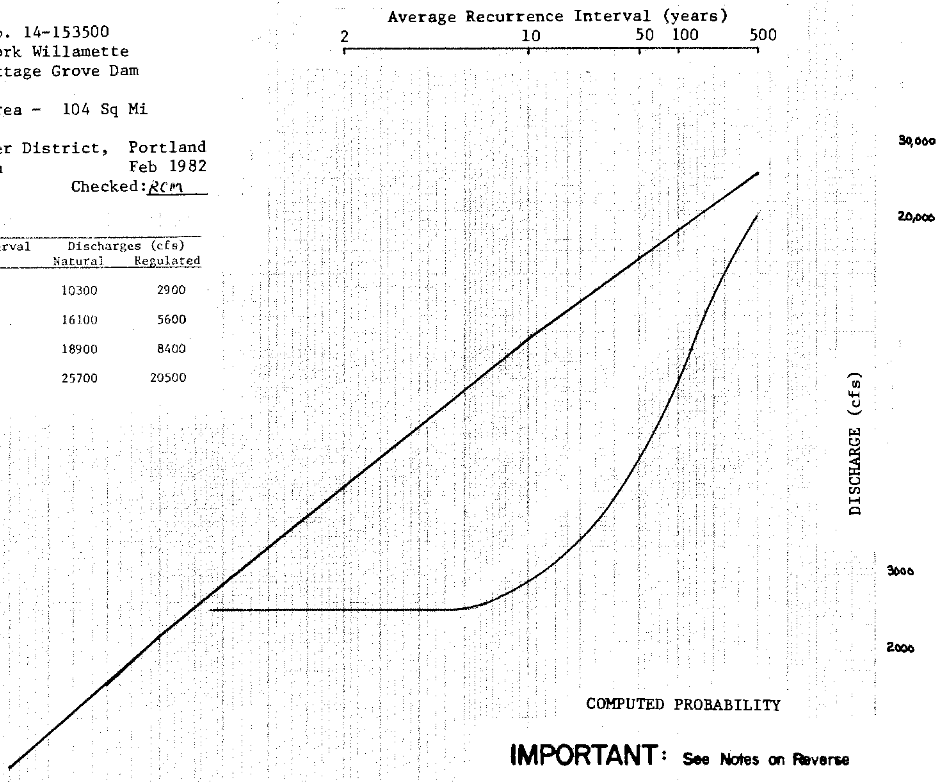
CUMULATIVE FREQUENCY CURVE
MAXIMUM ANNUAL DISCHARGE

USGS No. 14-153500
Coast Fork Willamette
below Cottage Grove Dam

Drainage Area - 104 Sq Mi

U.S. Army Engineer District, Portland
Hydrology Section Feb 1982
By: BJD Checked: RCM

Average Return Interval (years)	Discharges (cfs) Natural	Regulated
10	10300	2900
50	16100	5600
100	18900	8400
500	25700	20500



IMPORTANT: See Notes on Reverse

14-153500 Coast Fork Willamette River below Cottage Grove Dam

1. Period of record 1936-1977 (42years); period 1936-1942 is natural flow from USGS Water Supply Papers; period 1943-1977 is based on drainage area correlation with Coast Fork Willamette at London (D.A. 72.1 Sq Mi)
2. Drainage Area = 104 Square Miles
3. Data obtained from USGS Water Supply Papers.
4. Natural curve developed in accordance with WRC Guidelines using computed probability.
5. This station is regulated by: Cottage Grove Dam
6. Regulated curve based on basin wide flood routing study (HEC-5).

NOTES:

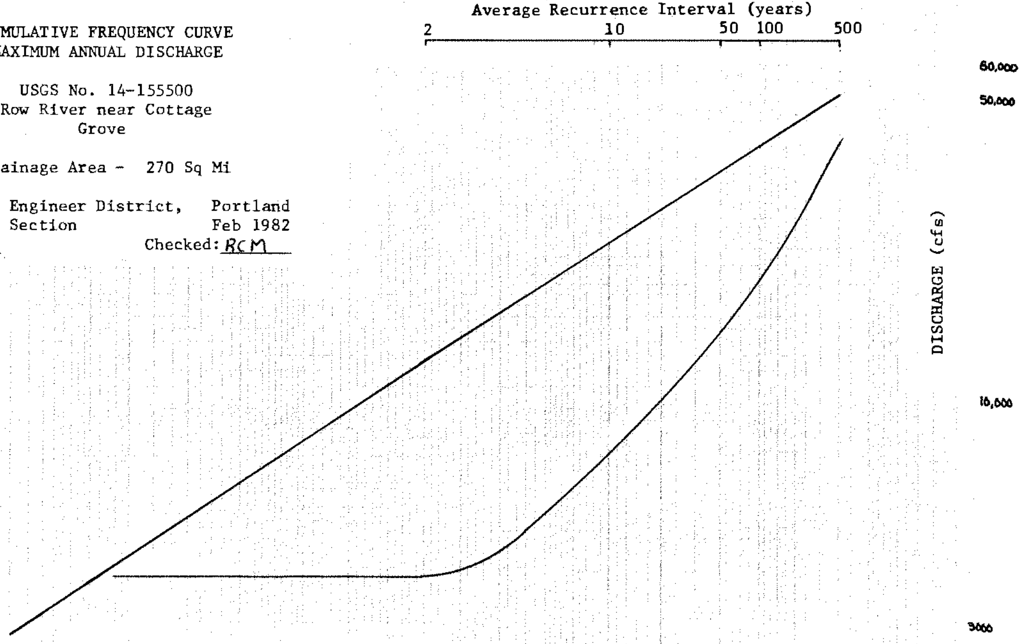
Coast River Basin

CUMULATIVE FREQUENCY CURVE
MAXIMUM ANNUAL DISCHARGE

USGS No. 14-155500
Row River near Cottage
Grove

Drainage Area - 270 Sq Mi

U.S..Army Engineer District, Portland
Hydrology Section Feb 1982
By: BJO Checked: RCM



Average Return Interval (years)	Discharges (cfs) Natural	Regulated
10	23600	7700
50	34800	14700
100	39800	19300
500	52000	40300

COMPUTED PROBABILITY

IMPORTANT: See Notes on Reverse

14-155500 Row River near Cottage Grove

1. Period of record 1939-1949 (11 years); record extended to 41years by correlation with long term station Row River above Pitcher Creek (1936-77).
2. Drainage Area = 270 Square Miles
3. Data obtained from USGS Water Supply Papers.
4. Natural curve developed in accordance with WRC Guidelines using **computed** probability.
5. This station is regulated by: Dorena Dam
6. Regulated curve based on basin wide flood study (HEC-5).

NOTES:

Middle Fork Willamette
River Basin

CUMULATIVE FREQUENCY CURVE
MAXIMUM ANNUAL DISCHARGE

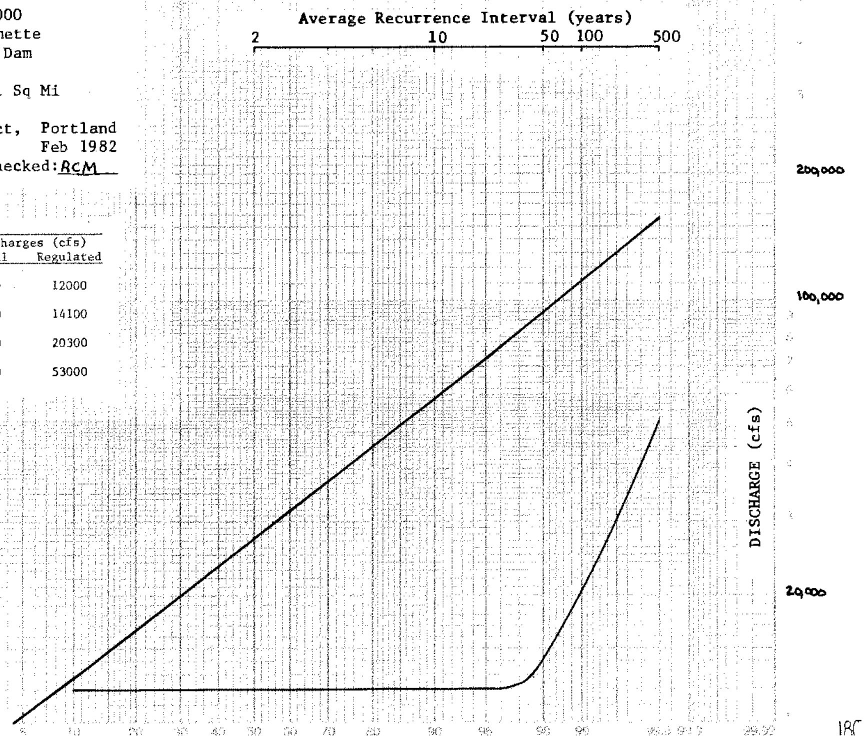
USGS No. 14-149000
Middle Fork Willamette
at Lookout Point Dam

Drainage Area - 991 Sq Mi

U.S. Army Engineer District, Portland
Hydrology Section Feb 1982
By: BJD Checked: RCM

Average Return Interval (years)	Discharges (cfs)	
	Natural	Regulated
10	58700	12000
50	93700	14100
100	111000	20300
500	155000	53000

IMPORTANT: See Notes on Reverse



14-149000 Middle Fork Willamette at Lookout Point Dam

1. Period of record 1924-1974 (51 years); period 1924-1950 obtained by drainage area ratio with Middle Fork Willamette River at Eula (D.A. = 941 Sq Mi); period 1951-1974 obtained by drainage area ratio with Middle Fork Willamette River below North Fork (D.A. = 924 Sq Mi).
2. Drainage Area = 991 Square Miles
3. Data obtained from USGS Water Supply Papers.
4. Natural curve developed in accordance with WRC Guidelines using **computed** probability.
5. This station is regulated by: Hills Creek Dam
   Lookout Point Dam
6. Regulated curve based on basin wide flood routing study (HEC-5)

NOTES:

ATTACHMENT B

Willamette Floodplain Middle Fork and Coast Fork RAS Model

Summary of Modeling to Date (April 2009)

Prepared by USACE-Portland District

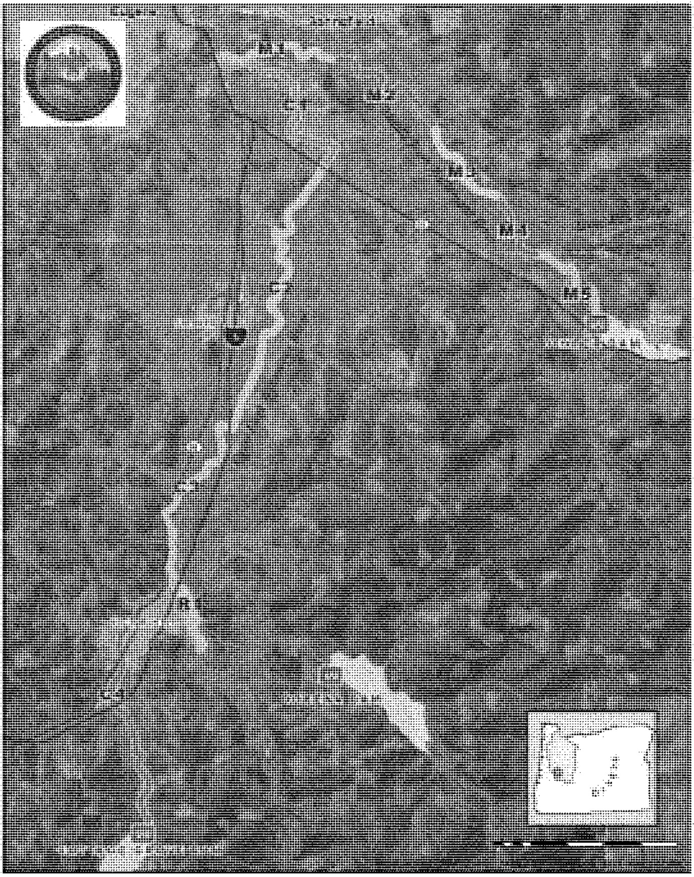
Willamette Floodplain Middle Fork and Coast Fork RAS Model
Summary of Modeling to Date (April 2009)

1.0 Introduction

1.1 Overview

The purpose of the Willamette River Floodplain Restoration (WFPR) Feasibility Study is to improve flood storage and restore natural floodplain function along the Willamette River and its tributaries. The study emphasizes the identification of opportunities for restoration of aquatic and riparian ecosystems, recovery of proposed and listed threatened and endangered species, flood damage reduction, and improvement of water quality. Key areas of the initial pilot study include the Coast and Middle Forks Willamette River. The study area and reach designation is shown in Figure 1.

Figure 1. Coast Fork and Middle Fork with Reaches Delineated



1.2 General Modeling Approach

The combined Middle Fork-Coast Fork steady-state HEC-RAS model was designed to accurately estimate water surface profiles in the channel for bankfull and near-bankfull conditions. The model was not designed to be a flood model capable of accurately modeling the large out-of-bank events and would require significant alteration to do so. The model is intended to determine floodplain areas along the modeled reaches that have potential for reconnection to the main channel. Because the model utilized ineffective flow areas to limit conveyance, the model should only be used in steady state. In order to complete the feasibility study, the RAS model will be used to understand the connectivity with the side channels as well as verify stages and velocities necessary for the 30% design.

Since the hydraulic modeling effort was quite large, the data collection and HEC-RAS model development was done in pieces over the past several years. Key dates for the data collection and model development are listed below in Table 1:

Table 1. Key Milestones in RAS Model Development

Reach		Date	POC
M1-M5 and C1-C4 and R1	Ortho photo density DTM	2004	LCOG – 3Di West
M3-M5*, portion of C2	Hydrosurvey	2005	Parametrix
M1, M2, portion of C1	Hydrosurvey	2007	Tetra Tech
M1, M2, portion of C1	RAS model	2007	Tetra Tech
Remainder of C1	Hydrosurvey	2008	Thomas Wright and Assoc

* The M3 portion of this hydrosurvey below the confluence of Fall Creek and the Middle Fork was not usable and efforts to correct the problems in 2009 were unsuccessful. Estimated bathymetry is noted in the model geometry.

2.0 Hydraulics and Hydrology

2.1 Model Development

The RAS model was constructed in phases as the necessary data was collected. These model pieces were merged together. Tetra Tech developed the RAS model for Reaches M1,M2 and a portion of C1 under a contract for the Corps. Their model documentation is attached for reference and their model was incorporated into the larger model.

A FEMA Flood Insurance Study (FIS) model was developed in the 1970’s for use analyzing the 1 percent exceedance flows (100-year flood flows). The WFPR Product Delivery Team (PDT) determined that this model was too course to be used for the feasibility design. New overbank and hydrosurvey data was collected to create the WFPR model.

2.2 Channel Geometry

The RAS model terrain TIN was produced by combining the DTM data with the bathymetry data. HEC-RAS cross sections were located at each of the cross section transects and cut from this TIN. Cross sections in the model were drawn valley-wise to in order to demonstrate the potential for hydraulic connection at bankfull flows. Nearly all of the off-channel features are disconnected. The model uses ineffective flow areas to limit conveyance in these features, as opposed to utilizing levees or blocked areas. This was done to facilitate mapping of the potential areas for reconnection and aid in the selection of restoration alternatives. An example of this mapping is shown in Figure 2.

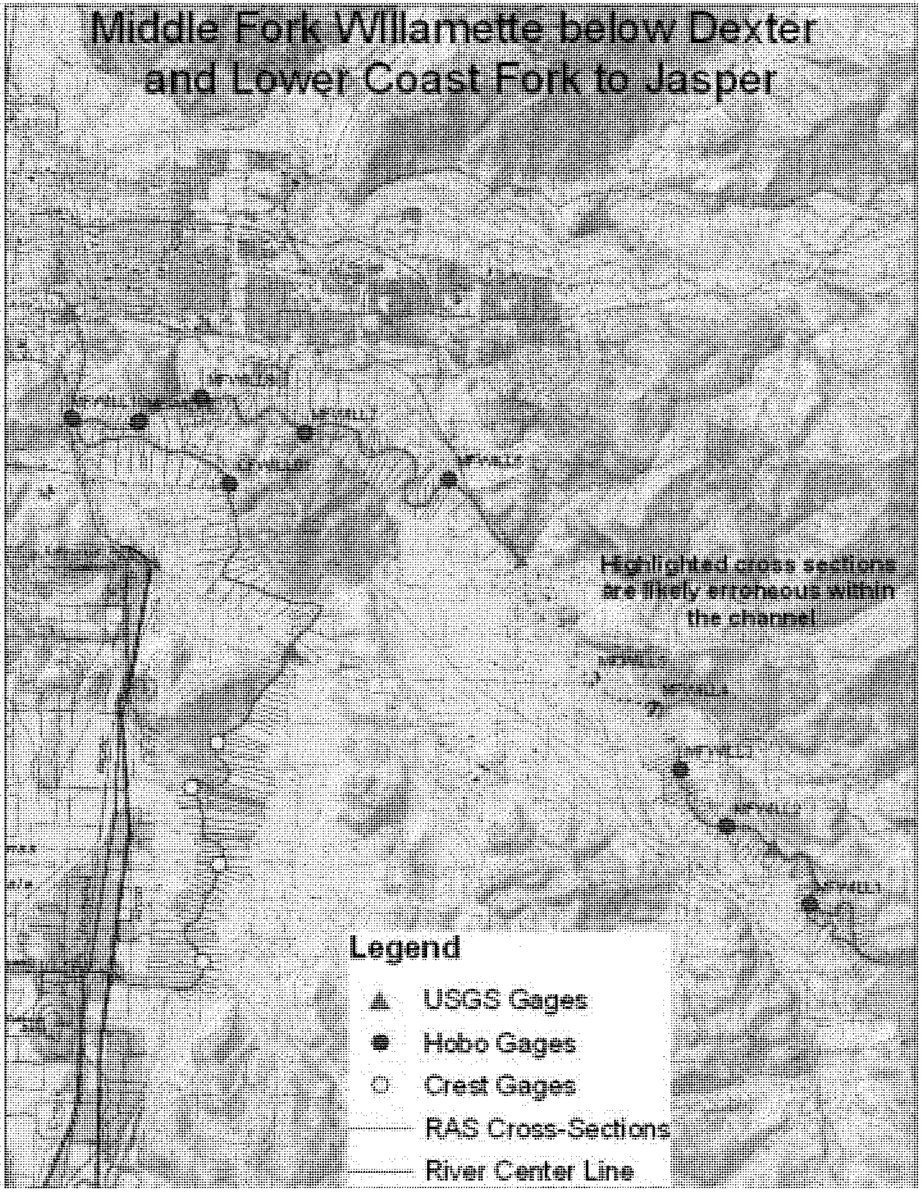
Flow splits are not included in this model. There are two large flow splits in the FEMA FIS model: one occurs on the Coast Fork Left Bank upstream of Highway 58 and is rather complex; the other split is on the Middle Fork Right Bank exiting the channel at approx RM 193.5. This model could be useful for determining at what flows the Coast Fork split occurs. The Middle Fork split potentially occurs near bankfull and should be investigated. This particular area is highly modified with roadways, ponds and likely culverts and will be complicated to sort out the flowpaths.

It is recommended to utilize the model up to a bankfull flow to determine if there is potential to make a reconnection with the floodplain features. The model could then be modified to more accurately depict the split (likely a lateral structure with a slot or culvert) to control water leaving the channel and a new reach downstream representing the flow split through the reconnection feature. The existing cross sections will need to be modified to allow for the new reach. Scaling up to analyze large flood flows will be project specific and this model may have some use, but that will need to be carefully determined on a case by case basis.

The 2005 hydrosurvey data was not usable in Reach M3 between river stations 195.155 and 198.685. The cross sections were modified to a trapezoidal channel to make it obvious to modelers that they do not reflect actual bathymetry. Efforts to contact the contractor were unsuccessful and if restoration sites are identified in this reach, additional surveys will be required. The model in this reach has an estimated channel depth and should not be considered accurate.

Bridge data is not entered for any reach. For bankfull flows, it is not expected that bridges on the Middle Fork will have a significant impact on water surface. Bridges on the Coast Fork should be considered. Data exists for the 4 known bridges.

Figure 2. WFPR HEC-RAS model Geometry and Gage Location Map



2.3 Model Parameters

Ineffective Flow Areas. Ineffective flow areas were placed largely based on terrain features with some logic based on the test flows. They may need to be adjusted to accurately model a different flow and should be looked at during further development. The terrain data can be useful in this effort as many depressions are not connected either upstream or downstream and do not have conveyance at any flow. Additionally, some secondary channels continue many sections downstream. Ineffective areas were set to allow a continuation of flow in the channel/secondary channel; however a different main stem input flow may prove the location of the ineffective threshold to be inaccurate and the downstream logic to fail. Not all secondary channels were approached in this manner; as a bankfull model, channels that would become active only at larger flood flows were permanently blocked with ineffective areas. There may be cases where flow splits could/should be used if refinement is warranted.

Flow Data and Boundary Conditions. This model was developed for use up to bank full conditions. At the USGS gage 1415200 Middle Fork Willamette River at Jasper, OR this corresponds to a flow of 20,000 cfs and a stage of 9.4 ft. On the Coast Fork at USGS gage 14157500 Coast Fork Willamette River near Goshen, OR this corresponds to a flow of 12,000 cfs and a stage of 11.7 ft.

Model Calibration. No calibration has been done on reaches other than Middle_Fork, Below_Dexter_1 RM 187.566 and 193.564, which is imported as delivered from Tetra Tech. Tetra Tech also built the lower portion of the Coast Fork Reach, however many of the cross sections were recut to match the overbank modeling approach utilized in the rest of the Coast Fork reaches and should be calibrated.

Data collected for calibration is included in the spreadsheet titled Calibration_Data.xls. The Corps installed 10 recording stage gages (8 hobos and 2 Sutron gages) located throughout the Middle Fork and lower Coast Fork (reach CF1) for this modeling effort. A crest gage program is in effect under the Corps Flood Plain Management Services (FPMS) program. Four crest gages are located on the Coast Fork and readings from these gages are included in the spreadsheet. In addition, three USGS real-time stream gages reside within the geographic area of the model. These include the following USGS Gages:

- 14152000 MIDDLE FORK WILLAMETTE RIVER AT JASPER, OR ;
- 14150000 MIDDLE FORK WILLAMETTE RIVER NEAR DEXTER, OR
- 14157500 COAST FORK WILLAMETTE RIVER NEAR GOSHEN, OR

Model Limitations. As mentioned in the Tetra Tech write-up of their Middle Fork model, the Confluence of the MF and CF is very complicated and is probably not adequately modeled. Some additional work, potentially including hydrosurvey, would be required to consider model results near the confluence accurate. It is likely that a two-dimensional model would be required to fully understand the hydrodynamics at the confluence.

Likewise, the confluence of Fall Creek and the Middle Fork may require additional work (this is within the area of inaccurate hydrosurvey) for some bankfull uses. Flow splits as well as the addition of the lower portion of Fall Creek may be required to analyze a potential restoration project in addition to accurate bathymetric survey.

The upper end of the Coast Fork model starts at the Creswell Bridge. A known flow split occurs upstream of the bridge with water flowing over the left bank, crossing the roadway associated with the bridge and flowing adjacent/through the community. This split reportedly occurred during the most recent flooding in Dec 2005 to Jan 2006. The model does not extend upstream far enough to accurately depict the split or the resultant flooding on the left bank downstream of the bridge. A flow split and additional upstream sections would be required to more accurately model this area.

There was no hydrosurvey data for the left side of the split modeled at Middle_Fork, Below_Dexter_2L. A depth was estimated from the photography. Modelers are advised to use caution in this area. Lateral structures connecting the flow split across the island may be necessary if additional refinement is warranted in this area.

TETRA TECH

MEMORANDUM

TO:	Mr. Michael Ott U.S. Army Corps of Engineers, Portland District
FROM:	Marc A. Schulte
SUBJECT:	**Revised HEC-RAS Geometry, Willamette River near Springfield, OR**
Cc:	Merri Martz (Tetra Tech)
Tt PROJECT No:	T-21232
DATE:	February 26, 2008

This memorandum summarizes Tetra Tech's efforts to update the geometry of the hydraulic model of the Willamette River near Springfield, Oregon. The Corps transmitted the original HEC-RAS hydraulic model geometry to Tetra Tech on January 28, 2008. The updates were developed using HEC-RAS v.3.1.3 and the HEC-GeoRAS ArcGIS extension.

The revised HEC-RAS model geometry currently represents changes to the model geometry only, with assumptions made with the aid of the previous hydraulic model, aerial photographs, and available topographic maps and data. We recommend that the Corps review the geometry prior to applying it to any hydraulic analyses.

Cross-Section Geometry

The HEC-RAS model was developed using two primary data sources:

- Fall 2007 Hydrographic and Topographic Survey Data (USACE, 2007)
- 2004 Digital Elevation Model (DEM) from Lane Council of Governments (LCOG) Photogrammetry/Ortho Data Set

Cross-sections in the HEC-RAS hydraulic model transmitted to Tetra Tech did not correspond to the locations and cross-sections in the hydrographic survey performed in the fall of 2007. Therefore, Tetra Tech replaced the cross-sections in the previous HEC-RAS hydraulic model through the surveyed reaches with cross-sections based on the 2007 survey locations, supplemented by DEM data. The replacement HEC-RAS cross-sections extend from just below the confluence of the Middle and Coast Forks (XS 59246), to approximately 4.5 miles upstream on the Coast Fork (XS 23653) and approximately 7.1 miles upstream on the Middle Fork (XS 37622).[1] The attached figure (Figure 1) summarizes the cross-sections in the updated portion of the HEC RAS model.

New HEC-RAS cross-sections are located at each 2007 survey cross-section transect. We combined the DEM data and the 2007 survey points (including bathymetry) into a single TIN surface, from which we cut cross-sections with GeoRAS. In this way, the new cross-sections effectively capture both channel geometry with the ground survey and bathymetry data, and floodplain geometry with ground survey and

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[1] Cross-section (XS) numbers in this memorandum correspond to the cross-section stationing in the revised HEC-RAS model.

DEM data. We compared the area and conveyance ($AR^{2/3}$) of selected TIN-generated cross-sections and the original surveyed cross-sections to ensure that no significant hydraulic discrepancies were introduced to the model through this process.

On the Coast Fork, surveyed cross-sections were relatively widely-spaced (XS 12612, XS 18419, and XS 23653). We located HEC RAS cross-sections at regular intervals (approximately 1000 feet) between these surveyed cross-sections more consistent with cross-section spacing in other parts of the hydraulic model. Inspection of these intermediate cross-sections revealed that the TIN was not adequate to capture the channel geometry. Therefore, we used the survey data and HEC-RAS to interpolate "channel only" cross-sections, which were then visually fit and hard-coded into the overall TIN cross-section. The result was a composite section that should better represent both the channel and floodplain on the reach.

We added one interpolated cross-section on the Middle Fork Reach (XS 1279.37). This section represents the HEC-RAS interpolation from adjacent cross-sections, which were both developed from the TIN combining survey and DEM data points.

Manning Roughness Coefficients

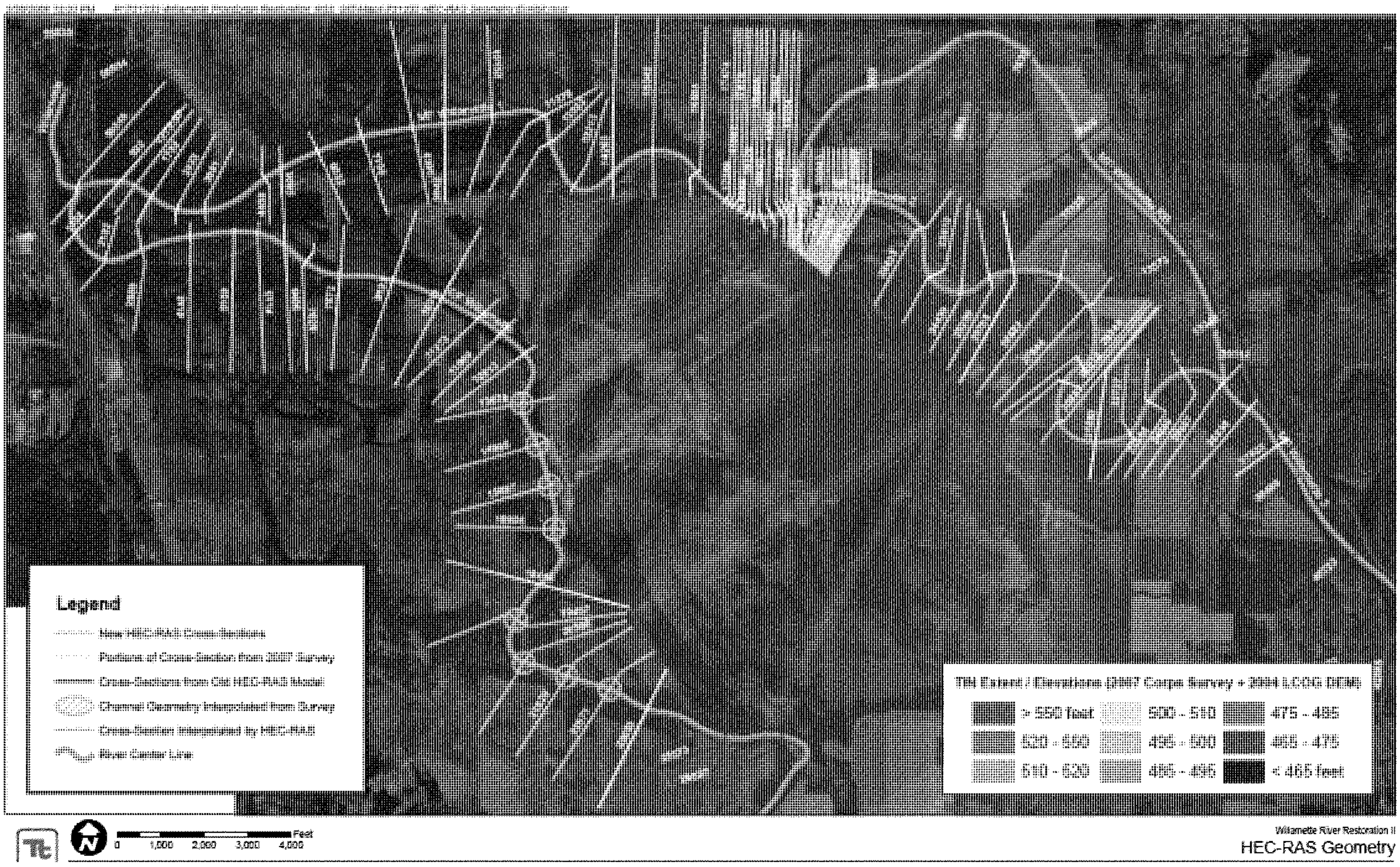
Tetra Tech assigned Manning roughness coefficients to the new cross-sections. These roughness values attempt to mimic the Manning roughness coefficients found in the original HEC-RAS model. The channel Manning roughness coefficient on the revised reach of the Coast Fork was n=0.045, and ranged between n=0.040 and n=0.045 on revised reaches of the Middle Fork. Overbank Manning roughness values ranged between n=0.070 and n=0.075 on the revised reach of Coast Fork and between n=0.050 to n=0.080 on the revised Middle Fork reaches. These roughness coefficients seem reasonable, but the Corps may want to review and/or revise the assigned Manning roughness values before applying the model geometry to hydraulic analyses. We would recommend a calibration of the channel roughness coefficients with the water surface elevations measured during the 2007 survey if possible.

Blocked and Ineffective Flow Areas

Tetra Tech assigned blocked and ineffective flow areas to mimic the blocked and ineffective flow areas in the previous HEC-RAS model. For example, we assigned is blocked flow to the left overbank of the Middle Fork XS 9042. Similar to the existing HEC RAS model, no ineffective flow areas were assigned on the Coast Fork. The Corps may want to review and/or revise the assigned blocked and ineffective flow areas in the before applying the model geometry to hydraulic analyses.

Confluence Hydraulics

It is apparent from the cross-section data that the confluence of the Middle and Coast Forks is more complex than currently suggested in the HEC RAS model. At higher flow rates, the two branches may be hydraulically connected for more than 0.5 miles upstream from the confluence (approximately to Middle Fork XS 3081 and Coast Fork XS 4140). We suggest that a more sophisticated simulation of the confluence, might be appropriate, depending on the ultimate application of the model. If the goal is to construct a model for flood routing applications, the confluence might be modeled in HEC-RAS with lateral structures to allow a hydraulic connection between the two reaches at higher flow rates. For a more precise evaluation of inundation limits at the confluence, a two-dimensional model might be considered. The Corps may want to review and/or revise the simulation of the confluence hydraulics before applying the model geometry to hydraulic analyses.


Legend
New HEC-RAS Cross-Sections
Portions of Cross-Section from 2007 Survey
Cross-Sections from Old HEC-RAS Model
Channel Geometry Interpolated from Survey
Cross-Section Interpolated by HEC-RAS
River Center Line
TIN Extent / Elevations (2007 Corps Survey + 2004 LCOG DEM)
> 550 feet
520 - 550
510 - 520
500 - 510
495 - 500
485 - 495
475 - 485
465 - 475
< 465 feet
Feet
0
1,000
2,000
3,000
4,000
Willamette River Restoration II
HEC-RAS Geometry

ATTACHMENT C

HEC-RAS Model Cross Section Locations

Figure 1 – HEC-RAS Model Cross Section Locations - Study Reaches M1 and C1

Figure 2 – HEC-RAS Model Cross Section Locations - Study Reach C2

Figure 3 – HEC-RAS Model Cross Section Locations - Study Reach C3

Figure 4 – HEC-RAS Model Cross Section Locations - Study Reach R1

Figure 5 – HEC-RAS Model Cross Section Locations - Study Reach M2

Figure 6 – HEC-RAS Model Cross Section Locations - Study Reach M3

Figure 7 – HEC-RAS Model Cross Section Locations - Study Reach M4

Figure 8 – HEC-RAS Model Cross Section Locations - Study Reach M5

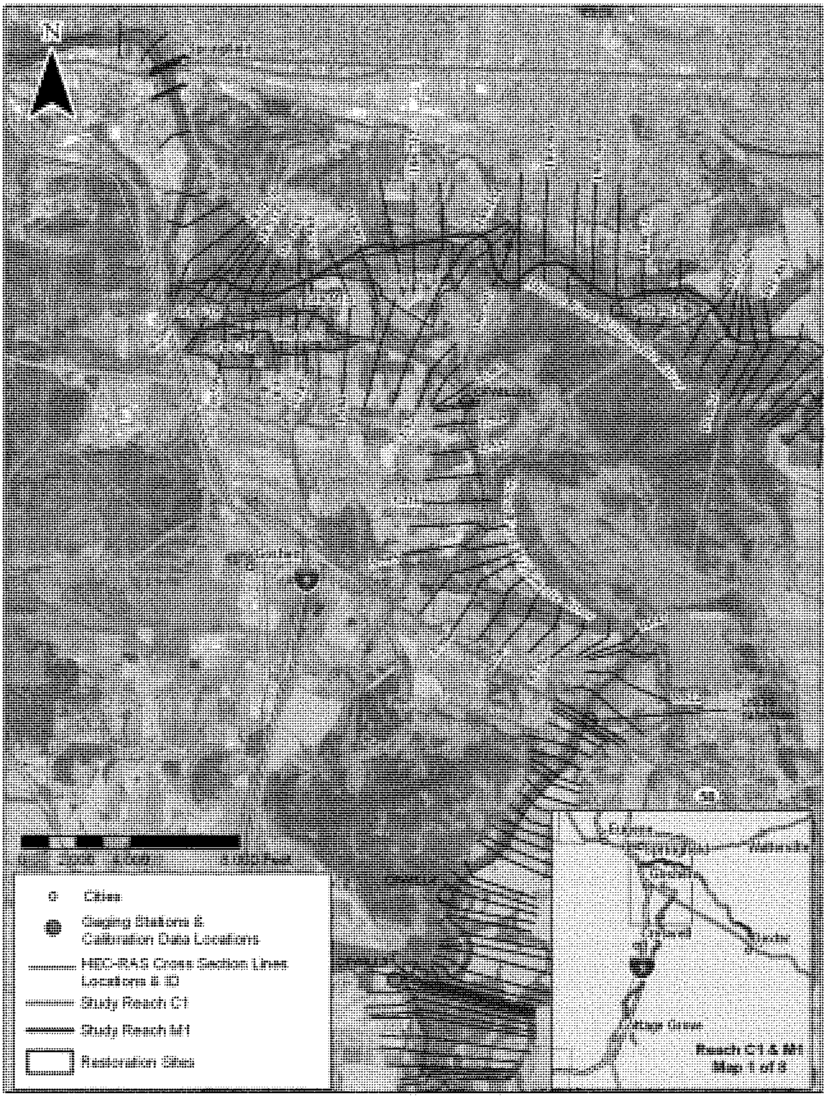


Figure 1. HEC-RAS Model Cross Section Locations - Study Reaches M1 and C1

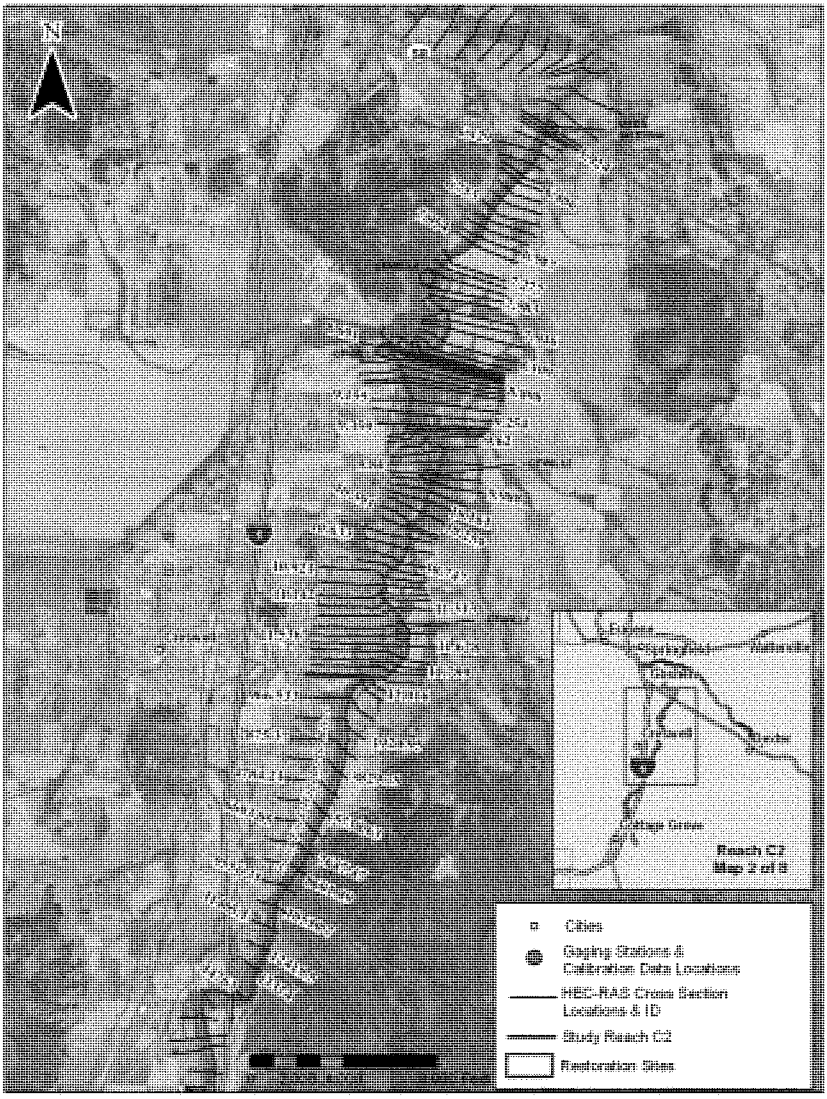


Figure 2. HEC-RAS Model Cross Section Locations - Study Reach C2

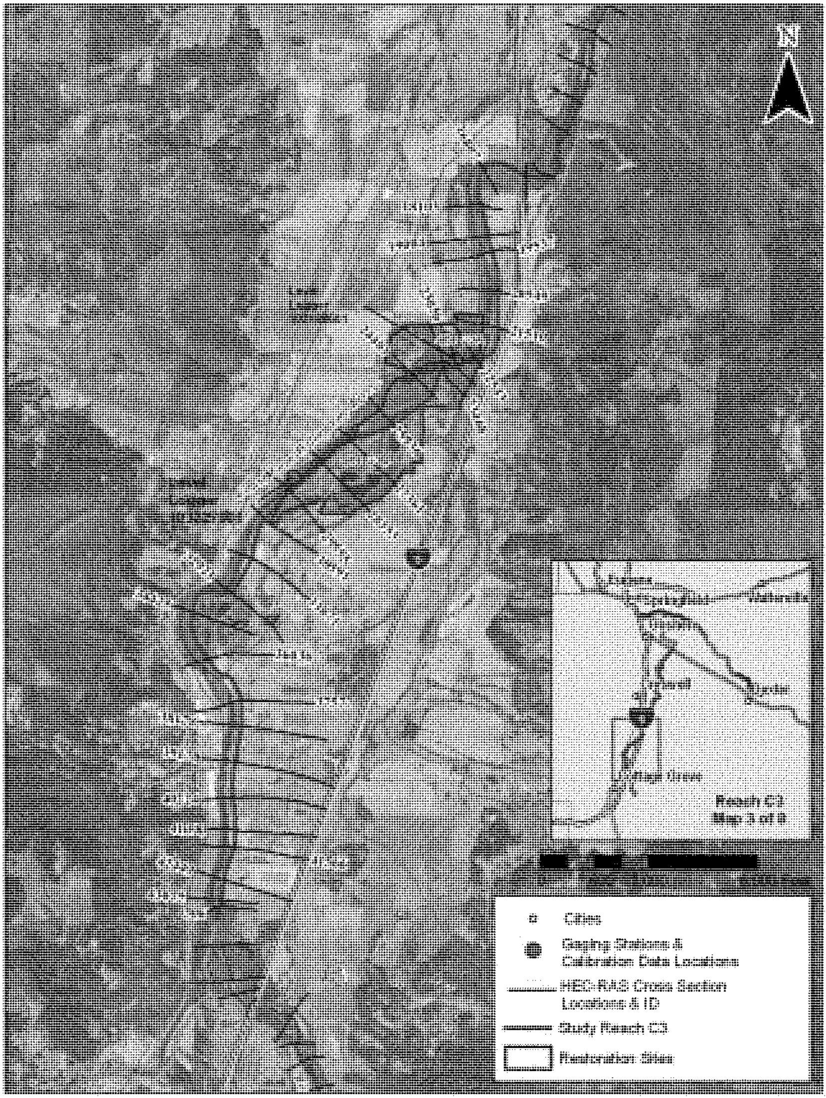


Figure 3. HEC-RAS Model Cross Section Locations - Study Reach C3

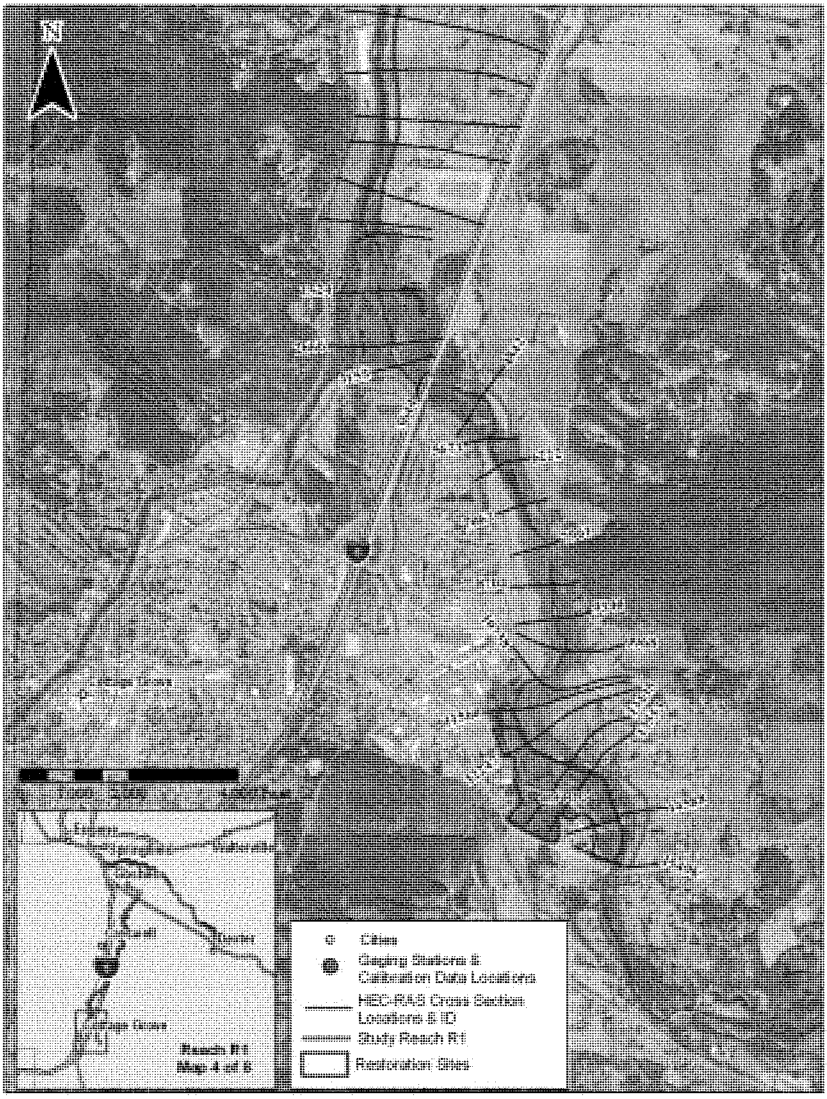


Figure 4. HEC-RAS Model Cross Section Locations - Study Reach R1

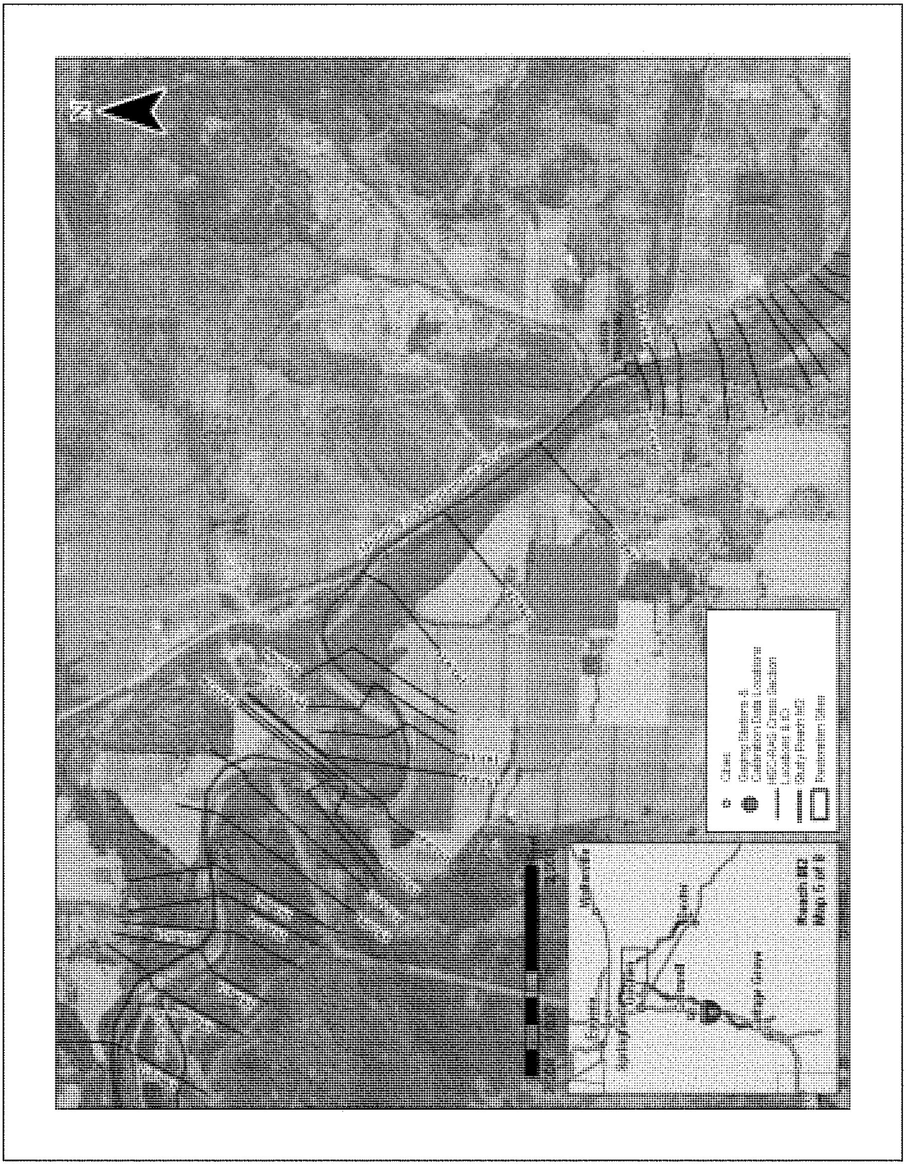


Figure 5. HEC-RAS Model Cross Section Locations - Study Reach M2

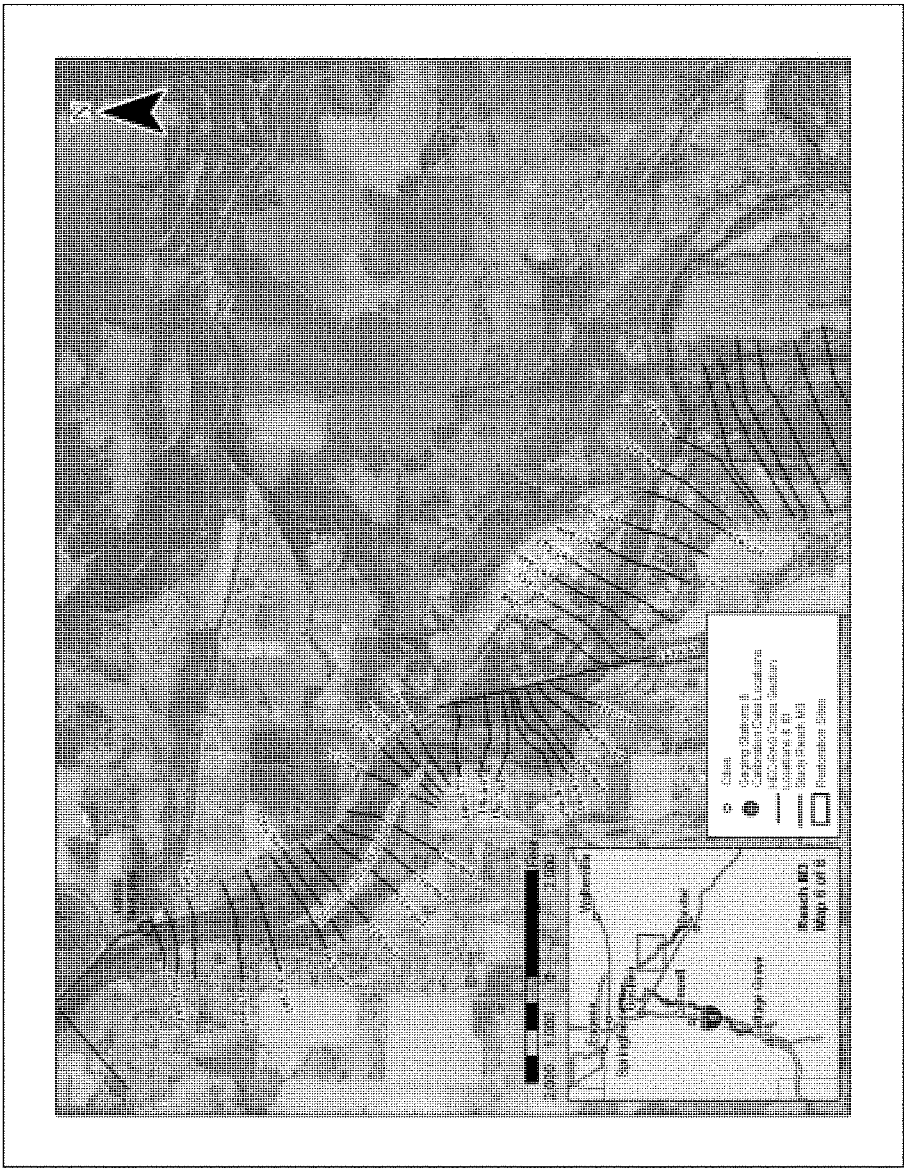


Figure 6. HEC-RAS Model Cross Section Locations - Study Reach M3

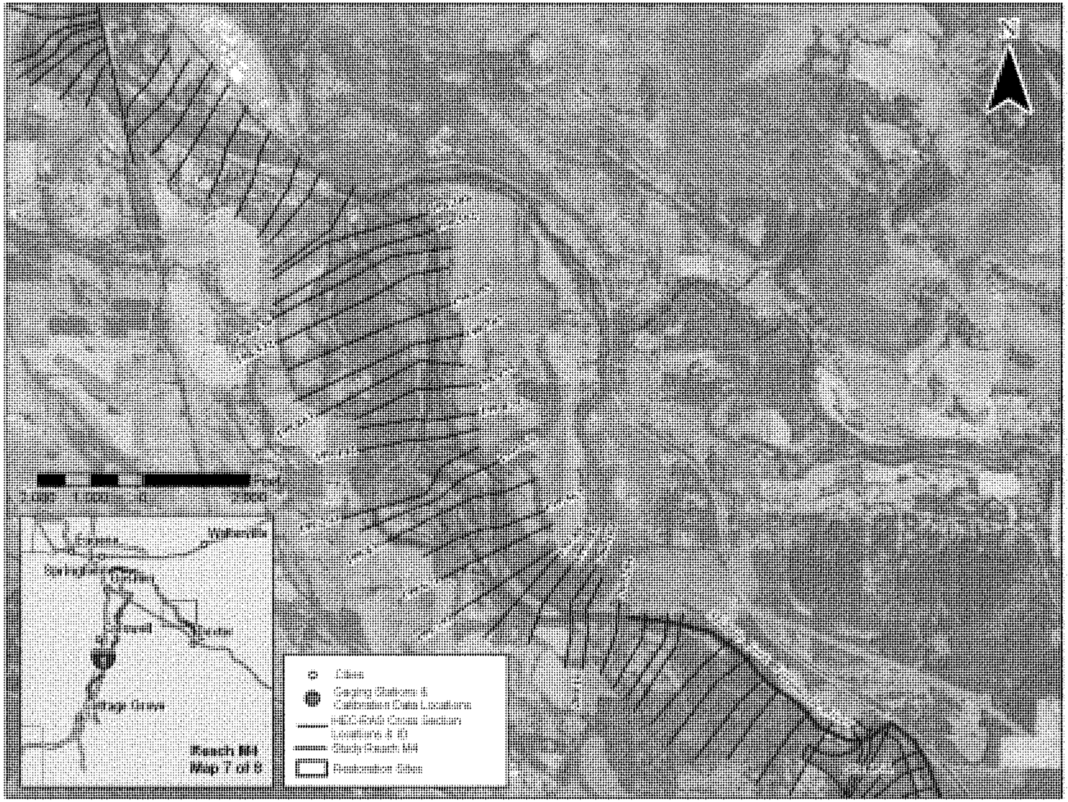


Figure 7. HEC-RAS Model Cross Section Locations - Study Reach M4

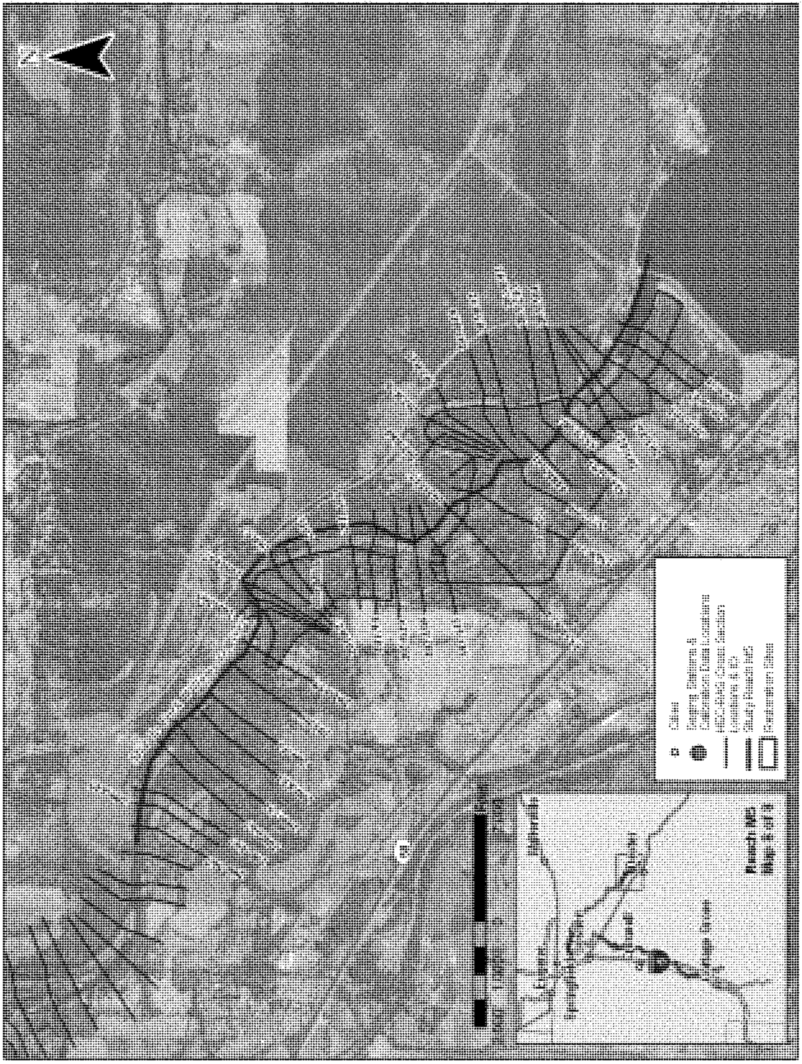


Figure 8. HEC-RAS Model Cross Section Locations - Study Reach M5

U.S. Army Corps
of Engineers
Portland District

Willamette River Floodplain Restoration, Oregon
Integrated Feasibility Report/Environmental Assessment

Lower Coast and Middle Fork Willamette River Subbasins

VOLUME 3: APPENDIX F

November 2013

Prepared by:

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APPENDIX F: Design and Engineering

November 2013

US Army Corps of Engineers ®
Portland District

WILLAMETTE FLOODPLAIN RESTORATION STUDY

DESIGN AND ENGINEERING APPENDIX

June 2013

TETRA TECH

WILLAMETTE FLOODPLAIN RESTORATION STUDY

DESIGN NARRATIVE

1. Project Description

A. General: The project is located in and upstream of Eugene, Oregon along the lower Coast Fork and Middle Fork Willamette Rivers. A total of five separate sites are included in the recommended plan, hereafter referred to as sites C1B, C1C, M1A, M1B, and M2A. All of the sites are accessible via existing paved public roadways, or via gravel roadways located on the sites. All five sites have been previously used in the past for gravel mining and are accessible for trucks and heavy equipment.

B. Design Features: Features include grading on site to move excess piles of aggregate and soil into existing gravel mined ponds to create shallow water habitat and reduce bank slopes to approximately 4:1; excavation of connector channels between ponds and between ponds and the rivers; removal of debris and riprap; installation of engineered log jams (ELJs) on bars/islands or banks within the rivers; grading to provide suitable planting surfaces; removal of invasive plant species; plantings of native riparian and wetland species; and placement of loose large wood in floodplain areas.

2. Basis of Design

A. Base Mapping. Feasibility level designs were done in MicroStation Version 8 and In-Roads software. One foot contour topographic survey data was obtained from the City of Eugene 2009 LiDAR. Digital orthophotography was obtained from the Lane Council of Governments, 2008. Bathymetric data for the Coast and Middle Forks was obtained from the Corps of Engineers, March and December 2006. Parcel data was obtained from the City of Eugene GIS department, 2010. All mapping is projected to NAD 83 HARN, State Plane Oregon South, Units are U.S. International Feet. All elevations are relative to NAVD 88 in units of feet.

B. Basis of Quantities: The cost estimate is based on project quantity take-offs that have been calculated from the design drawings prepared for the recommended plan and are included at the end of this appendix. Elevations for channel excavation were developed based on the hydraulic modeling conducted for the project to provide connections to the ponds and other off-channel habitat features during the winter/spring seasons to provide rearing and refuge habitat for salmonids. Quantities were calculated using InRoads three-dimensional surfaces and checked with end area hand calculations.

Site	Regrade Onsite	Channel Excavation	Bank-Type ELJ	River-Type ELJ	LWD	Revegetation	Total Project Area
	SY	CY	#	#	# pieces	AC	AC
C1B	46,944	5,146.3	0	1	909.8	74.3	90.98
C1C	22,821	10,502.7	0	2	832.3	73.8	83.23
M1A	36,450	9,645.7	2	0	1479.3	120.23	147.93
M1B	120,227	20,151.8	0	0	1704.2	90.69	170.42
M2A	0	0	0	0	765.2	49.3	76.52

C. Imported Materials. Imported materials will primarily include large rock, bedding material for culverts/bridges, and large wood. All of these materials would be obtained from commercial sources in the Lane County area. Gravel and cobble material would be sourced from on-site piles of aggregate and excavated materials. Top soil would be sourced from on-site piles and excavated materials.

3. Soil and Geotechnical Data

A. Soils Data. The Lane County Soil Survey (SCS 1981) data was reviewed to identify soil types present on each site. A summary is provided by each site below.

1) Site C1B. Soils mapped on Site C1B include Cloquato silt loam, fluvents, McBee silty clay loam, and Newberg fine sandy loam.
2) Site C1C. Soils mapped on Site C1C include primarily fluvents.
3) Site C3A. Soils mapped on Site C3A include Camas gravelly sandy loam, Malabon silty clay loam, Newberg loam, pits and riverwash.
4) Site C3B. Soils mapped on Site C3B include Camas gravelly sandy loam, Chehalis silty clay loam, Cloquato silt loam, McBee silty clay loam, and pits.
5) Site M1A. Soils mapped on Site M1A include Chehalis silty clay loam, Cloquato silt loam, and Newberg fine sandy loam.
6) Site M1B. Soils mapped on Site M1B include Camas gravelly sandy loam, McBee silty clay loam, Newberg fine sandy loam, Newberg loam, and pits.
7) Site M2A. Soils mapped on Site M2A include fluvents and riverwash.

Soil descriptions are as follows.

Camas gravelly sandy loam, occasionally flooded. This is a deep, excessively drained soil on bottom lands formed from recent sandy and gravelly alluvium. The surface layer is typically gravelly sandy loam about 14 inches thick; the substratum to a depth of 60 inches or more is very gravelly sand. Permeability is very rapid, runoff is slow and hazard of erosion is slight during periods of overflow from nearby streams. Subject to occasional, brief periods of flooding from November to May.

Chehalis silty clay loam, occasionally flooded. This is a deep, well drained soil on floodplains formed from recent mixed alluvium. The surface layer is typically silty clay loam about 13 inches thick; the subsoil is silty clay loam about 42 inches thick; the substratum to a depth of 70 inches is silt loam. Permeability is moderate, runoff is slow, and hazard of erosion is slight. Subject to occasional flooding from November to March.

Cloquato silt loam. This is a deep, well drained soil on floodplains formed from recent mixed alluvium. The surface layer is typically silt loam about 14 inches thick, the next layer is silt loam about 19 inches thick, the upper 17 inches of the substratum is silt loam and the lower part to a depth of 60 inches or more is sand. Permeability is moderate, runoff is slow, and the hazard of erosion is slight. Subject to occasional, very brief periods of flooding from November to March.

Fluvents, nearly level. These deep, well drained to poorly drained soils are on islands and low floodplains and in overflow channels, oxbows, and sloughs along major rivers and streams; formed from recently deposited sediment from mixed sources. Fluvents are highly stratified sand, silt, and gravel to a depth of 40 to 60 inches or more; substratum is loose, open gravel or gravelly loamy sand. Permeability is moderate to very rapid, runoff is slow, and hazard of erosion is slight except during flood events.

Malabon silty clay loam. This is a deep, well drained soil on broad valley terraces formed in silty and clayey alluvium. The surface is typically silty clay loam about 12 inches thick; the subsoil is silty clay loam and silty clay about 30 inches thick; the substratum is clay loam to a depth of 60 inches or more. Stratified sand and gravel are at a depth of 40 inches or more in some areas. Permeability is moderately slow, runoff is slow, and the hazard of water erosion is slight.

McBee silty clay loam. This is a deep, moderately well drained soil on floodplain formed in recent mixed alluvium. The surface is typically silty clay loam about 24 inches thick; the subsoil is silt loam about 17 inches thick; the substratum to a depth of 62 inches is silt loam. Permeability is moderate, runoff is slow, and the hazard of water erosion is moderate. Subject to frequent, brief periods of flooding from November to May.

Newberg fine sandy loam. This is a deep, somewhat excessively drained soil on floodplains formed in recent alluvium. The surface is typically fine sandy loam about 14 inches thick; the substratum to a depth of 65 inches is fine sandy loam and coarse sandy loam. Permeability is moderately rapid, runoff is slow, and the hazard of water erosion is slight. The soil is occasionally flooded for brief periods from December to March.

Newberg loam. This is a deep, somewhat excessively drained soil on floodplains formed in recent silty alluvium. The surface layer is typically loam about 14 inches thick; the substratum to a depth of 65 inches is fine sandy loam and coarse sandy loam. In some areas the surface layer is fine sandy loam, and in some areas layers of very gravelly sand are below a depth of 24 inches.

Pits. This map unit consists of open excavations where soil, rock and/or gravel have been removed.

Riverwash. This map unit consists of deep, excessively drained to poorly drained islands or sand and gravel bars in and along major streams and rivers. These are recent deposits of sand and gravel that are typically stratified sand and gravel to a depth of 60 inches or more. Riverwash is subject to frequent overflow.

B. Geotechnical Considerations. No geotechnical borings were conducted during the feasibility study, but as all five sites have been mined extensively in the past for gravel aggregate, it is expected that the soil descriptions provided are representative of actual site conditions. Geotechnical data will be of primary importance to the bridge/culvert sites to determine foundation requirements during the PED phase; a minimum of two borings per bridge/culvert site are recommended. At this level of design, it has been assumed that spread footings will be used for foundations. All other features proposed involve minor excavation, grading or plantings and these areas are dominated by alluvium and there are also piles of topsoil stockpiled on Site M1B that can be regraded to improve planting media. There are no bedrock outcrops in the vicinity of areas proposed for excavation or grading.

4. Dewatering and Erosion Control.

For installation of ELJs, it is assumed that dewatering will be required and that sheetpile coffer dams will be used to enclose each ELJ site (approximately 150 linear feet of sheetpile for each ELJ). Pumping would be required to dewater for excavation and placement of the key logs at the base of each ELJ and it is assumed that 30 days of pumping is required for each ELJ.

Dewatering during excavation of channels or during grading to place material along the pond perimeters is assumed to not be necessary as these areas are isolated from the rivers. Erosion control measures such as silt fencing or silt curtains would be necessary. Erosion control BMPs have been assumed necessary for excavation and grading at all sites.

5. Bridges and Culverts.

For the feasibility level designs, prefabricated concrete arch or box culverts were used as the basis for all cost estimating. Bridges will be prefabricated wood or steel pedestrian bridges.

6. Hazardous Toxic and Radiological Wastes (HTRW) Evaluation.

An environmental database records search was conducted in July 2011 by EDR, Inc. to evaluate the potential for the presence of hazardous materials and other contaminants in the study area. The results of that database search are provided as Attachment 2 to this appendix. Additionally, the Nature Conservancy contracted with Hahn and Associates to conduct a Level 1 Environmental Assessment of the Wildish properties at the confluence of the Coast and Middle Forks prior to acquisition to evaluate the potential for the presence of hazardous materials and other contaminants (Hahn and Assoc. 2010). The results of these two evaluations of the likelihood of encountering hazardous materials during construction are briefly summarized in this section. All of the proposed restoration sites are located within the 100-year floodplain and floodway. Thus, it is possible that hazardous materials or contaminants in floodwaters could have contaminated any one of these sites. However, there is no specific contamination that has been identified at any of the sites. Tetra Tech staff walked the sites in 2010 and 2011 and did not identify any potential contaminants.

Site C1B. This site is owned by Lane County and has been used for gravel extraction in past decades. The site is undeveloped, but the public is allowed access on foot from Franklin Boulevard. Visual observation of the site indicated that small quantities of trash are present, primarily adjacent to the road, but no hazardous materials, drums, or sheens/odors were observed. Two high voltage transmission lines are adjacent to this site, but not actually present on the site. The 2001 database search (EDR 2011) revealed eleven potential pollutant sources within one mile of the site. Virtually all of these potential pollutant sources are located along I-5 or Franklin Boulevard to the west of the site and generally separated by a railroad grade from the site. Four of the sites are Resource Conservation and Recovery Act (RCRA) conditionally exempt small quantity generators of hazardous materials such as small manufacturing and gas stations. Four of the sites have had leaking underground fuel storage tanks. A biofuel station within one mile was a former Brownfields site (former gas station) that was cleaned up and turned into a biofueling station that uses non-toxic fuels. A BPA substation within one mile has had several releases of various pollutants including oil, lead, ethanol, PCBs, and other materials. BPA has been working with the State of Oregon and other agencies to clean up and resolve all issues. The site will continue to store herbicides and fuels on the site for maintenance use. Lane Community College has some notices of non-compliance for handling of used oil, as well as documented releases of volatiles and disposal of paint waste into storm drains. They are registered to store and use pesticides and fuels and laboratory materials on site. Overall, it is unlikely that any of these potential pollutant sources have released hazardous materials that could have reached Site C1B. Therefore, the likelihood of encountering hazardous materials or contaminants on the site is low.

Site C1C. This site is owned by the Nature Conservancy and was recently purchased from Wildish. The site was used for gravel extraction in past decades and is generally undeveloped. One high voltage transmission line crosses this site (BPA). Visual observation of the site did not reveal the presence of any hazardous materials, drums, or sheens/odors. The Level 1 Environmental Assessment (Hahn and Assoc. 2010) indicated there were no potential pollutant sources to this site. The potential pollutant sources indicated for Site C1B are also within one mile of Site C1C, but similarly to Site C1B, it is unlikely that any of those potential pollutant sources have released hazardous materials that could have reached Site C1C. Therefore, the likelihood of encountering hazardous materials or other contaminants on the site is low.

Site M1A. This site is owned by the Nature Conservancy and was recently purchased from Wildish. The site was used for gravel extraction in past decades and is generally undeveloped. One high voltage transmission line crosses this site (BPA). Visual observation of the site did not reveal the presence of any hazardous materials, drums, or sheens/odors. The Level 1 Environmental Assessment (Hahn and Assoc. 2010) indicated there was only one potential pollutant source to this site, which is the current hazelnut orchard on the western portion of the site, where pesticides and herbicides may have been used in the past. The 2011 database search (EDR 2011) revealed two potential pollutant sources within one mile of the site, but both sites are former leaking underground fuel storage tanks that have been decommissioned or cleaned up. The Springfield Utility Board drinking water well field is located between the potential pollutant sources and Site M1A and no reports of contaminants have occurred in that area; thus, it is unlikely that any discharges of hazardous materials or pollutants from the two potential sources could have reached Site M1A. Therefore, the likelihood of encountering hazardous materials or other contaminants on the site is low.

Site M1B. This site is owned by the Nature Conservancy and was recently purchased from Wildish. The site was used for gravel extraction in past decades and is generally undeveloped. One high voltage transmission line crosses this site (BPA). Visual observation of the site did not reveal the presence of any hazardous materials, drums, or sheens/odors. The Level 1 Environmental Assessment (Hahn and Assoc. 2010) indicated there was only one potential pollutant source to this site, from the former agricultural use of the site prior to Wildish's purchase and then an on-going agricultural lease, where pesticides and herbicides may have been used. The 2011 database search (EDR 2011) revealed the same two potential pollutant sources as identified for Site M1A, which are both located across the river, with the Springfield Utility Board well field in between. It is unlikely that any discharges of hazardous materials or pollutants from the two potential sources could have reached Site M1B. Therefore, the likelihood of encountering hazardous materials or other contaminants on the site is low.

Site M2A. This site is owned by the Nature Conservancy and was recently purchased from Wildish. The site was used for gravel extraction in past decades and is generally undeveloped. One high voltage transmission line is adjacent to this site (BPA; upstream). Visual observation of the site did not reveal the presence of any hazardous materials, drums, or sheens/odors. The Level 1 Environmental Assessment (Hahn and Assoc. 2010) indicated there were no potential pollutant sources to this site. The 2011 database search (EDR 2011) revealed three potential pollutant sources within one mile. These three potential sources are all across the river from the project site. One source is a manufacturing company that is a RCRA conditionally exempt small quantity generator that uses spent solvents and other materials. There is no record of spills or other releases. The Clearwater Landfill is located within one mile but there are no records of spills or other releases. Wentworth Buick has a leaking underground fuel storage tank, but it is unlikely that any hazardous materials or other contaminants would have reached Site M2A because Jasper Slough, that discharges into the Springfield Millrace is located between the potential source and the river and if any fuels discharged to ground or surface waters they would have likely been carried down the Millrace. An NPDES permitted stormwater outfall is located in Clearwater Park across the river from Site M2A, but it is not likely that any pollutants from the outfall have contaminated Site M2A. Therefore, the likelihood of encountering hazardous materials or other contaminants on the site is low.

7. Project Construction

A. Construction Sequencing. See proposed design and construction schedule provided in the Cost Appendix. Each of the five sites can be designed and constructed separately as they are all independent and do not rely on any other to be previously constructed. At this time it is proposed that the sites will all begin design in 2013, with the first site, M2A, beginning construction in

2014. The final sites would be in construction in 2017. The following sequence has been identified for the feasibility level study.

1) Construction Contract Awarded
2) Notice to Proceed
3) Contractor Submit Bonds
4) Contractor Provide Pre-Construction Submittals
5) Pre-Construction Kick-off Meeting
6) Contractor Mobilize to Site
7) Contractor Install Erosion Control BMPs and Create Staging Work Area
8) Improve Access, Only as Necessary
9) Clearing and Grubbing
10) Removal of Invasives (can go on while other actions are occurring)
11) Isolation of In-Water Work Areas and Removal of Fish (ponds)
12) Grading On Site at Ponds
13) Removal of Debris/Concrete/Riprap
14) Excavate Connector Channels (except in-water connection to rivers)
15) Install Temporary Bridge or Access Route for ELJs
16) Isolation of In-Water ELJ Work Areas and Removal of Fish
17) Construction of ELJs
18) Removal of In-Water Isolation Measures When Work is Complete (grading or ELJs)
19) Removal of Temporary Bridge or Access Route for ELJs
20) Isolate In-Water Work Area for River Channel Connections and Removal of Fish
21) Excavate Final In-Water Channel Connections
22) Removal of Final Water Isolation Measures
23) Place Loose Large Wood in Floodplain
24) Site Grading for Plantings
25) Remove Staging Area and Access Routes as Appropriate
26) Install Erosion Control Seeding/Mulch at each Grading Completed Location
27) Plantings
28) Removal Erosion Control BMPs After Seeding has Grown to Minimum 1-inch

8. Recommendations for PED Phase

The following additional design analyses should be conducted during the PED phase to refine the design to final designs and specifications.

A. Conduct bathymetric surveys of ponds to be graded at Site C1B (bathymetric surveys already completed on Sites C1C, M1A, M1B, and M2A).
B. Conduct two geotechnical borings at each bridge and culvert location and prepare geotechnical recommendations on soil bearing capacity and foundation requirements.
C. Develop reach scale HEC-RAS modeling to refine channel elevations and determine no-rise for Lane County approval/permitting at each site.
D. Develop detailed erosion control and dewatering plans for each site.
E. Develop 60%, 90%, and 100% designs and specifications for each site.

9. References

EDR. 2011.

Hahn and Associates, Inc. 2010. A Phase 1 Environmental Site Assessment Approximate 1,271-Acre Wildish Property, Vicinity of Frank Parrish Road and Seavey Loop Road, Eugene, OR. Prepared for The Nature Conservancy, Portland, Oregon, Project #: 7812.

U.S.D.A. Soil Conservation Service (SCS). 1981. Soil Survey of Lane County Area, Oregon.

U.S. Army Corps of Engineers, 1999, *Engineering and Design for Civil Works Projects, Engineering Regulation 1110-2-1150,* Department of the Army, Washington D.C., 31 August 1999.

ATTACHMENT 1
FEASIBILITY LEVEL DESIGN DRAWINGS

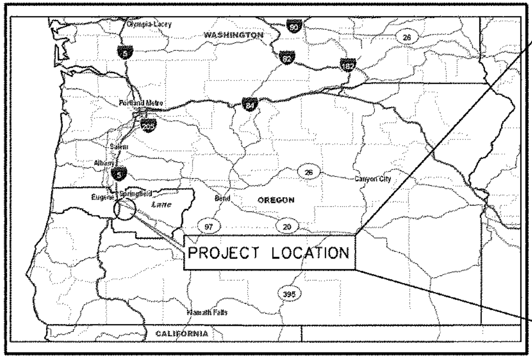
US Army Corps
of Engineers
Portland District

MIDDLE FORK AND COAST FORK WILLAMETTE

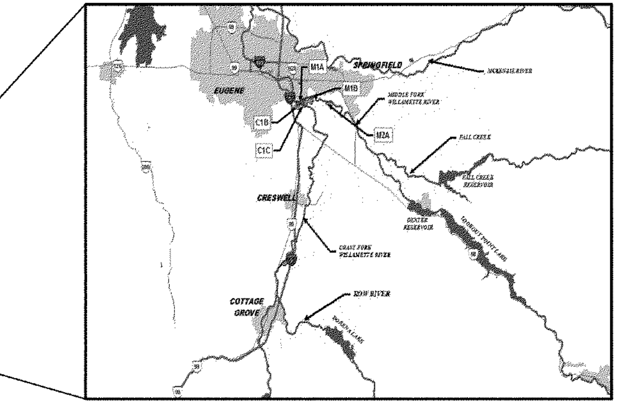
FLOODPLAIN RESTORATION STUDY

LANE COUNTY, OREGON

35% DESIGN



VICINITY MAP
NOT TO SCALE



PROJECT LOCATION
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SAFETY PAYS

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US Army Corps
of Engineers
Portland District

U.S.ARMY ENGINEER DISTRICT,PORTLAND
CORPS OF ENGINEERS
PORTLAND, OREGON

Prepared by:
TETRA TECH
Portland, Oregon

Designed by:
Drawn by:
Checked by:
Date:
File #: WRFP-01.dgn
Rev.

WILLAMETTE RIVER FLOODPLAIN
RESTORATION STUDY
TITLE SHEET
PORTLAND
OREGON

Plate
number:
Sheet 1 of 17

DATE AND TIME PLOTTED: $$$DATE$$$ $TIME
DESIGN FILE: $$$DGN$$$

ABBREVIATIONS

ACC	ACCORDING
APPROX	APPROXIMATE
AVG	AVERAGE
BOB	BASIS OF BEARING
BM	BENCHMARK
BMP	BEST MANAGEMENT PRACTICE
CHNL	CHANNEL
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
CY	CUBIC YARD
D/S	DOWNSTREAM
DEMO	DEMOLITION
DIA	DIAMETER
DSL	DEPT OF STATE LANDS
FG	FINISH GRADE
E	EAST, EASTING
EA	EACH
EG	EXISTING GROUND
EL	ELEVATION
EXIST	EXISTING
GRND	GROUND
H, HORIZ	HORIZONTAL
IE	INVERT ELEVATION
IN	INCHES
INV	INVERT
L	LEFT
LF	LINEAR FOOT
LWD	LARGE WOODY DEBRIS
MAX	MAXIMUM
MIN	MINIMUM
N	NORTH, NORTHING
NAD	NORTH AMERICAN DATUM
N/A	NOT APPLICABLE
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
ODFW	OREGON DEPT OF FISH & WILDLIFE
OHW	ORDINARY HIGH WATER
OHWM	ORDINARY HIGH WATER MARK
PCL	PRIMARY CONTROL LINE
PC	POINT OF CURVATURE
PDX	PORTLAND
PERM	PERMANENT
POB	POINT OF BEGINNING
POE	POINT OF END
PI	POINT OF INTERSECTION
PROP	PROPOSED
PT	POINT
R, RAD	RADIUS, RIGHT
R/W	RIGHT OF WAY
REF	REFERENCE
S	SOUTH
SS	SIDE SLOPE
SF	SQUARE FEET
SPEC	SPECIFICATION
STA	STATION
SY	SQUARE YARD
TBM	TEMPORARY BENCHMARK
TEMP	TEMPORARY
TH	THICKNESS
TYP	TYPICAL
U/S	UPSTREAM
V,VERT	VERTICAL
W	WEST
W/	WITH
WCS	WATER CONTROL STRUCTURE

GENERAL NOTES

1. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS, INCLUDING REQUIREMENTS SET FORTH IN THE PERMITS OBTAINED FOR THIS PROJECT. THE CONTRACTOR SHALL MAINTAIN A COPY OF ALL PERMITS ONSITE DURING CONSTRUCTION.
2. ALL CONSTRUCTION WORK AFFECTING AREAS BELOW THE OHW MUST BE CONDUCTED DURING THE APPROVED FISH WINDOW, GENERALLY JUNE 1 TO OCTOBER 31; UNLESS AN EXTENSION IS RECEIVED FROM THE OREGON DEPARTMENT OF FISH AND WILDLIFE.
3. THE CONTRACTOR IS RESPONSIBLE FOR JOB SITE CONDITIONS AND THE SAFETY OF HUMAN LIFE DURING THE COURSE OF CONSTRUCTION. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY DURING THE PERIOD OF CONSTRUCTION AND NOT LIMITED TO NORMAL WORKING HOURS.
4. THE CONTRACTOR SHALL KEEP JOB SITE AREA CLEAN, HAZARD-FREE, AND PROPERLY DISPOSE OF ALL DEBRIS, RUBBISH, AND CONSTRUCTION WASTE. ALL DISTURBED AREAS ARE TO BE REHABILITATED TO PRE-CONSTRUCTION CONDITIONS OR PER PLANTING PLAN, TO BE PROVIDED SEPARATELY.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE AND CONFIRM THAT THE WORK MAY BE ACCOMPLISHED AS SHOWN PRIOR TO PROCEEDING WITH CONSTRUCTION.
6. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY INDICATED OTHERWISE.

SURVEY CONTROL AND CONSTRUCTION LIMITS

1. 1'-CONTOUR TOPOGRAPHIC SURVEY BY CITY OF EUGENE 2009 LIDAR, DIGITAL ORTHOPHOTO BY LANE COUNCIL OF GOVERNMENTS, 2009, BATHYMETRIC DATA BY CORPS OF ENGINEERS, MARCH AND DECEMBER, 2008.
2. PARCEL DATA FROM CITY OF EUGENE GIS, 2010.
3. ALL MAPPING IS PROJECTED TO NAD 83 HARN, STATE PLANE OREGON SOUTH. UNITS ARE U.S. INTERNATIONAL FEET. REPRESENTATIONS OF TRUE NORTH SHALL NOT BE USED TO IDENTIFY OR ESTABLISH THE BEARING OF TRUE NORTH AT THE JOB SITE.
4. ALL ELEVATIONS ARE RELATIVE TO NAVD 88 IN UNITS OF FEET.
5. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION AND IS THE MEASURED HORIZONTAL DISTANCE.
6. CONSTRUCTION LIMITS, CENTERLINE AND OFFSET STAKING TO BE PERFORMED BY OTHERS.
7. ALL CONSTRUCTION ACTIVITY, INCLUDING HAUL ROUTES, STAGING AND STOCKPILING, SHALL BE CONFINED TO THE PARCEL AS SHOWN IN THESE PLANS. CONTRACTOR SHALL ADHERE TO CONSTRUCTION LIMITS. CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING AND MAINTAINING REQUIRED DATUM, BENCHMARKS, CONTROL LINES AND LEVELS. DO NOT DISTURB, EXCAVATE OR WORK BEYOND PROJECT LIMITS WITHOUT PERMISSION FROM CONSTRUCTION MANAGER.
8. UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND IN SOME CASES HAVE NOT BEEN SURVEYED. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING OREGON UTILITY NOTIFICATION CENTER AT 800.332.2344 PRIOR TO COMMENCEMENT OF CONSTRUCTION WORK.

ROCK

1. ALL STREAMBED MATERIAL (GRAVELS AND COBBLES) WITH A MEAN DIAMETER OF LESS THAN 6" TO BE PLACED AS CULVERT SUBSTRATE SHALL BE RIVER RUN, NOT ANGULAR.
2. ALL STREAMBED MATERIAL WITH A MEAN DIAMETER EXCEEDING 6" AND RIPRAP SHALL BE PROVIDED BY A SOURCE THAT IS APPROVED BY THE CONSTRUCTION MANAGER. ROCK MATERIAL WITH A MEAN DIAMETER EXCEEDING 6" SHALL BE ANGULAR IN NATURE AND BE OF SUFFICIENT HARDNESS TO RESIST WEATHERING AND SHALL BE FREE OF CRACKS AND OTHER BLEMISHES. POROUS OR SOFT ROCK SHALL NOT BE ALLOWED FOR USE AS STABILIZATION ROCK.
3. GEOTEXTILE SHALL BE PLACED OVER THE PREPARED SUBGRADE AND BENEATH ROCK MATERIAL AS SHOWN IN THESE PLANS. SUBGRADE SURFACES SHALL BE PREPARED TO BE REASONABLY SMOOTH, FREE OF MOUNDS, DIPS, CUTS OR OVERHANGING SECTIONS AND FREE OF DEBRIS.

ENVIRONMENTAL PROTECTION

1. THE CONTRACTOR SHALL MINIMIZE ENVIRONMENTAL POLLUTION AND DAMAGE THAT MAY OCCUR AS THE RESULT OF CONSTRUCTION OPERATIONS.
2. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING AND UTILIZING BEST MANAGEMENT PRACTICES (BMPS) TO PREVENT STORMWATER RUNOFF AND WATER POLLUTION DURING CONSTRUCTION ACTIVITIES. EXAMPLES OF BMPS ARE INCLUDED IN PLAN DETAILS. CONTRACTOR SHALL SUBMIT STORMWATER POLUTION PREVENTION PLAN FOR APPROVAL BY CONTRACTING OFFICER'S REPRESENTATIVE.
3. IF POTENTIAL HAZARDOUS MATERIALS ARE ENCOUNTERED, THE MANAGER SHOULD BE CONTACTED IMMEDIATELY. ALL CONSTRUCTION SPOILS AND WASTE SHALL BE DISPOSED OF AT AN APPROVED LANDFILL FACILITY.
4. EXISTING ON-SITE MATERIALS SHALL BE CAREFULLY REMOVED AND STORED, OR DISPOSED OF. COMPLETELY REMOVE STUMPS, ROOTS, WILLOWS, SHRUBS, WEEDS, AND OTHER DEBRIS PROTRUDING FROM THE GROUND WHERE DIRECTED BY CONSTRUCTION MANAGER. WOODY DEBRIS AND PLANT MATERIAL SHALL BE SALVAGED FOR REUSE AS DIRECTED.
5. TREES TO BE CLEARED WILL BE FLAGGED BY THE CONTRACTOR. TREES DESIGNATED FOR CLEARING SHALL BE REUSED IN STREAM CHANNEL AS SHOWN AND AS APPROVED BY CONSTRUCTION MANAGER. TREES AND LAND AREAS OUTSIDE CONSTRUCTION AND PLANTING LIMITS SHALL BE MARKED FOR PROTECTION IN THE FIELD. EXERCISE CARE IN AREAS NOT SO MARKED TO AVOID UNNECESSARY DAMAGE TO NATURAL VEGETATION.
6. IF WET WEATHER IS FORECAST OR CONSTRUCTION ACTIVITIES ARE NOT ANTICIPATED FOR A 72-HOUR PERIOD, CONTRACTOR SHALL MULCH ALL EXPOSED GROUND, WITH EXCEPTIONS INCLUDING BOTTOMS OF CHANNELS, AND AREAS OF HIGH CONSTRUCTION TRAFFIC. CONTRACTOR SHALL HAVE STRAW BALES ON SITE AT ALL TIMES FOR MULCHING. MULCH SHALL BE FREE FROM WEEDS, MOLD, AND OTHER DELETERIOUS MATERIALS. STRAW OR WOOD CELLULOSE FIBER IS SUITABLE FOR MULCH. STRAW SHALL BE STALKS FROM OATS, WHEAT, RYE, BARLEY, OR RICE.
7. ALL AREAS DISTURBED BY CONSTRUCTION OPERATIONS, INCLUDING STAGING AREA, SHALL BE SEEDED UPON COMPLETION OF THE PROJECT. SEEDING SHOULD ONLY BE PERFORMED AT OPPORTUNE TIMES. SEEDING SHOULD NOT OCCUR DURING EXCESSIVE PRECIPITATION EVENTS OR IN LOCATIONS WHERE RIVER FLOWS WILL ERODE SEED PLACEMENT. SEED MIXTURE SHALL BE IN ACCORDANCE WITH PLANTING PLAN (BY OTHERS). SEEDING WILL INCLUDE MULCH. MULCH SHALL BE STABILIZED THROUGH THE USE OF TACKIFIERS.

DEWATERING AND EROSION CONTROL

1. THE CONTRACTOR SHALL SUBMIT A WATER DIVERSION PLAN TO THE CONSTRUCTION MANAGER. DIVERSION PLAN IS SUBJECT TO APPROVAL BY CONSTRUCTION MANAGER. NOTICE SHALL BE GIVEN TO THE CONSTRUCTION MANAGER A MINIMUM OF THREE DAYS PRIOR TO DIVERSION. CARE SHALL BE TAKEN WHEN INSTALLING SILT CURTAINS TO EXCLUDE FISH FROM CURTAINED AREA.
2. SEDIMENT FENCES SHALL BE INSTALLED AS SHOWN ON THESE PLANS AND WITH FIELD-DIRECTION BY THE CONSTRUCTION MANAGER. SEDIMENT FENCING MATERIALS SHALL BE PROVIDED BY THE CONTRACTOR.
3. STRAW BALES SHALL BE PLACED DOWNSTREAM OF THE WATER RETURN TO TRAP SILT. BALES SHALL BE SECURED WITH WOOD OR METAL STAKES DRIVEN 2 FEET INTO GROUND. 3" MINUS GRAVEL SHALL BE PLACED AT A DEPTH OF 4" ON THE UP-GRADIENT TOE OF THE BALES.

SITE EARTHWORK AND GRADING

1. THE CONTRACTOR IS RESPONSIBLE FOR ALL SITE EARTHWORK AND GRADING ACTIVITIES. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB SITE CONDITIONS PER DIRECTION OF THE CONSTRUCTION MANAGER. SIGNIFICANT DEVIATIONS FROM THESE PLANS SHALL BE COORDINATED WITH THE ENGINEER OF RECORD AND SHALL BE DOCUMENTED FOR INCLUSION IN AS-BUILT DRAWINGS TO BE PREPARED AT COMPLETION OF PROJECT.
2. ALL FILL MATERIAL, WHETHER IMPORTED FILL OR BORROW MATERIAL FROM ON-SITE SHALL BE SUBJECT TO VISUAL INSPECTION BY THE CONSTRUCTION MANAGER AND SHALL BE FREE FROM ORGANIC MATTER, SILTS, CLAYBALLS AND OTHER DELETERIOUS MATERIALS AND SHALL NOT CONTAIN STONES LARGER THAN 3 INCHES IN DIAMETER.
3. EXCAVATED NATIVE SPOILS SHALL BE DISPOSED OF AT THE ONSITE DISPOSAL AREA AS SHOWN.

TEMPORARY CONSTRUCTION FACILITIES

1. ALL TEMPORARY UTILITIES AND FACILITES WILL BE THE RESPONSIBILITY OF THE CONTRACTOR. A CONSTRUCTION TRAILER IS NOT REQUIRED. ANY USE OF POTABLE WATER OR ELECTRICITY FROM EXISTING CONNECTIONS ON SITE MUST BE COORDINATED WITH LANDOWNER THROUGH WRITTEN AGREEMENT PRIOR TO USE. A CHEMICAL TOILET OF SUITABLE TYPE SHALL BE PROVIDED AND MAINTAINED BY THE CONTRACTOR AT ALL TIMES.

LEGEND

●	BANK TYPE ELJ	┈┈┈	MAJOR CONTOUR (10')
●	RIVER TYPE ELJ	┈┈┈	MINOR CONTOUR (1')
┈┈┈	EDGE OF WATER	▭	RIPRAP
▭	TEMPORARY BRIDGE	■	EXCAVATION AREA
▬	PEDESTRIAN BRIDGE	▧	TEMPORARY CONSTRUCTION STAGING
— · —	ALIGNMENT	▩	REGRADE BANKS
— · · —	PROJECT LIMITS	▤	REMOVE DEBRIS
▨	TEMPORARY ACCESS ROAD	▦	NOTCH
⌣	CULVERT	— · —	REVETMENT
		━━━	OBLITERATE ROAD

SHEET INDEX

SHEET No.	SITE ID.	SHEET DESCRIPTION
1	---	TITLE SHEET
2	---	GENERAL NOTES, LEGEND AND ABBREVIATIONS
3	C1B	PROJECT FEATURE PLAN VIEW SITE C1B
4	C1B	REAL ESTATE, ACCESS AND STAGING SITE C1B
5	C1B	TYPICAL SECTIONS, PROFILES AND DETAILS SITE C1B
6	C1C	PROJECT FEATURE PLAN VIEW SITE C1C
7	C1C	REAL ESTATE, ACCESS AND STAGING SITE C1C
8	C1C	ENLARGED PLAN VIEW AND DETAILS SITE C1C
9	C1C	TYPICAL SECTIONS, PROFILES AND DETAILS SITE C1C
10	M1A	PROJECT FEATURE PLAN VIEW SITE M1A
11	M1A	REAL ESTATE, ACCESS AND STAGING SITE M1A
12	M1A	TYPICAL SECTIONS, PROFILES AND DETAILS SITE M1A
13	M1B	PROJECT FEATURE PLAN VIEW SITE M1B
14	M1B	REAL ESTATE, ACCESS AND STAGING SITE M1B
15	M1B	TYPICAL SECTIONS, PROFILES AND DETAILS SITE M1B
16	M2A	PROJECT FEATURE PLAN VIEW SITE M2A
17	M2A	REAL ESTATE, ACCESS AND STAGING SITE M2A
18	M2A	TYPICAL SECTIONS, PROFILES AND DETAILS SITE M2A
19	M2A	TYPICAL SECTIONS, PROFILES AND DETAILS SITE M2A

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PORTLAND, OREGON

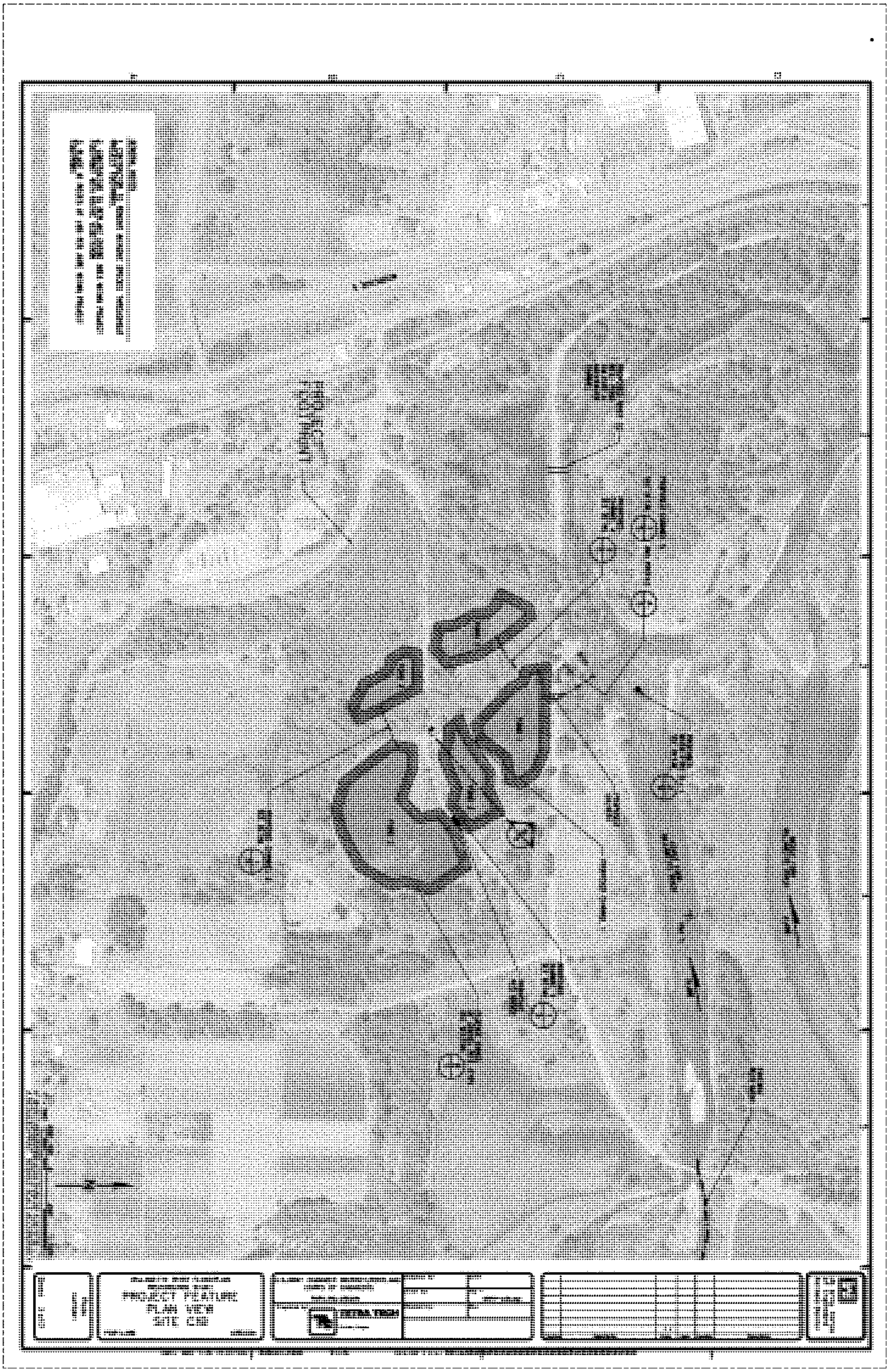
Prepared by:
TETRA TECH
Portland, Oregon

Designed by:
Drawn by:
Checked by:
Date:
File #: WRFP-02.dgn
Rev.

WILLAMETTE RIVER FLOODPLAIN
RESTORATION STUDY
GENERAL NOTES,
LEGEND AND
ABBREVIATIONS
PORTLAND OREGON

Plate
number:

Sheet 2 of 17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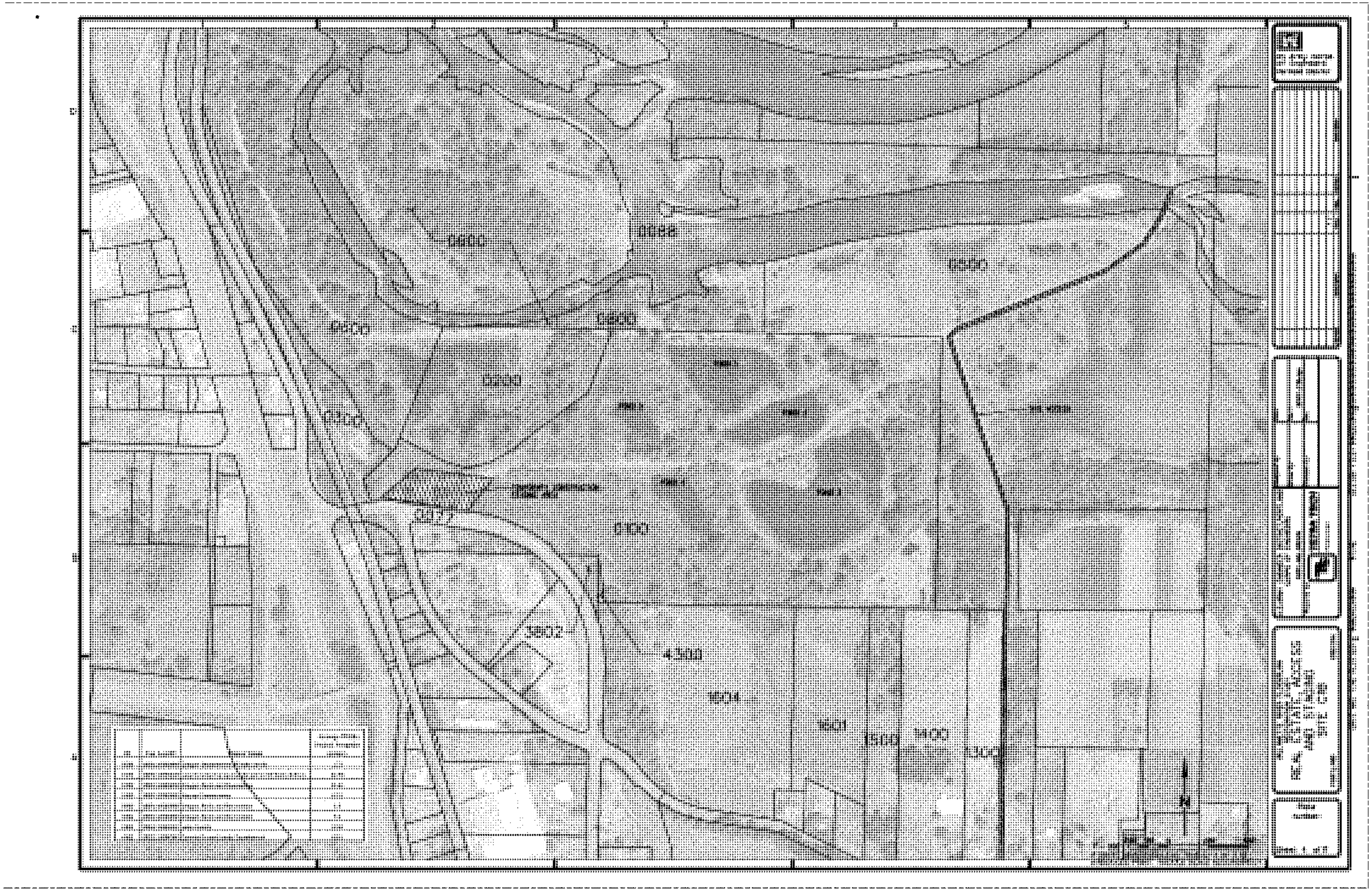
PROJECT FEATURE
PLAN VIEW
SITE C30
TETRA TECH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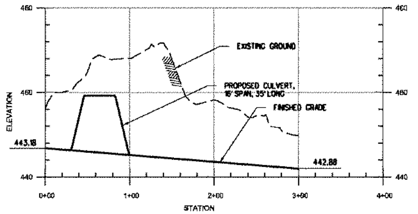
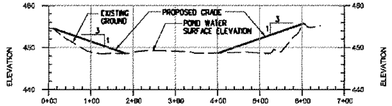
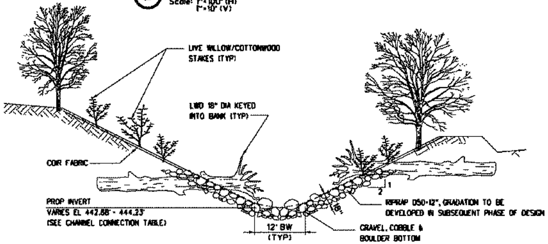


Ⓐ PROFILE – SITE C1B BACKWATER CHANNEL 5
Scale: 1"=50' (H)
1"=5' (V)



Ⓑ POND SECTION
Scale: 1"=100' (H)
1"=10' (V)



① TYPICAL CHANNEL SECTION
Scale: NO SCALE

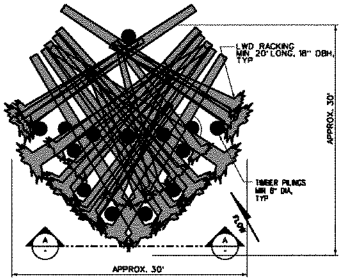
CHANNEL CONNECTION TABLE					BRIDGE AND CULVERT TABLE				
#	CONNECTION	U/S IE	D/S IE	LENGTH	#	CONNECTION	IE OUT	IE IN	LENGTH
5	RIVER TO POND 1	443.18	442.88	300 FT	5	RIVER TO POND 1	443.08	443.12	35 FT
1	POND 1 TO POND 2	443.88	443.68	100 FT	2	POND 2 TO POND 3	444.00	444.00	40 FT
2	POND 2 TO POND 3	444.46	444.38	80 FT	-	RIVER TO WEST POND	443.00	443.10	35 FT
3	POND 3 TO POND 4	445.50	445.00	250 FT	-	-	-	-	-
4	POND 1 TO POND 5	444.23	443.68	275 FT	-	-	-	-	-

NOTE: CONNECTIONS ARE STATED IN DOWNSTREAM TO UPSTREAM ORDER:
(E.G. 'POND 1 TO POND 2': POND 1 IS DOWNSTREAM OF POND 2. RIVER IS DOWNSTREAM OF ALL PONDS.)

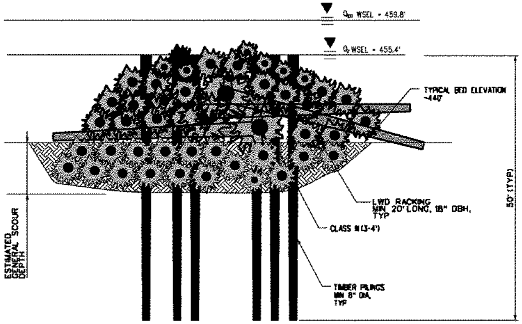
	Regrade Onsite	Channel Excavation	Bank-Type ELJ	River-Type ELJ	LWD	Revegetation	Total Project Area
	CY	CY	#	#	# pieces	AC	AC
C1B	65000	5146	0	1	910	91	91

○ QUANTITY TABS

NOTE: SCOUR DEPTH AND TIMBER PILE DEPTH TO BE CALCULATED IN SUBSEQUENT PHASE OF DESIGN.



PLAN VIEW



SECTION VIEW

② RIVER TYPE – ELJ PLAN AND SECTION
③ Scale: NO SCALE

IF SHEET MEASURES LESS THAN 22" X 34" IT IS
A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps
of Engineers
Portland District

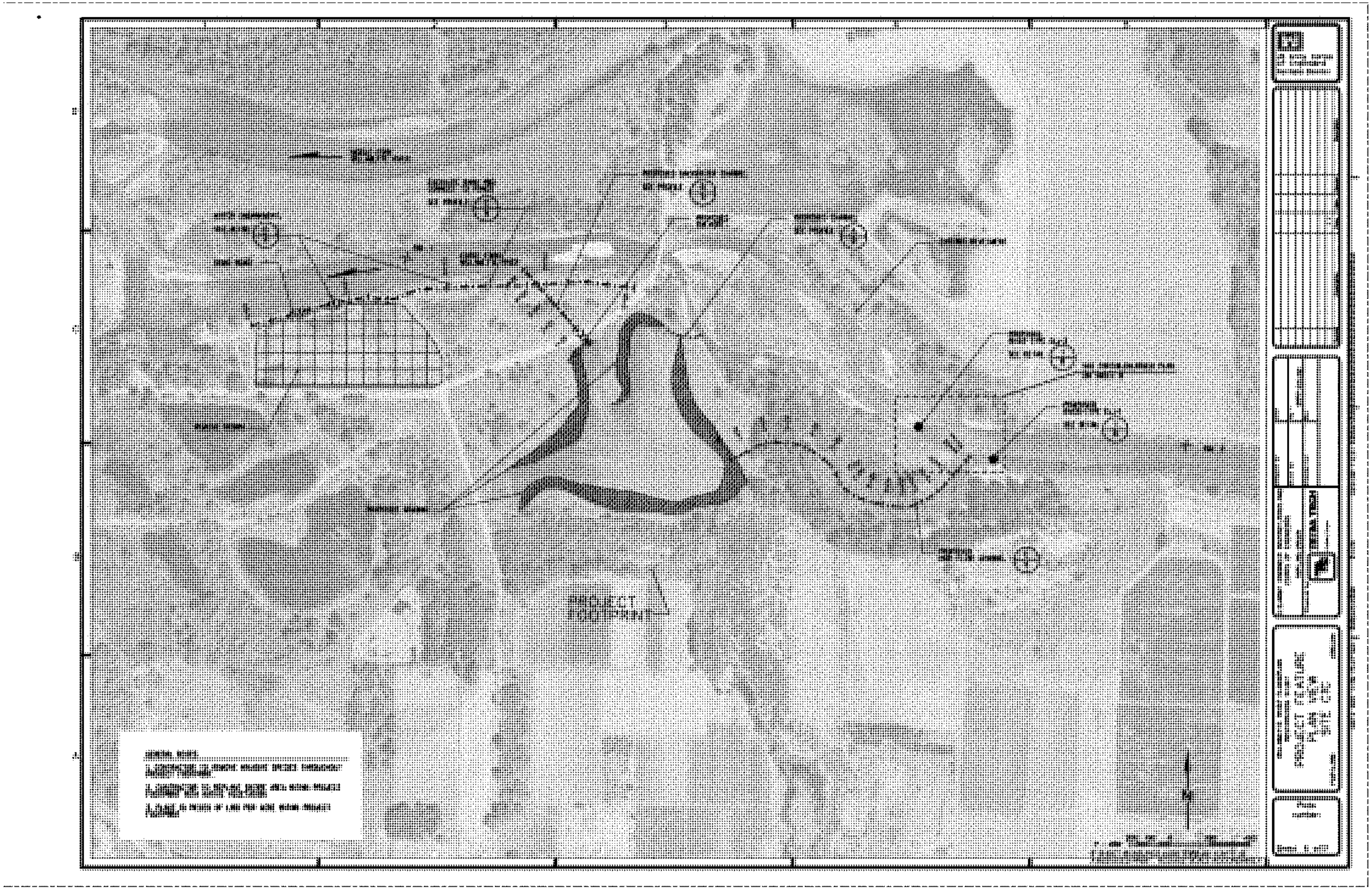
WILLAMETTE RIVER FLOODPLAIN
RESTORATION STUDY
TYPICAL SECTIONS,
PROFILE AND DETAILS
SITE C1B
PORTLAND OREGON

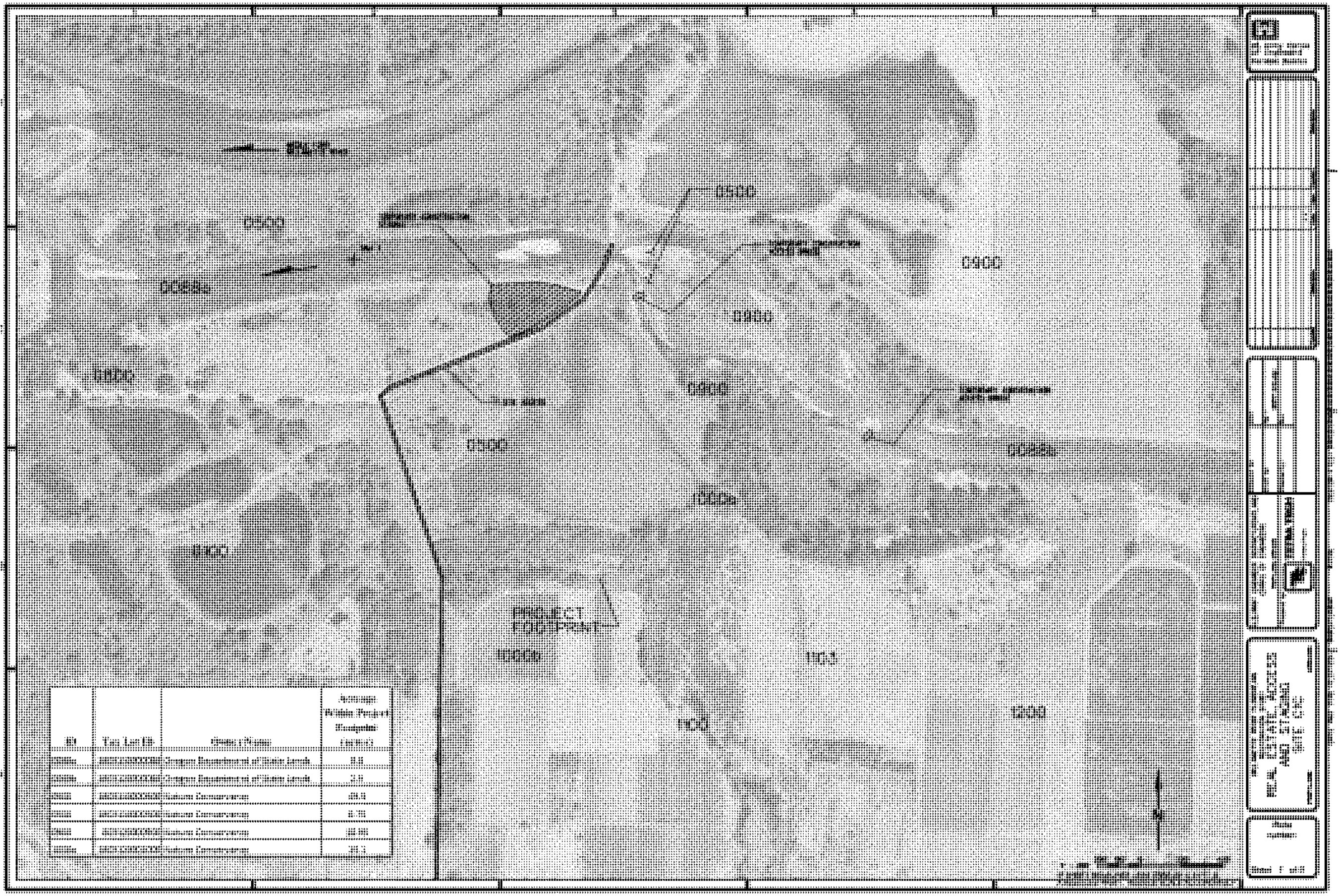
U.S. ARMY ENGINEER DISTRICT, PORTLAND
CORPS OF ENGINEERS
PORTLAND, OREGON
Prepared by: TETRA TECH
Portland, Oregon

Designed by:
Drawn by:
Checked by:
Date:
File: WRFP-C1B.dgn
Rev.

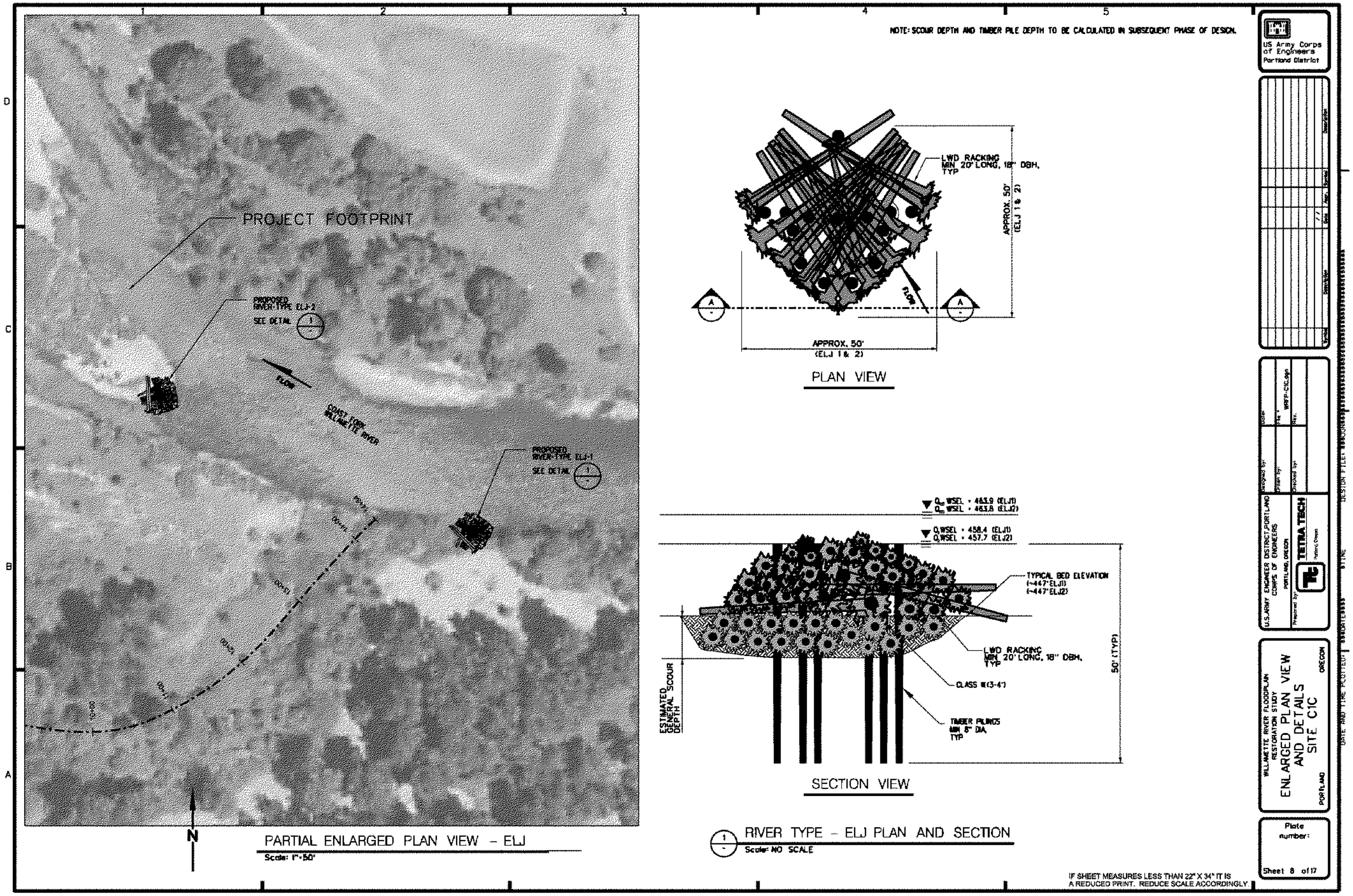
Plate number:
Sheet 5 of 17

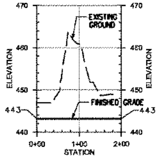
DATE AND TIME PLOTTED: $$$$DATE$$$$ $TIME DESIGN FILE: $$$$DGN$$$$


PROJECT FOOTPRINT
PROJECT FEATURE
PLAN VIEW
TETRA TECH



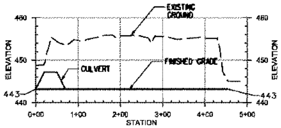
ID	Tax Lot ID	Owner Name	Acreage Within Project Footprint (acres)
[illegible]	[illegible]	Oregon Department of State Lands	[illegible]
[illegible]	[illegible]	Oregon Department of State Lands	[illegible]
[illegible]	[illegible]	Nature Conservancy	[illegible]
[illegible]	[illegible]	Nature Conservancy	[illegible]
[illegible]	[illegible]	Nature Conservancy	[illegible]
[illegible]	[illegible]	Nature Conservancy	[illegible]


1
2
3
4
5
A
B
C
D
PROJECT FOOTPRINT
PROPOSED RIVER-TYPE ELJ-2
SEE DETAIL 1
FLOW
COAST FORK WILLAMETTE RIVER
PROPOSED RIVER-TYPE ELJ-1
SEE DETAIL 1
10+00
11+00
12+00
13+00
14+00
N
PARTIAL ENLARGED PLAN VIEW – ELJ
Scale: 1"=50'
NOTE: SCOUR DEPTH AND TIMBER PILE DEPTH TO BE CALCULATED IN SUBSEQUENT PHASE OF DESIGN.
LWD RACKING MIN 20' LONG, 18" DBH, TYP
APPROX. 50' (ELJ 1 & 2)
FLOW
A
A
APPROX. 50' (ELJ 1 & 2)
PLAN VIEW
Q_{100} WSEL : 463.9 (ELJ1)
Q_{100} WSEL : 463.8 (ELJ2)
Q_2 WSEL : 458.4 (ELJ1)
Q_2 WSEL : 457.7 (ELJ2)
TYPICAL BED ELEVATION (~447' ELJ1) (~447' ELJ2)
LWD RACKING MIN 20' LONG, 18" DBH, TYP
CLASS III (3-4')
TIMBER PILINGS MIN 8" DIA, TYP
ESTIMATED GENERAL SCOUR DEPTH
50' (TYP)
SECTION VIEW
1
RIVER TYPE – ELJ PLAN AND SECTION
Scale: NO SCALE
IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.
US Army Corps of Engineers Portland District
Symbol
Description
Date
Appr.
Symbol
Description
/ /
U.S.ARMY ENGINEER DISTRICT,PORTLAND
CORPS OF ENGINEERS
PORTLAND, OREGON
Prepared by:
TETRA TECH
Portland, Oregon
Designed by:
Drawn by:
Checked by:
Date:
File #
WRFP-C1C.dgn
Rev.
WILLAMETTE RIVER FLOODPLAIN RESTORATION STUDY
ENLARGED PLAN VIEW AND DETAILS SITE C1C
PORTLAND
OREGON
Plate number:
Sheet 8 of 17
DATE AND TIME PLOTTED: $$$$DATE$$$$
$TIME
DESIGN FILE: $$$$DGN$$



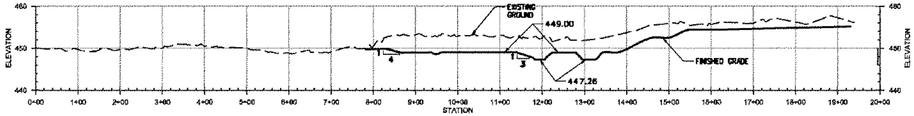
Ⓐ PROFILE SITE C1C SIDE CHANNEL

Scale: 1"=100' (H)
1"=10' (V)



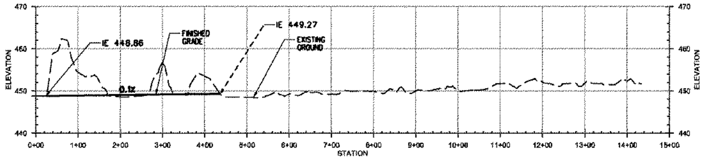
Ⓑ PROFILE SITE C1C POND TO RIVER BACKWATER CONNECTION

Scale: 1"=100' (H)
1"=10' (V)



Ⓒ PROFILE – EXCAVATED BANKS

Scale: 1"=100' (H)
1"=10' (V)

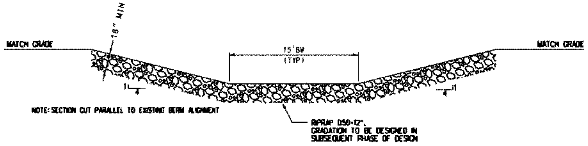


Ⓔ PROFILE – HIGH FLOW

Scale: 1"=100' (H)
1"=10' (V)

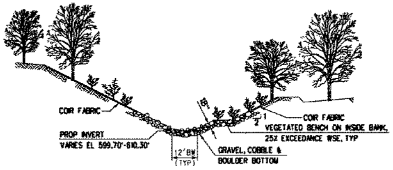
	Regrade Onsite	Channel Excavation	Bank-Type ELJ	River-Type ELJ	LWD	Revegetation	Total Project Area
	CY	CY	#	#	# pieces	AC	AC
C1C	38000	10503	0	2	832	83	83

◯ QUANTITY TABS



Ⓓ NOTCH EMBANKMENT SECTION

Scale: 1"=5' (H)
1"=5' (V)



① TYPICAL RIGHT BEND CHANNEL SECTION

Scale: NO SCALE

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers
Portland District

U.S.ARMY ENGINEER DISTRICT,PORTLAND
CORPS OF ENGINEERS
PORTLAND, OREGON

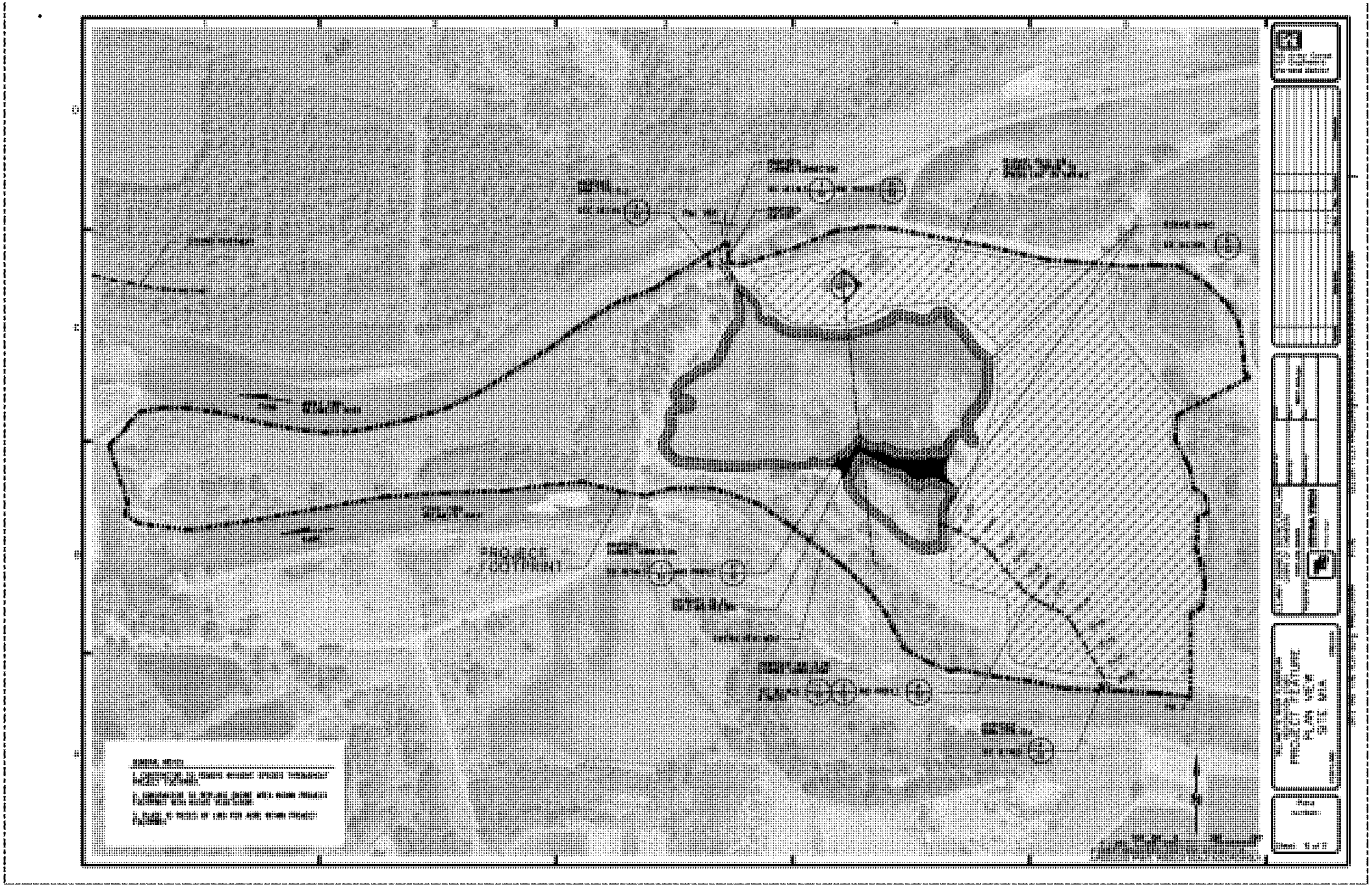
Prepared by: TETRA TECH
Portland, Oregon

Designed by:
Drawn by:
Checked by:
Date:
File #: WRFP-C1C.dgn
Rev.

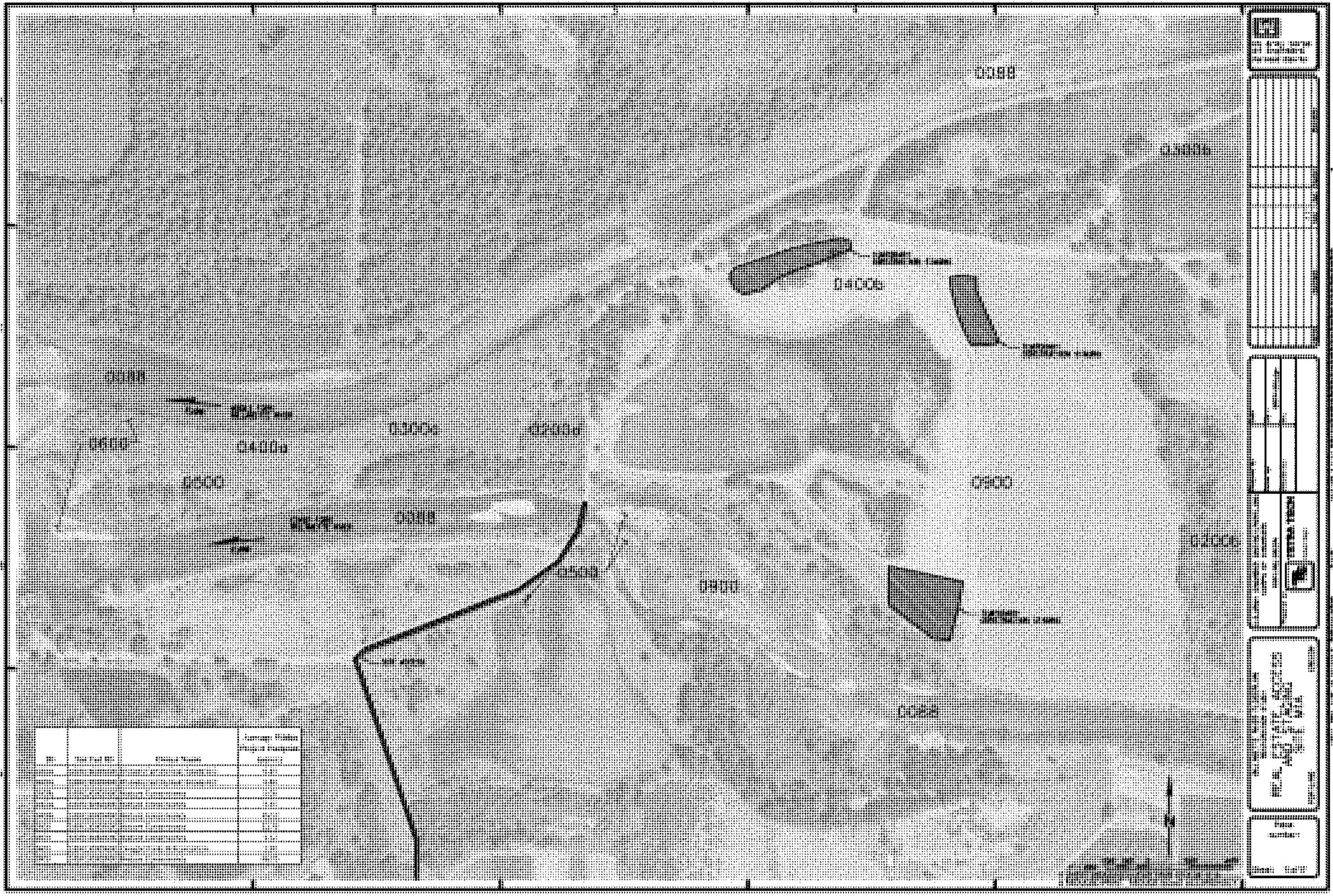
WILLAMETTE RIVER FLOODPLAIN
RESTORATION STUDY
TYPICAL SECTIONS,
PROFILES AND DETAILS
SITE C1C
PORTLAND OREGON

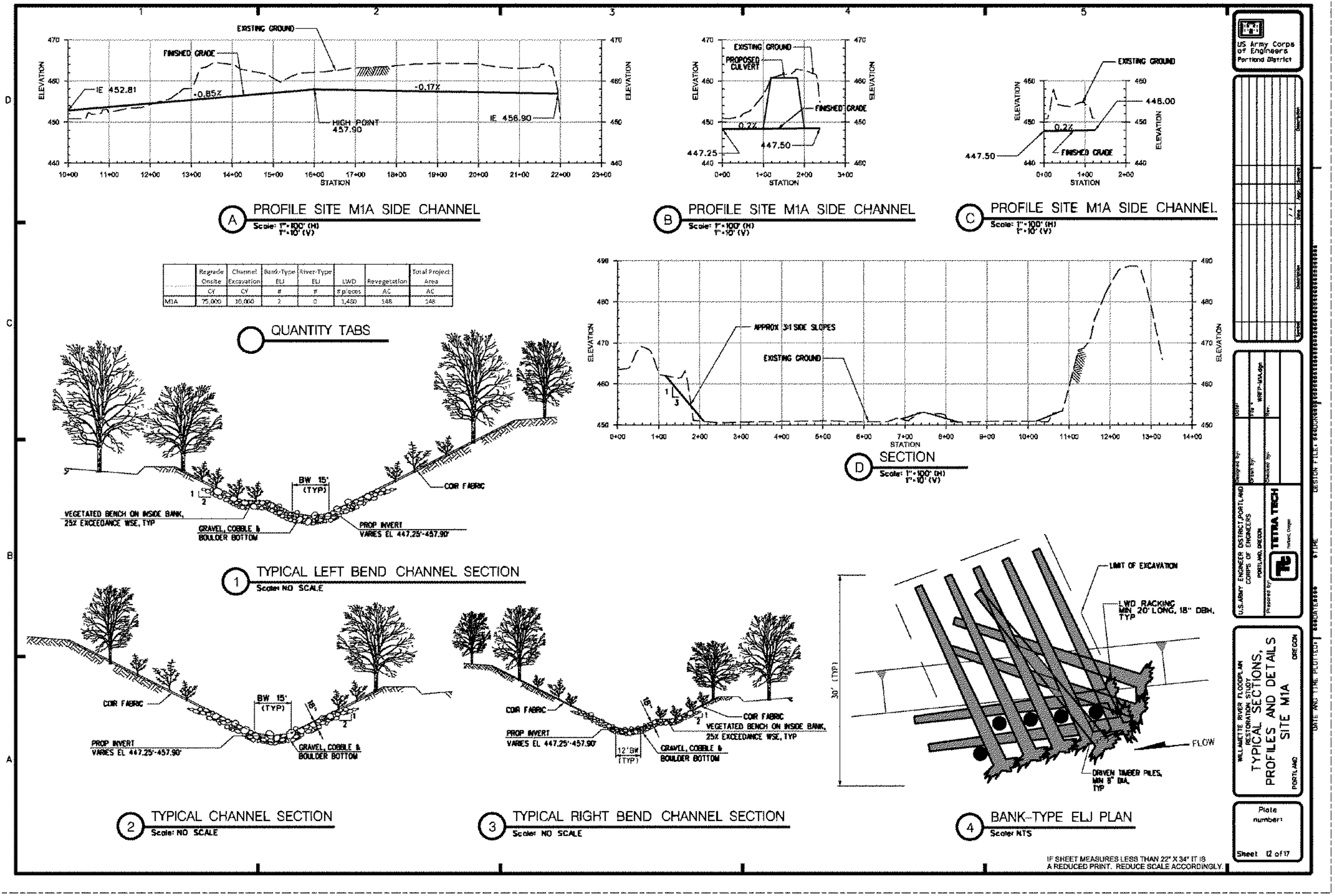
Plate number:
Sheet 9 of 17

DATE AND TIME PLOTTED: $$$$DATE$$$$ $TIME DESIGN FILE: $$$$DGN$$$$

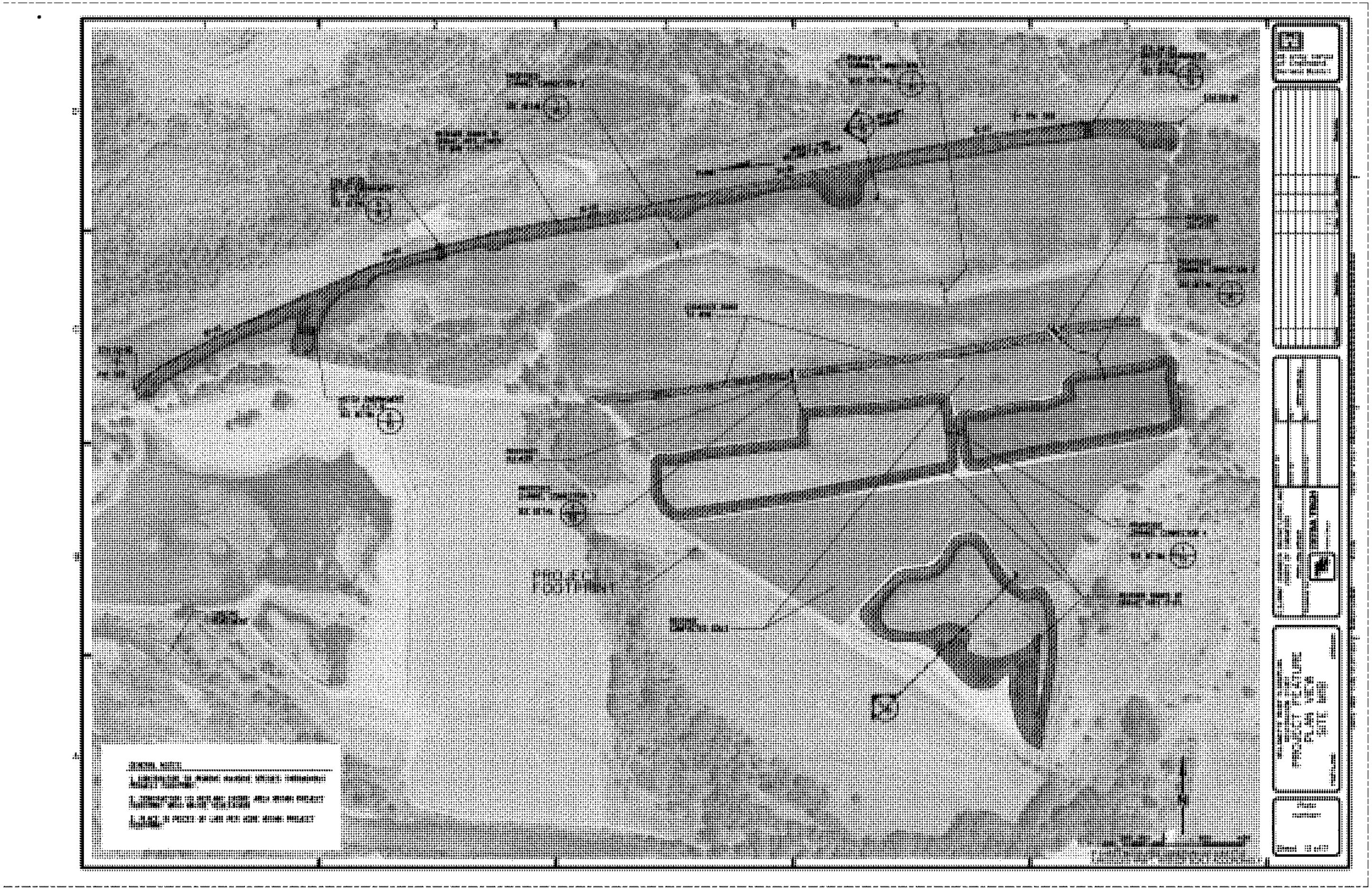


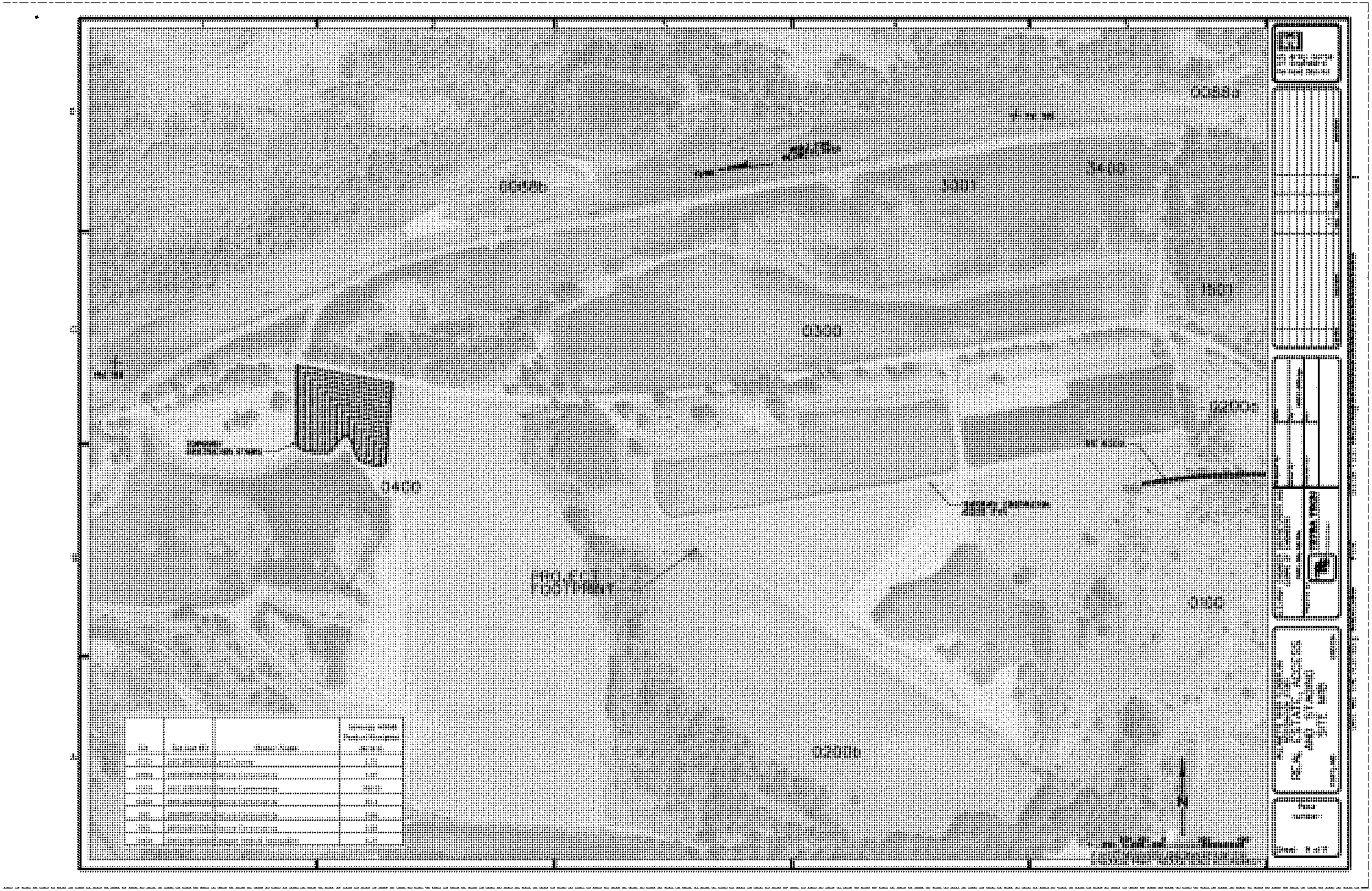
PROJECT FOOTPRINT
PROJECT FEATURE
PLAN VIEW
SITE MAP

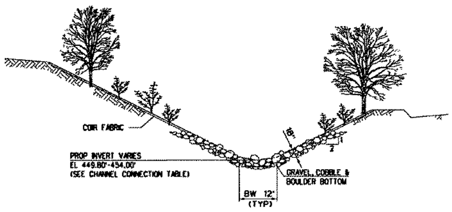

0400a
0400b
0300a
0200a
0900
0800
0500
0600
0200b
0300b
REAL ESTATE, ACCESS AND STAGING SITE MAP
TETRA TECH



	Regrade Onsite	Channel Excavation	Bank-Type ELJ	River-Type ELJ	LWD	Revegetation	Total Project Area
	CY	CY	#	#	# pieces	AC	AC
M1A	75,000	10,000	2	0	1,480	348	348


PROJECT FOOTPRINT
PROJECT FEATURE
PLAN VIEW
SITE MAP
TETRA TECH


0088a
0088b
3301
3400
1501
0300
0200a
0400
PROJECT
FOOTPRINT
0100
0200b
N
REAL ESTATE, ACCESS
AND STAGING
SITE MAP
TETRA TECH



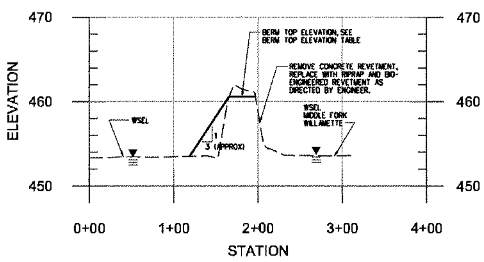
① TYPICAL SECTION
Scale: NO SCALE

CHANNEL CONNECTION TABLE			
#	U/S IE	D/S IE	LENGTH
1	454.0	453.9	90 FT
2	450.0	449.8	100 FT
3	454.0	453.7	275 FT
4	452.9	452.7	100 FT
5	450.0	449.8	200 FT

NOTE: UPSTREAM INVERT IS SOUTH AND EAST OF DOWNSTREAM INVERT.

	Regrade Onsite	Channel Excavation	Bank-Type ELJ	River-Type ELJ	LWD	Revegetation	Total Project Area
	CY	CY	#	#	# pieces	AC	AC
M1B	240000	20152	0	0	1704	170	170

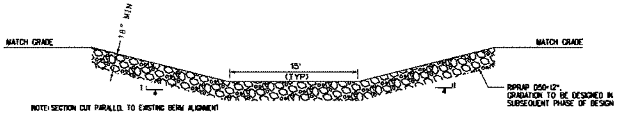
QUANTITY TABS



NOTE: BERM TOP ELEVATIONS ARE BASED ON WATER SURFACE ELEVATIONS FOR 2-YR RETURN PERIOD FLOOD

BERM TOP ELEVATION	
STA	ELEVATION
0+00	463.94
5+00	462.48
10+00	461.89
15+00	461.28
20+00	460.49
25+00	459.86
30+00	459.34
35+00	458.63
40+00	457.47
45+00	456.41
50+00	455.61
53+00	455.13

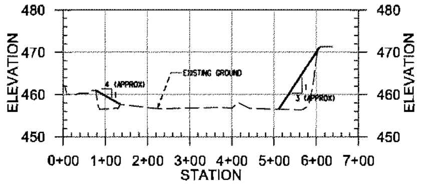
Ⓐ TYPICAL SECTION – BANK RESHAPING FOR RIVER BERM
Scale: 1"=50' (H)
1"=5' (V)



NOTE: SECTION CUT PARALLEL TO EXISTING BERM ALIGNMENT

Ⓑ NOTCH EMBANKMENT SECTION
Scale: 1"=5' (H)
1"=5' (V)

NOTE: NOTCH ELEVATIONS SHOWN ON PLAN SHEET ARE BASE ON WATER SURFACE ELEVATIONS FOR 90% EXCEEDANCE FLOW FOR WINTER SEASON.



Ⓒ TYPICAL SECTION – POND
Scale: 1"=100' (H)
1"=10' (V)

IF SHEET MEASURES LESS THAN 22" X 34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

US Army Corps of Engineers
Portland District

U.S. ARMY ENGINEER DISTRICT, PORTLAND
CORPS OF ENGINEERS
PORTLAND, OREGON

Prepared by:
TETRA TECH
Portland, Oregon

Designed by:
Drawn by:
Checked by:
Date:
File #: WRFP-M1B.dgn
Rev.

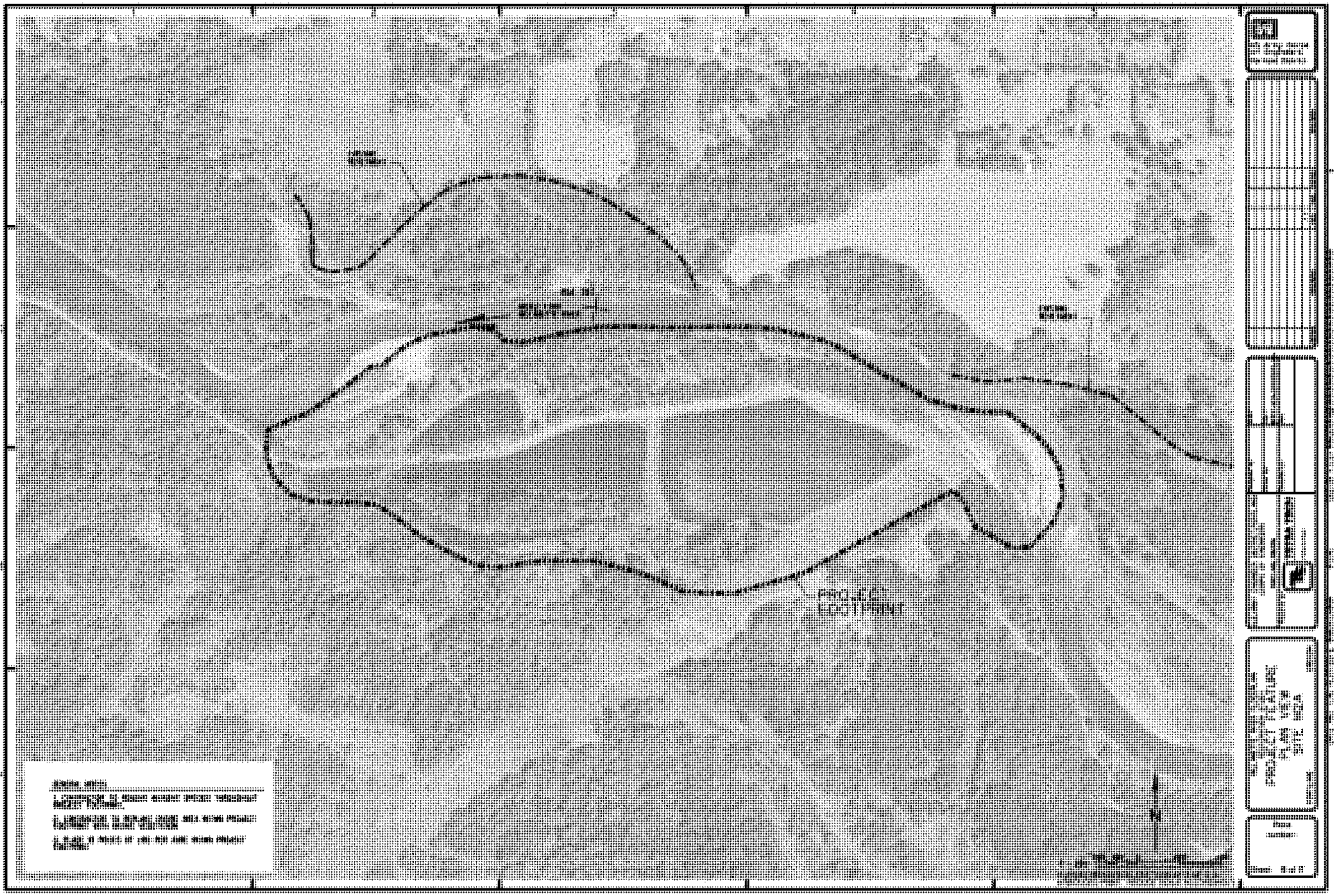
WILLAMETTE RIVER FLOODPLAIN
RESTORATION STUDY

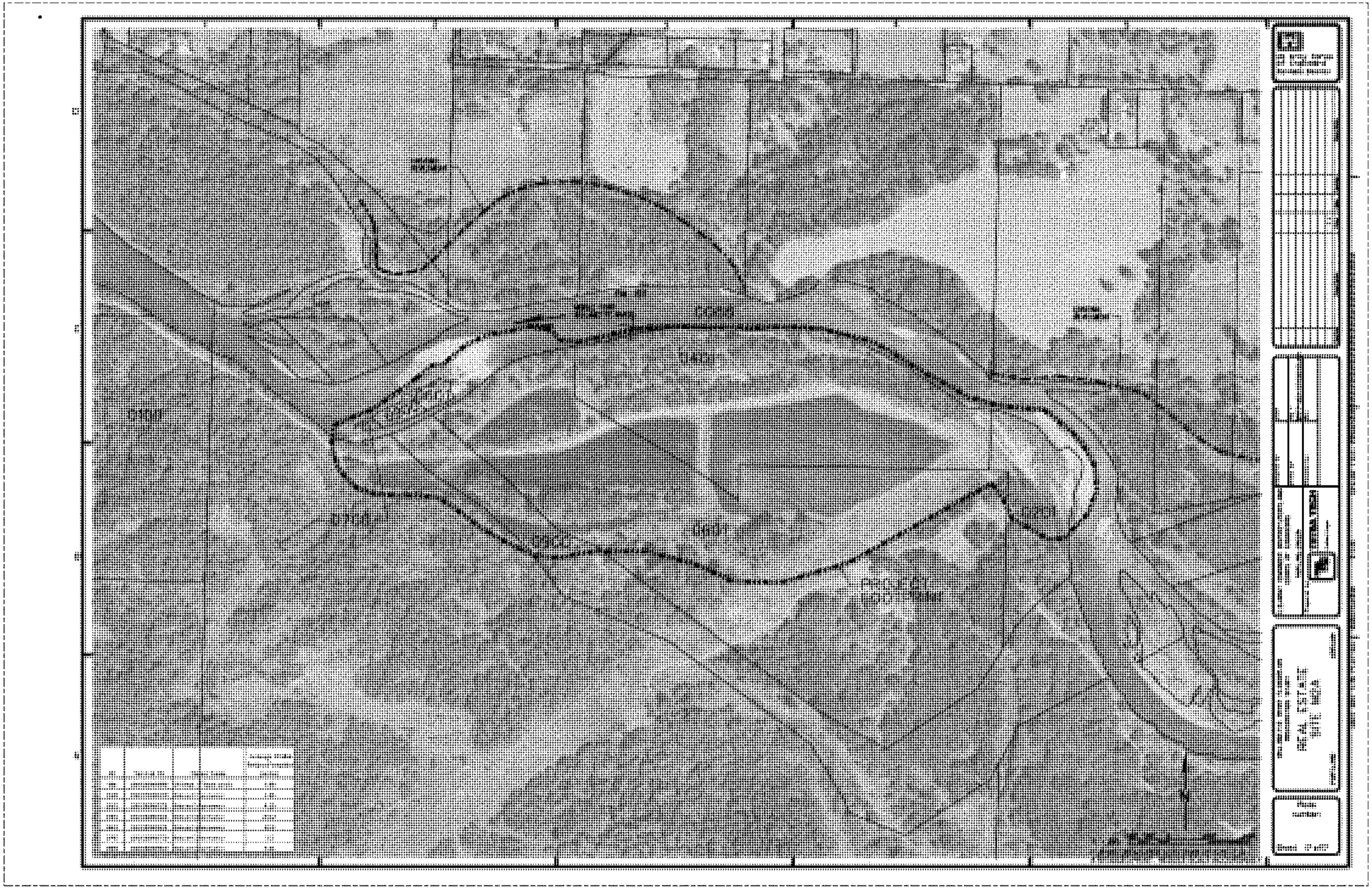
TYPICAL SECTION,
PROFILE AND DETAILS
SITE M1B

PORTLAND OREGON

Plate number:
Sheet 15 of 17

DATE AND TIME PLOTTED: $$$DATE$$$ $TIME DESIGN FILE: $$$$DGN$$$$


PROJECT FOOTPRINT
PROJECT FEATURE
PLAN VIEW
SITE N2A


0100
0700
PROJECT FOOTPRINT
REAL ESTATE
SITE MAP
TETRA TECH

ATTACHMENT 2
EDR DATABASE SEARCH RESULTS

Coast Fork Confluence Site
Franklin Blvd/Seavey Loop Rd
Eugene, OR 97405

Inquiry Number: 3118160.6s
July 07, 2011

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

FORM-BPF-ASH

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Map Findings Summary 4

Map Findings 7

Orphan Summary 98

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Physical Setting Source Summary A-2

Physical Setting SSURGO Soil Map A-5

Physical Setting Source Map A-9

Physical Setting Source Map Findings A-11

Physical Setting Source Records Searched A-26

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

FRANKLIN BLVD/SEAVEY LOOP RD
EUGENE, OR 97405

COORDINATES

Latitude (North):	44.018400 - 44° 1' 6.2"
Longitude (West):	123.011400 - 123° 0' 41.0"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	499086.3
UTM Y (Meters):	4873700.5
Elevation:	454 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	44123-A1 EUGENE EAST, OR
Most Recent Revision:	1986
East Map:	44122-A8 SPRINGFIELD, OR
Most Recent Revision:	1986

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	2006, 2005
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL........................ National Priority List

EXECUTIVE SUMMARY

Proposed NPL	Proposed National Priority List Sites
NPL LIENS	Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL	National Priority List Deletions

Federal CERCLIS list

CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY	Federal Facility Site Information listing

Federal RCRA CORRACTS facilities list

CORRACTS	Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF	RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG	RCRA - Large Quantity Generators
RCRA-SQG	RCRA - Small Quantity Generators

Federal institutional controls / engineering controls registries

US ENG CONTROLS	Engineering Controls Sites List
US INST CONTROL	Sites with Institutional Controls

Federal ERNS list

ERNS	Emergency Response Notification System

State and tribal landfill and/or solid waste disposal site lists

SWF/LF	Solid Waste Facilities List

State and tribal leaking storage tank lists

INDIAN LUST	Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

AST	Aboveground Storage Tanks
INDIAN UST	Underground Storage Tanks on Indian Land
FEMA UST	Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

ENG CONTROLS	Engineering Controls Recorded at ESCI Sites
INST CONTROL	Institutional Controls Recorded at ESCI Sites

State and tribal voluntary cleanup sites

INDIAN VCP	Voluntary Cleanup Priority Listing

EXECUTIVE SUMMARY

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
HIST LF	Old Closed SW Disposal Sites
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL	Clandestine Drug Labs
AOCONCERN	Columbia Slough
CDL	Uninhabitable Drug Lab Properties
US HIST CDL	National Clandestine Laboratory Register

Local Land Records

LIENS 2	CERCLA Lien Information
LUCIS	Land Use Control Information System

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	Spill Database

Other Ascertainable Records

DOT OPS	Incident and Accident Data
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
RAATS	RCRA Administrative Action Tracking System
UIC	Underground Injection Control Program Database
OR HAZMAT	Hazmat/Incidents
DRYCLEANERS	Drycleaning Facilities
AIRS	Oregon Title V Facility Listing
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER	PCB Transformer Registration Database
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
COAL ASH DOE	Sleam-Electric Plan Operation Data
FINANCIAL ASSURANCE	Financial Assurance Information Listing
COAL ASH	Coal Ash Disposal Sites Listing

EXECUTIVE SUMMARY

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants..... EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal CERCLIS NFRAP site List

CERC-NFRAP: Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

A review of the CERC-NFRAP list, as provided by EDR, and dated 02/25/2011 has revealed that there is 1 CERC-NFRAP site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
USDOE BPA ALVEY SUBSTATION	***86000 FRANKLIN***	***W 1/2 - 1 (0.633 mi.)***	***C12***	***20***

Federal RCRA generators list

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 03/11/2011 has revealed that there are

EXECUTIVE SUMMARY

3 RCRA-CESQG sites within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CRANE EQUIPMENT MFG CO	*33740 SEAVEY LOOP RD*	*SW 1/4 - 1/2 (0.497 mi.)*	*A7*	*13*
SHELL SS SAP 121618	*86623 FRANKLIN BLVD*	*WSW 1/2 - 1 (0.611 mi.)*	*B9*	*17*
USDOE BPA ALVEY SUBSTATION	*86000 FRANKLIN*	*W 1/2 - 1 (0.633 mi.)*	*C12*	*20*

State- and tribal - equivalent NPL

ECSI: The Environmental Cleanup Site Information System records information about sites in Oregon that may be of environmental interest. The data come from the Department of Environmental Quality.

A review of the ECSI list, as provided by EDR, and dated 06/01/2011 has revealed that there are 5 ECSI sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BPA - ALVEY SUBSTATION	*86000 FRANKLIN BLVD.*	*W 1/2 - 1 (0.633 mi.)*	*C14*	*25*
PRIDE OF OREGON - MCVAY	*86714 MCVAY HWY*	*W 1/2 - 1 (0.695 mi.)*	*D19*	*66*
EL-JAY FACTORY #2	*86470 FRANKLIN BLVD.*	*WNW 1/2 - 1 (0.936 mi.)*	*E26*	*72*
LANE COMMUNITY COLLEGE	*4000 E 30TH AVE*	*WSW 1 - 2 (1.276 mi.)*	*28*	*78*

Lower Elevation	Address	Direction / Distance	Map ID	Page
GOSHEN EQUIPMENT	*34024 OLD WILLAMETTE HI*	*S 1 - 2 (1.478 mi.)*	*29*	*94*

State- and tribal - equivalent CERCLIS

OR CRL: Sites that are or may be contaminated and may require cleanup.

A review of the OR CRL list, as provided by EDR, and dated 05/24/2011 has revealed that there is 1 OR CRL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BPA - ALVEY SUBSTATION	*86000 FRANKLIN BLVD.*	*W 1/2 - 1 (0.633 mi.)*	*C14*	*25*

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environmental Quality's LUST Database List.

A review of the LUST list, as provided by EDR, and dated 04/01/2011 has revealed that there are 12 LUST sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EMERALD PEOPLES UTILITY DISTRI	*33733 SEAVEY LOOP RD*	*SW 1/4 - 1/2 (0.492 mi.)*	*A5*	*9*
SHELL 121618	86623 FRANKLIN BLVD	WSW 1/2 - 1 (0.611 mi.)	B10	20
SUNNY LCC Cleanup Complete: 04/23/1997	86623 E FRANKLIN BLVD	WSW 1/2 - 1 (0.611 mi.)	B11	20

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
ALVEY SUBSTATION BPA Cleanup Complete: 12/20/2006	86000 FRANKLIN BLVD	W 1/2 - 1 (0.633 mi.)	C13	25
ALVEY SUBSTATION Cleanup Complete: 03/18/2005	***86000 FRANKLIN***	***W 1/2 - 1 (0.633 mi.)***	***C15***	***35***
SEQUENTIAL BIOFUELS	***86714 MCVAY HWY***	***W 1/2 - 1 (0.695 mi.)***	***D17***	***40***
PRIDE OF OREGON - MCVAY Cleanup Complete: 04/17/1991	***86714 MCVAY HWY***	***W 1/2 - 1 (0.695 mi.)***	***D19***	***66***
YATES ASTRO Cleanup Complete: 02/26/2001	86742 MCVAY HWY	W 1/2 - 1 (0.696 mi.)	D20	70
UNOCAL 4458	***86770 MCVAY HWY***	***W 1/2 - 1 (0.699 mi.)***	***D22***	***71***
GOULTER PROPERTY Cleanup Complete: 07/12/1991	86430 FRANKLIN BLVD	WNW 1/2 - 1 (0.853 mi.)	24	72
EL-JAY DIVISION - CEDARAPIDS I Cleanup Complete: 12/30/2002	***86470 FRANKLIN BLVD***	***WNW 1/2 - 1 (0.936 mi.)***	***E25***	***72***
EL JAY DIVISION Cleanup Complete: 11/22/2002	86470 FRANKLIN BLVD	WNW 1/2 - 1 (0.936 mi.)	E27	77

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Quality's UST List on Disk.

A review of the UST list, as provided by EDR, and dated 04/01/2011 has revealed that there are 7 UST sites within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EMERALD PEOPLES UTILITY DISTRI	***33733 SEAVEY LOOP RD***	***SW 1/4 - 1/2 (0.492 mi.)***	***A5***	***9***
JACKSON FOOD STORES #551	86623 FRANKLIN BLVD	WSW 1/2 - 1 (0.611 mi.)	B8	16
ALVEY SUBSTATION	***86000 FRANKLIN***	***W 1/2 - 1 (0.633 mi.)***	***C15***	***35***
SEQUENTIAL BIOFUELS	***86714 MCVAY HWY***	***W 1/2 - 1 (0.695 mi.)***	***D17***	***40***
ASTRO #208	86742 MCVAY HIGHWAY	W 1/2 - 1 (0.696 mi.)	D21	71
UNOCAL 4458	***86770 MCVAY HWY***	***W 1/2 - 1 (0.699 mi.)***	***D22***	***71***
EMPORIUM	86776 MCVAY HWY	W 1/2 - 1 (0.700 mi.)	D23	71

State and tribal voluntary cleanup sites

VCP: Responsible parties have entered into an agreement with DEQ to voluntarily address contamination associated with their property.

A review of the VCP list, as provided by EDR, and dated 04/22/2011 has revealed that there are 2 VCP sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PRIDE OF OREGON - MCVAY	***86714 MCVAY HWY***	***W 1/2 - 1 (0.695 mi.)***	***D19***	***66***
EL-JAY FACTORY #2	***86470 FRANKLIN BLVD.***	***WNW 1/2 - 1 (0.936 mi.)***	***E26***	***72***

EXECUTIVE SUMMARY

State and tribal Brownfields sites

Brownfields investigations and/or cleanups that have been conducted in Oregon.

A review of the BROWNFIELDS list, as provided by EDR, and dated 05/24/2011 has revealed that there is 1 BROWNFIELDS site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PRIDE OF OREGON - MCVAY	***86714 MCVAY HWY***	***W 1/2 - 1 (0.695 mi.)***	***D19***	***66***

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: The EPA's listing of Brownfields properites addressed by Cooperative Agreement Recipients and Brownfields properties addressed by Targeted Brownfields Assessments

A review of the US BROWNFIELDS list, as provided by EDR, and dated 03/29/2011 has revealed that there is 1 US BROWNFIELDS site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MCVAY HIGHWAY BIOFUELING STATI	86714 MCVAY HIGHWAY	W 1/2 - 1 (0.695 mi.)	D18	40

Other Ascertainable Records

RCRA-NonGen: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA-NonGen list, as provided by EDR, and dated 03/11/2011 has revealed that there are 2 RCRA-NonGen sites within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EMERALD PUD	***33733 SEAVEY LOOP RD***	***SW 1/4 - 1/2 (0.492 mi.)***	***A1***	***7***
DOYLES HARLEY DAVIDSON	86441 COLLEGE VIEW RD	SW 1/2 - 1 (0.691 mi.)	16	39

FTTS: FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years. To maintain currency, EDR contacts the Agency on a quarterly basis.

A review of the FTTS list, as provided by EDR, and dated 04/09/2009 has revealed that there is 1 FTTS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EMERALD PUD	***33733 SEAVEY LOOP RD***	***SW 1/4 - 1/2 (0.492 mi.)***	***A1***	***7***

EXECUTIVE SUMMARY

HIST FTTS: A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

A review of the HIST FTTS list, as provided by EDR, and dated 10/19/2006 has revealed that there is 1 HIST FTTS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EMERALD PUD	33733 SEAVEY LOOP RD	SW 1/4 - 1/2 (0.492 mi.)	A3	8

PADS: The PCB Activity Database identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify the United States Environmental Protection Agency of such activities. The source of this database is the U.S. EPA.

A review of the PADS list, as provided by EDR, and dated 11/01/2010 has revealed that there is 1 PADS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EMERALD PUD	33733 SEAVEY LOOP RD	SW 1/4 - 1/2 (0.492 mi.)	A2	8

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 04/14/2010 has revealed that there are 2 FINDS sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EMERALD PEOPLES UTILITY DISTRI	33733 SEAVEY LOOP ROAD	SW 1/4 - 1/2 (0.492 mi.)	A4	9
CRANE EQUIPMENT MFG CO	***33740 SEAVEY LOOP RD***	***SW 1/4 - 1/2 (0.497 mi.)***	***A7***	***13***

MANIFEST: Hazardous waste manifest information.

A review of the MANIFEST list, as provided by EDR, and dated 12/31/2009 has revealed that there is 1 MANIFEST site within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SHELL SS SAP 121618	***86623 FRANKLIN BLVD***	***WSW 1/2 - 1 (0.611 mi.)***	***B9***	***17***

EXECUTIVE SUMMARY

NPDES: A listing of permitted wastewater facilities.

A review of the NPDES list, as provided by EDR, and dated 05/10/2011 has revealed that there is 1 NPDES site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EMERALD PEOPLES UTILITY DISTRI	***33733 SEAVEY LOOP RD***	***SW 1/4 - 1/2 (0.492 mi.)***	***A5***	***9***

HSIS: Hazardous Substance Information Survey

A review of the HSIS list, as provided by EDR, and dated 12/01/2010 has revealed that there is 1 HSIS site within approximately 0.5 miles of the target property.

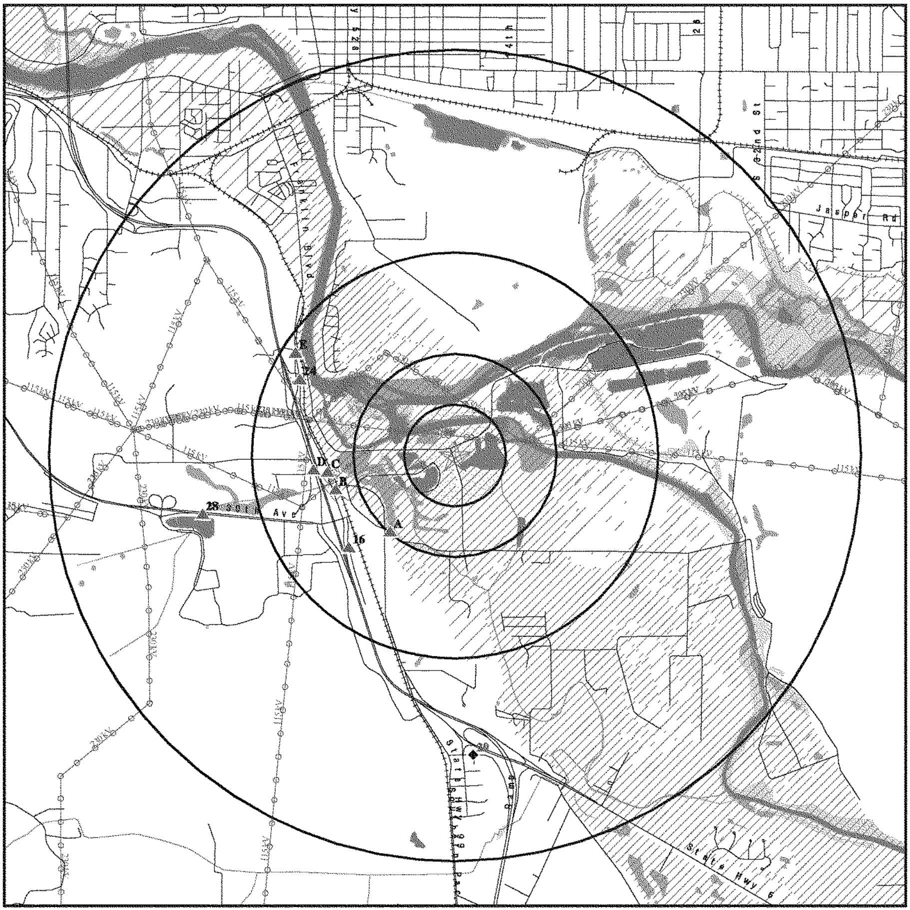
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EMERALD PEOPLES UTILITY	33733 SEAVEY LOOP RD	SW 1/4 - 1/2 (0.492 mi.)	A6	11

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 20 records.

Site Name	Database(s)
STATON COMPANIES INC	AST,HSIS
WASTE ALTERNATIVES TERMINATED	LF
FUTURE LOGGING	LUST
JAMES RIVER TAG FUELING SITE	LUST
STATON COMPANIES	RCRA-NLR
GOSHEN AUTO RECYCLERS	RCRA-NLR
OIL RE-REFINING COMPANY	RCRA-NLR
WEYERHAEUSER NR CO SOUTH VALLEY	FINDS,RCRA-CESQG
WESTERN COATING, INC.	FINDS,NPDES
JAMES RIVER TAG FUELING SITE	FINDS
MCKENZIE HWY 126E MP 49	HAZMAT
INTERSTATE 5 NEAR HWY 58	HAZMAT
MP 16 MCKENZIE HWY	HAZMAT
MCKENZIE HWY, MP#19.2	HAZMAT
WEYERHAEUSER NR COMPANY	HSIS
ZIP-O-LOG MILLS INC	HSIS
CONE LUMBER COMPANY	NPDES
REMOTE AUTO DISMANTLING	NPDES
GOSHEN AUTO RECYCLERS	NPDES
MOUNTAIN GATE PHASE 4	NPDES

OVERVIEW MAP - 3118160.6s

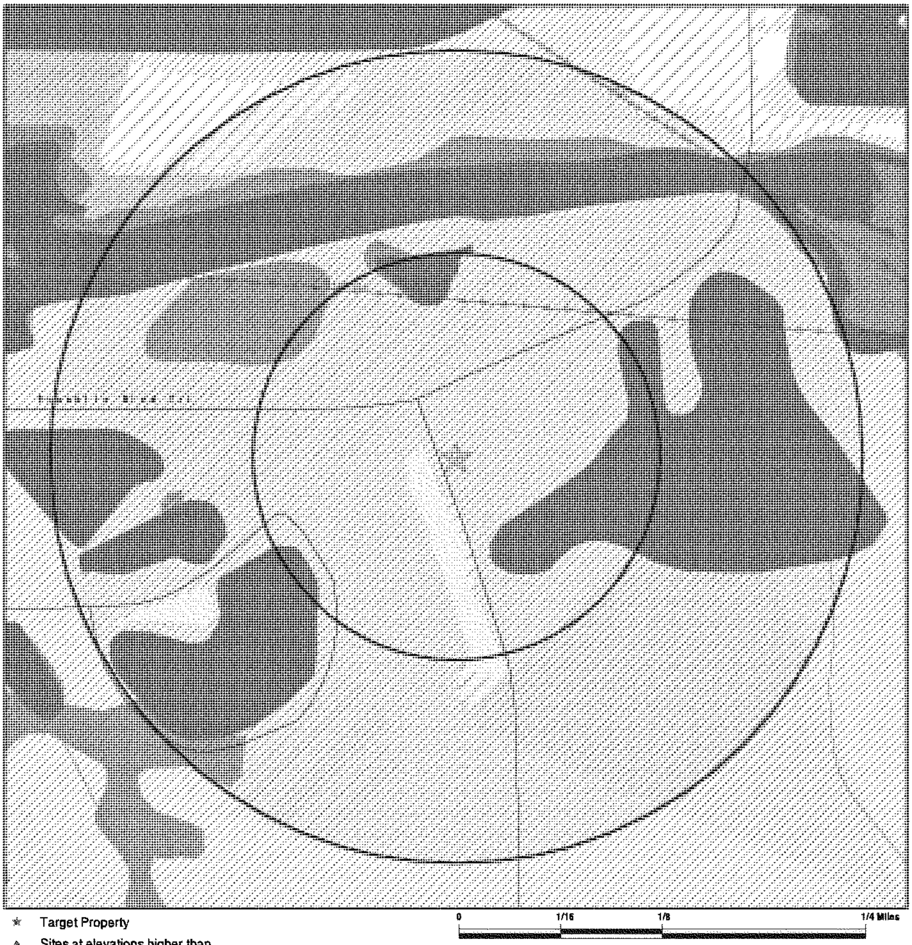


- ★ Target Property
- △ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Manufactured Gas Plants
- ▨ National Priority List Sites
- ▨ Dept. Defense Sites
- ▨ Indian Reservations BIA
- Power transmission lines
- Oil & Gas pipelines
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- ▨ National Wetland Inventory
- ▨ State Wetlands
- ▨ Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Coast Fork Confluence Site	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Franklin Blvd/Seavey Loop Rd Eugene OR 97405	CONTACT:	Merri Martz
		INQUIRY #:	3118160.6s
LAT/LONG:	44.0184 / 123.0114	DATE:	July 07, 2011 7:14 pm

DETAIL MAP - 3118160.6s



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Manufactured Gas Plants
- ▲ Sensitive Receptors
- ▨ National Priority List Sites
- ▨ Dept. Defense Sites
- ▨ Indian Reservations BIA
- ∿ Power transmission lines
- ∿ Oil & Gas pipelines
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- ▨ National Wetland Inventory
- ▨ State Wetlands
- ▦ Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Coast Fork Confluence Site
ADDRESS: Franklin Blvd/Seavey Loop Rd
Eugene OR 97405
LAT/LONG: 44.0184 / 123.0114

CLIENT: Tetra Tech EM, Inc.
CONTACT: Merri Martz
INQUIRY #: 3118160.6s
DATE: July 07, 2011 7:15 pm

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.500	0	0	0	0	0	0
Proposed NPL		1.500	0	0	0	0	0	0
NPL LIENS		0.500	0	0	0	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.500	0	0	0	0	0	0
Federal CERCLIS list								
CERCLIS		1.000	0	0	0	0	NR	0
FEDERAL FACILITY		1.500	0	0	0	0	0	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		1.000	0	0	0	1	NR	1
Federal RCRA CORRACTS facilities list								
CORRACTS		1.500	0	0	0	0	0	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		1.000	0	0	0	0	NR	0
Federal RCRA generators list								
RCRA-LQG		0.750	0	0	0	0	NR	0
RCRA-SQG		0.750	0	0	0	0	NR	0
RCRA-CESQG		0.750	0	0	1	2	NR	3
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		1.000	0	0	0	0	NR	0
US INST CONTROL		1.000	0	0	0	0	NR	0
Federal ERNS list								
ERNS		0.500	0	0	0	NR	NR	0
State- and tribal - equivalent NPL								
ECSI		1.500	0	0	0	3	2	5
State- and tribal - equivalent CERCLIS								
OR CRL		1.000	0	0	0	1	NR	1
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		1.000	0	0	0	0	NR	0
State and tribal leaking storage tank lists								
LUST		1.000	0	0	1	11	NR	12
INDIAN LUST		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
State and tribal registered storage tank lists								
UST		0.750	0	0	1	6	NR	7
AST		0.750	0	0	0	0	NR	0
INDIAN UST		0.750	0	0	0	0	NR	0
FEMA UST		0.750	0	0	0	0	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS		1.000	0	0	0	0	NR	0
INST CONTROL		1.000	0	0	0	0	NR	0
State and tribal voluntary cleanup sites								
VCP		1.000	0	0	0	2	NR	2
INDIAN VCP		1.000	0	0	0	0	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		1.000	0	0	0	1	NR	1
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		1.000	0	0	0	1	NR	1
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9		1.000	0	0	0	0	NR	0
ODI		1.000	0	0	0	0	NR	0
HIST LF		1.000	0	0	0	0	NR	0
INDIAN ODI		1.000	0	0	0	0	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		0.500	0	0	0	NR	NR	0
AOCONCERN		1.500	0	0	0	0	0	0
CDL		0.500	0	0	0	NR	NR	0
US HIST CDL		0.500	0	0	0	NR	NR	0
Local Land Records								
LIENS 2		0.500	0	0	0	NR	NR	0
LUCIS		1.000	0	0	0	0	NR	0
Records of Emergency Release Reports								
HMIRS		0.500	0	0	0	NR	NR	0
SPILLS		0.500	0	0	0	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.750	0	0	1	1	NR	2
DOT OPS		0.500	0	0	0	NR	NR	0
DOD		1.500	0	0	0	0	0	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FUDS		1.500	0	0	0	0	0	0
CONSENT		1.500	0	0	0	0	0	0
ROD		1.500	0	0	0	0	0	0
UMTRA		1.000	0	0	0	0	NR	0
MINES		0.750	0	0	0	0	NR	0
TRIS		0.500	0	0	0	NR	NR	0
TSCA		0.500	0	0	0	NR	NR	0
FTTS		0.500	0	0	1	NR	NR	1
HIST FTTS		0.500	0	0	1	NR	NR	1
SSTS		0.500	0	0	0	NR	NR	0
ICIS		0.500	0	0	0	NR	NR	0
PADS		0.500	0	0	1	NR	NR	1
MLTS		0.500	0	0	0	NR	NR	0
RADINFO		0.500	0	0	0	NR	NR	0
FINDS		0.500	0	0	2	NR	NR	2
RAATS		0.500	0	0	0	NR	NR	0
UIC		TP	NR	NR	NR	NR	NR	0
MANIFEST		0.750	0	0	0	1	NR	1
OR HAZMAT		0.500	0	0	0	NR	NR	0
DRYCLEANERS		0.750	0	0	0	0	NR	0
NPDES		0.500	0	0	1	NR	NR	1
AIRS		0.500	0	0	0	NR	NR	0
HSIS		0.500	0	0	1	NR	NR	1
INDIAN RESERV		1.500	0	0	0	0	0	0
SCRD DRYCLEANERS		1.000	0	0	0	0	NR	0
PCB TRANSFORMER		0.500	0	0	0	NR	NR	0
COAL ASH EPA		1.000	0	0	0	0	NR	0
COAL ASH DOE		0.500	0	0	0	NR	NR	0
FINANCIAL ASSURANCE		0.500	0	0	0	NR	NR	0
COAL ASH		1.000	0	0	0	0	NR	0

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
Manufactured Gas Plants		1.500	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

A1
SW
1/4-1/2
0.492 mi.
2599 ft.

EMERALD PUD
33733 SEAVEY LOOP RD
EUGENE, OR 97405

Site 1 of 7 in cluster A

RCRA-NonGen **1010567371**
FTTS **ORSTATE07121**

Relative:
Higher

Actual:
462 ft.

RCRA-NonGen:
Date form received by agency: 09/19/2007
Facility name: EMERALD PUD
Facility address: 33733 SEAVEY LOOP RD
EUGENE, OR 97405-9602
EPA ID: ORSTATE07121
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 10
Land type: Other land type
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 08/23/2007
Evaluation: COMPLIANCE ASSISTANCE VISIT
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

FTTS INSP:
Inspection Number: 199201022666 1
Region: 10
Inspection Date: 01/02/92
Inspector: HEISTER
Violation occurred: Yes
Investigation Type: Section 6 PCB Federal Conducted
Investigation Reason: Neutral Scheme, Region
Legislation Code: TSCA
Facility Function: User

MAP FINDINGS

Map ID
Direction
Distance
Elevation | Site | Database(s) | EDR ID Number
EPA ID Number

A2
SW
1/4-1/2
0.492 mi.
2599 ft.

EMERALD PUD
33733 SEAVEY LOOP RD
EUGENE, OR 97405

PADS **1004580675**
ORD080249048

Site 2 of 7 in cluster A

Relative:
Higher

Actual:
462 ft.

PADS:
EPAID: ORD080249048
Facility name: EMERALD PUD
Facility Address: 33733 SEAVEY LOOP RD
EUGENE, OR 97405
Facility country: US
Generator: Yes
Storer: No
Transporter: No
Disposer: No
Research facility: No
Smelter: No
Facility owner name: EMERALD PUD
Contact title: Not reported
Contact name: CROCKER DAVID K
Contact tel: (503)746-1583
Contact extension: Not reported
Mailing address: 33733 SEAVEY LOOP RD
EUGENE, OR 97405
Mailing country: US
Cert. title: Not reported
Cert. name: Not reported
Cert. date: 2/14/1990
Date received: 3/14/1990

A3
SW
1/4-1/2
0.492 mi.
2599 ft.

EMERALD PUD
33733 SEAVEY LOOP RD
EUGENE, OR 97405

HIST FTTS **1007276881**
N/A

Site 3 of 7 in cluster A

Relative:
Higher

Actual:
462 ft.

HIST FTTS INSP:
Inspection Number: 199201022666 1
Region: 10
Inspection Date: Not reported
Inspector: HEISTER
Violation occurred: Yes
Investigation Type: Section 6 PCB Federal Conducted
Investigation Reason: Neutral Scheme, Region
Legislation Code: TSCA
Facility Function: User

A4
SW
1/4-1/2
0.492 mi.
2599 ft.

EMERALD PEOPLES UTILITY DISTRICT
33733 SEAVEY LOOP ROAD
EUGENE, OR 97405

FINDS **1005649230**
N/A

Site 4 of 7 in cluster A

Relative:
Higher

Actual:
462 ft.

FINDS:

Registry ID: 110006697627

Environmental Interest/Information System

OR-DEQ (Oregon - Department Of Environmental Quality) is a regulatory agency whose job is to protect the quality of Oregon's Environment. DEQ uses a combination of technical assistance, inspections and permitting to help public and private facilities and citizens understand and comply with state and federal environmental regulations.

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

PCS (Permit Compliance System) is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

A5
SW
1/4-1/2
0.492 mi.
2599 ft.

EMERALD PEOPLES UTILITY DISTRICT
33733 SEAVEY LOOP RD
EUGENE, OR 97405

LUST **1000486073**
UST **N/A**
NPDES

Site 5 of 7 in cluster A

Relative:
Higher

Actual:
462 ft.

LUST:

Region:	Western Region
Facility ID:	20-98-7015
Cleanup Received Date:	05/01/1998
Cleanup Start Date:	05/01/1998
Cleanup Complete Date:	**Not reported**

UST:

Facility ID:	10121
Facility Telephone:	(541)744-7478
Permittee Name:	BILLY WILSON, MECHANIC
Number of Permitted Tanks:	3
Active Tanks:	3
Decommissioned Tanks:	Not reported
Number of Tanks:	3

EMERALD PEOPLES UTILITY DISTRICT (Continued) **1000486073**

NPDES:

WQ File Nbr:	110724
Legal Name:	EMERALD PEOPLES UTILITY DISTRICT
Region:	Not reported
Pri SIC:	4231
Facility Type:	Not reported
Latitude:	Not reported
Longitude:	Not reported
Category:	Not reported
Permit Type:	GEN17A
Permit Active:	Not reported
Is Active?:	FALSE
Permit Description:	Not reported
Expiration Date:	Not reported
EPA Number:	Not reported
UIC Facility:	Not reported
Admin Agent:	Not reported
Last Action Date:	Not reported
Permit Writer:	Not reported
Compliance Inspector:	Not reported
DMR Reviewer:	Not reported
Application Number:	Not reported
Class:	Not reported
Start Date:	Not reported

WQ File Nbr:	110724
Legal Name:	EMERALD PEOPLES UTILITY DISTRICT
Region:	WR
Pri SIC:	4231
Facility Type:	TRUCKING TERMINAL FACILITIES
Latitude:	44.0154
Longitude:	-123.0201
Category:	IND
Permit Type:	GEN17B
Permit Active:	True
Is Active?:	Not reported
Permit Description:	Industrial Wastewater; WPCF wash water
Expiration Date:	10/31/2017
EPA Number:	n/a
UIC Facility:	False
Admin Agent:	Salem Office
Last Action Date:	6/26/2009
Permit Writer:	Not reported
Compliance Inspector:	Wiltse
DMR Reviewer:	Wiltse
Application Number:	985594
Class:	N/A
Start Date:	12/20/2002

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
A6 **SW** **1/4-1/2** **0.492 mi.** **2599 ft.**	**EMERALD PEOPLES UTILITY** **33733 SEAVEY LOOP RD** **EUGENE, OR 97405** **Site 6 of 7 in cluster A**	**HSIS**	**S106847428** **N/A**

Relative:
Higher

Actual:
462 ft.

HSIS:
Facility Id: 078638
Physical State Of The Substance: 2
Physical State: LIQUID
Average Amount Possessed During The Year Code: 21
Maximum Amount Possessed During The Year Code: 30
Chemical Trade Name: GASOLINE
Applicable Unit Of Measure Code: 2
Description Of The Unit Of Measure: GALLONS
Type Code: B
Description: UNDERGROUND TANK
Type Code: Not reported
Temperature Description: Not reported
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Pressure of Code: Not reported
Pressure Description: Not reported
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Temperature Description: Not reported
Temperature of The Hazardous Substance Code: Not reported
Days Hazardous Substance On Site During Year: 365
Is The Substance Protected A Trade Secret: False
Description Of The Max Qnty Code: 10,000-49,999
Description Of The Avg Qnty Code: 5,000-9,999
Most Hazardous Ingridient: PETROLEUM DISTILLATES
United Nations/north America 4 Digit Class Number: 1203
Hazard Rank: 2
Chemical Abstract Service Identifier Number: 8006619
Is Substance Pure Or Mixture: Mixture
Chemical Is Extremely Hazardous Substance (EHS): Not reported
First Hazardous Class Code For Chemical: 3.0
Second Hazardous Class Code For Chemical: 6.3
Third Hazardous Class Code For Chemical: 6.4
Hazard Class 1 Of The Chemical: Flammable and Combustible Liquid
Hazard Class 2 Of The Chemical: Acute Health Hazard
Hazard Class 3 Of The Chemical: Chronic Health Hazard
Chemical Is A Toxic 313 Chemical: No
EPA Pesticide Registration Number: Not reported
Department Or Division Of Company: Not reported
Facility Has Written Emergency Plan: Yes
Does The Chemical Contain A 112r Chemical: No
Contains 112R: No
Contains EHS: No
Fertilizer: No
Pesticide: No
Contains 313: Yes
NAICS Code 1: 221122
NAICS Desc 1: ELECTRIC POWER DISTRIBUTION
NAICS Code 2: 000000
NAICS Desc 2: Not reported
Company Name: EMERALD PEOPLES UTILITY
Manager Name: FRANK LAMBE

EMERALD PEOPLES UTILITY (Continued) **S106847428**

Business Phone: 5417461583
Mailing Address: 33733 SEAVEY LOOP RD
Mailing City,St,Zip: EUGENE, OR 974059614
No. of Employees: 71
Day Phone: 5417461583
Placard: Yes
Fire Dept Code: 0139
Sprinkler System: No
Emergency Contact: RON DUBBS
Emergency Procedure: OFFICE
Business Type: OFFICE FOR PUBLIC UTILITY

Facility Id: 078638
Physical State Of The Substance: 2
Physical State: LIQUID
Average Amount Possessed During The Year Code: 21
Maximum Amount Possessed During The Year Code: 30
Chemical Trade Name: DIESEL
Applicable Unit Of Measure Code: 2
Description Of The Unit Of Measure: GALLONS
Type Code: B
Description: UNDERGROUND TANK
Type Code: Not reported
Temperature Description: Not reported
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Pressure of Code: Not reported
Pressure Description: Not reported
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Temperature Description: Not reported
Temperature of The Hazardous Substance Code: Not reported
Days Hazardous Substance On Site During Year: 365
Is The Substance Protected A Trade Secret: False
Description Of The Max Qnty Code: 10,000-49,999
Description Of The Avg Qnty Code: 5,000-9,999
Most Hazardous Ingridient: PETROLEUM DISTILLATES
United Nations/north America 4 Digit Class Number: 1202
Hazard Rank: 2
Chemical Abstract Service Identifier Number: 68476346
Is Substance Pure Or Mixture: Mixture
Chemical Is Extremely Hazardous Substance (EHS): Not reported
First Hazardous Class Code For Chemical: 3.0
Second Hazardous Class Code For Chemical: 6.3
Third Hazardous Class Code For Chemical: 6.4
Hazard Class 1 Of The Chemical: Flammable and Combustible Liquid
Hazard Class 2 Of The Chemical: Acute Health Hazard
Hazard Class 3 Of The Chemical: Chronic Health Hazard
Chemical Is A Toxic 313 Chemical: No
EPA Pesticide Registration Number: Not reported
Department Or Division Of Company: Not reported
Facility Has Written Emergency Plan: Yes
Does The Chemical Contain A 112r Chemical: No
Contains 112R: No
Contains EHS: No
Fertilizer: No
Pesticide: No

EMERALD PEOPLES UTILITY (Continued) **S106847428**

Contains 313:	Yes
NAICS Code 1:	221122
NAICS Desc 1:	ELECTRIC POWER DISTRIBUTION
NAICS Code 2:	000000
NAICS Desc 2:	Not reported
Company Name:	EMERALD PEOPLES UTILITY
Manager Name:	FRANK LAMBE
Business Phone:	5417461583
Mailing Address:	33733 SEAVEY LOOP RD
Mailing City,St,Zip:	EUGENE, OR 974059614
No. of Employees:	71
Day Phone:	5417461583
Placard:	Yes
Fire Dept Code:	0139
Sprinkler System:	No
Emergency Contact:	RON DUBBS
Emergency Procedure:	OFFICE
Business Type:	OFFICE FOR PUBLIC UTILITY

A7 **CRANE EQUIPMENT MFG CO** **RCRA-CESQG** **1004770332**
SW **33740 SEAVEY LOOP RD** **FINDS** **ORD982655458**
1/4-1/2 **EUGENE, OR 97405**
0.497 mi.
2623 ft. **Site 7 of 7 in cluster A**

Relative:
Higher

Actual:
460 ft.

RCRA-CESQG:

Date form received by agency:	12/31/2003
Facility name:	CRANE EQUIPMENT MFG CO
Facility address:	33740 SEAVEY LOOP RD EUGENE, OR 97405-9602
EPA ID:	ORD982655458
Mailing address:	33740 SEAVEY LOOP EUGENE, OR 97405-9602
Contact:	MIKE KOGUTKIEWCZ
Contact address:	33740 SEAVEY LOOP EUGENE, OR 97405-9602
Contact country:	US
Contact telephone:	(541) 746-9681
Contact email:	Not reported
EPA Region:	10
Land type:	Private
Classification:	Conditionally Exempt Small Quantity Generator
Description:	Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

CRANE EQUIPMENT MFG CO (Continued) **1004770332**

Owner/Operator Summary:

Owner/operator name:	CRANE EQUIPMENT MFG CO
Owner/operator address:	33740 SEAVEY LOOP EUGENE, OR 97405
Owner/operator country:	US
Owner/operator telephone:	(541) 746-9681
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	09/22/1988
Owner/Op end date:	Not reported
Owner/operator name:	CRANE EQUIPMENT MFG CORP
Owner/operator address:	33740 SEAVEY LOOP EUGENE, OR 97405
Owner/operator country:	US
Owner/operator telephone:	(541) 746-9681
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	12/14/1993
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Historical Generators:

Date form received by agency:	01/02/2003
Facility name:	CRANE EQUIPMENT MFG CO
Classification:	Conditionally Exempt Small Quantity Generator
Date form received by agency:	01/04/2002
Facility name:	CRANE EQUIPMENT MFG CO
Classification:	Conditionally Exempt Small Quantity Generator
Date form received by agency:	01/19/2001
Facility name:	CRANE EQUIPMENT MFG CO
Classification:	Conditionally Exempt Small Quantity Generator
Date form received by agency:	01/13/2000
Facility name:	CRANE EQUIPMENT MFG CO
Classification:	Conditionally Exempt Small Quantity Generator
Date form received by agency:	01/25/1999

CRANE EQUIPMENT MFG CO (Continued) **1004770332**

Facility name: CRANE EQUIPMENT MFG CO
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 01/06/1998
Facility name: CRANE EQUIPMENT MFG CO
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 01/06/1997
Facility name: CRANE EQUIPMENT MFG CO
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 01/16/1996
Facility name: CRANE EQUIPMENT MFG CO
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 01/17/1995
Facility name: CRANE EQUIPMENT MFG CO
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 01/20/1994
Facility name: CRANE EQUIPMENT MFG CO
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 10/04/1993
Facility name: CRANE EQUIPMENT MFG CO
Classification: Conditionally Exempt Small Quantity Generator

Hazardous Waste Summary:
Waste code: NA
Waste name: NA

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Used Oil - Generators
Date violation determined: 07/25/2007
Date achieved compliance: 08/13/2007
Violation lead agency: State
Enforcement action: NOTICE OF NONCOMPLIANCE
Enforcement action date: 07/26/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Universal Waste - Small Quantity Handlers
Date violation determined: 07/25/2007
Date achieved compliance: 08/13/2007
Violation lead agency: State
Enforcement action: NOTICE OF NONCOMPLIANCE
Enforcement action date: 07/26/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State

CRANE EQUIPMENT MFG CO (Continued) **1004770332**

Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:

Evaluation date: 07/25/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Generators
Date achieved compliance: 08/13/2007
Evaluation lead agency: State

Evaluation date: 07/25/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Universal Waste - Small Quantity Handlers
Date achieved compliance: 08/13/2007
Evaluation lead agency: State

FINDS:

Registry ID: 110004794651

Environmental Interest/Information System

OR-DEQ (Oregon - Department Of Environmental Quality) is a regulatory agency whose job is to protect the quality of Oregon's Environment. DEQ uses a combination of technical assistance, inspections and permitting to help public and private facilities and citizens understand and comply with state and federal environmental regulations.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

B8 **JACKSON FOOD STORES #551** **UST** **U004015745**
WSW **86623 FRANKLIN BLVD** **N/A**
1/2-1 **EUGENE, OR 97405**
0.611 mi.
3225 ft. **Site 1 of 4 in cluster B**

Relative:
Higher

Actual:
462 ft.

UST:

Facility ID: 8140
Facility Telephone: (208) 888-6061
Permittee Name: Richard Wright
Number of Permitted Tanks: 4
Active Tanks: 4
Decommissioned Tanks: 8
Number of Tanks: 12

Map ID / Direction / Distance / Elevation	Site	Database(s)	EDR ID Number / EPA ID Number
B9 **WSW** **1/2-1** **0.611 mi.** **3225 ft.**	**SHELL SS SAP 121618** **86623 FRANKLIN BLVD** **EUGENE, OR 97405** **Site 2 of 4 in cluster B**	**RCRA-CESQG** **FINDS** **MANIFEST**	**1005418122** **ORQ000019752**

Relative:
Higher

Actual:
462 ft.

RCRA-CESQG:

Date form received by agency: 12/31/2010
Facility name: SHELL SS SAP 121618
Facility address: 86623 FRANKLIN BLVD
EUGENE, OR 97405-9605
EPA ID: ORQ000019752
Mailing address: P O BOX 3127, RM 669B
HOUSTON, TX 77253
Contact: RAY WALDING
Contact address: PO BOX 3127
HOUSTON, TX 77067-2058
Contact country: US
Contact telephone: 281-874-2247
Contact email: Not reported
EPA Region: 10
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name: EQUILON ENTPRS LLC DBA SHELL OIL PROD US
Owner/operator address: P O BOX 3127
HOUSTON, TX 77252
Owner/operator country: US
Owner/operator telephone: 281 874 2224
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 01/29/2002
Owner/Op end date: Not reported

Owner/operator name: EQUILON ENTPRS LLC DBA SHELL OIL PROD US
Owner/operator address: PO BOX 3127
HOUSTON, TX 77252
Owner/operator country: US
Owner/operator telephone: 281 874 2224
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 08/01/1998
Owner/Op end date: Not reported

SHELL SS SAP 121618 (Continued) **1005418122**

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Historical Generators:

Date form received by agency: 12/31/2009
Facility name: SHELL SS SAP 121618
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 12/31/2008
Facility name: SHELL SS SAP 121618
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 12/31/2007
Facility name: SHELL SS SAP 121618
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 05/22/2007
Facility name: SHELL SS SAP 121618
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 12/31/2006
Facility name: SHELL SS SAP 121618
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 12/31/2005
Facility name: SHELL SS SAP 121618
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 12/31/2004
Facility name: SHELL SS SAP 121618
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 12/31/2003
Facility name: SHELL SS SAP 121618
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 03/24/2003
Facility name: SHELL SS SAP 121618
Site name: TEXACO SS SAP 121618
Classification: Small Quantity Generator

Date form received by agency: 01/29/2002

SHELL SS SAP 121618 (Continued) **1005418122**

Facility name:	SHELL SS SAP 121618
Site name:	TEXACO SS SAP 121618
Classification:	Small Quantity Generator

Hazardous Waste Summary:

Waste code:	NA
Waste name:	NA
Violation Status:	No violations found

FINDS:

Registry ID: 110014070888

Environmental Interest/Information System

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OR MANIFEST:

Manifest Year:	Manifest Year - 2004
Epa Id:	ORQ000019752
Inactive Status:	Not reported
Year:	2004
Facility Status:	CEG
Organization Name:	Not reported
Contact First Name:	Nora
Contact Last Name:	Cortez
Contact Telephone Number:	281 874-2224
Mailing Address:	12700 NORTHBOROUGH DR #300G03
Mailing City:	Houston
Mailing State:	TX
Mailing Zip:	77067-2508

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
B10 **WSW** **1/2-1** **0.611 mi.** **3225 ft.**	**SHELL 121618** **86623 FRANKLIN BLVD** **EUGENE, OR 97405** **Site 3 of 4 in cluster B**	**LUST**	**S108834264** **N/A**

Relative:
Higher

Actual:
462 ft.

LUST:
Region: Western Region
Facility ID: 20-07-1374
Cleanup Received Date: 09/11/2007
Cleanup Start Date: Not reported
Cleanup Complete Date: Not reported

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
B11 **WSW** **1/2-1** **0.611 mi.** **3225 ft.**	**SUNNY LCC** **86623 E FRANKLIN BLVD** **EUGENE, OR 97403** **Site 4 of 4 in cluster B**	**LUST**	**S103248544** **N/A**

Relative:
Higher

Actual:
462 ft.

LUST:
Region: Western Region
Facility ID: 20-89-4034
Cleanup Received Date: 02/15/1989
Cleanup Start Date: 04/27/1989
Cleanup Complete Date: 04/23/1997

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
C12 **West** **1/2-1** **0.633 mi.** **3343 ft.**	**USDOE BPA ALVEY SUBSTATION** **86000 FRANKLIN** **EUGENE, OR 97405** **Site 1 of 4 in cluster C**	**CERC-NFRAP** **RCRA-CESQG** **FINDS** **SPILLS**	**1002998758** **OR8891406334**

Relative:
Higher

Actual:
473 ft.

CERC-NFRAP:
Site ID: 1001482
Federal Facility: Federal Facility
NPL Status: Not on the NPL
Non NPL Status: NFRAP-Site does not qualify for the NPL based on existing information

CERCLIS-NFRAP Site Alias Name(s):
Alias Name: BPA-ALVEY SUBSTATION
Alias Address: 86000 FRANKLIN
EUGENE, OR 98362

CERCLIS-NFRAP Assessment History:
Action: DISCOVERY
Date Started: Not reported
Date Completed: 11/16/1988
Priority Level: Not reported

Action: ARCHIVE SITE
Date Started: Not reported
Date Completed: 04/09/1991
Priority Level: Not reported

Action: PRELIMINARY ASSESSMENT
Date Started: 04/09/1991
Date Completed: 04/09/1991

USDOE BPA ALVEY SUBSTATION (Continued) **1002998758**

Priority Level: NFRAP-Site does not qualify for the NPL based on existing information

RCRA-CESQG:
Date form received by agency: 12/31/2003
Facility name: USDOE BPA ALVEY SUBSTATION
Facility address: 86000 FRANKLIN
EUGENE, OR 97405
EPA ID: OR8891406334
Mailing address: PO BOX 3621-KEP
PORTLAND, OR 97208-3621
Contact: BRETT SHERER
Contact address: PO BOX 3621-KEP
PORTLAND, OR 97208-3621
Contact country: US
Contact telephone: (503) 230-3928
Contact email: Not reported
EPA Region: 10
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:
Owner/operator name: USDOE BONNEVILLE POWER ADMINISTRATION
Owner/operator address: 86000 FRANKLIN
EUGENE, OR 97405
Owner/operator country: US
Owner/operator telephone: (541) 465-6991
Legal status: Federal
Owner/Operator Type: Owner
Owner/Op start date: 01/01/1981
Owner/Op end date: Not reported

Owner/operator name: USDOE BONNEVILLE POWER ADMINISTRATION
Owner/operator address: 86000 FRANKLIN
EUGENE, OR 97405
Owner/operator country: US
Owner/operator telephone: (541) 465-6991
Legal status: Federal
Owner/Operator Type: Operator
Owner/Op start date: 12/31/2003
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No

USDOE BPA ALVEY SUBSTATION (Continued) **1002998758**

Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 02/10/2003
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 02/28/2002
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 03/19/2001
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 03/06/2000
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 03/01/1999
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 02/23/1998
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Small Quantity Generator

Date form received by agency: 02/28/1997
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 02/26/1996
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 02/17/1995
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Small Quantity Generator

Date form received by agency: 02/16/1994
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 03/17/1993

USDOE BPA ALVEY SUBSTATION (Continued) **1002998758**

Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Conditionally Exempt Small Quantity Generator

Date form received by agency: 03/02/1992
Facility name: USDOE BPA ALVEY SUBSTATION
Classification: Conditionally Exempt Small Quantity Generator

Hazardous Waste Summary:
Waste code: NA
Waste name: NA

Violation Status: No violations found

FINDS:

Registry ID: 110004776797

Environmental Interest/Information System

OR-DEQ (Oregon - Department Of Environmental Quality) is a regulatory agency whose job is to protect the quality of Oregon's Environment. DEQ uses a combination of technical assistance, inspections and permitting to help public and private facilities and citizens understand and comply with state and federal environmental regulations.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

OR SPILLS:
Year: Not reported
Facility ID: 06-1357
Spill Date: Not reported
Material: Not reported
Quantity: 700
Unit of Measure: Gallons
How Occurred: Not reported
Release Date: 3/31/2006
Description: Oil circuit breaker problem caused spill of 700 gallons of transformer oil at BPA maintenance station on March 31, 2006. BPA thought they had it cleaned up and now are seeing sheen in the drainage ditch and the holding ponds. Emergency Cleanup Contracto
Location: Not reported
Lat/Long: 44.0003 / -123.0171
Source: Business
Material: Not reported
Media: Coding for the PS/BC Oil Spill Database
Responsible Company: Alvey Substation BPA
Responsible Contact: Not reported
Responsible Address: 86000 Franklin Blvd
Responsible City,St,Zip: Eugene, OR 97405-8611
Responsible Country: LANE

USDOE BPA ALVEY SUBSTATION (Continued) **1002998758**

Year:	Not reported
Facility ID:	06-1357
Spill Date:	Not reported
Material:	Not reported
Quantity:	700
Unit of Measure:	Gallons
How Occurred:	Not reported
Release Date:	3/31/2006
Description:	Oil circuit breaker problem caused spill of 700 gallons of transformer oil at BPA maintenance station on March 31, 2006. BPA thought they had it cleaned up and now are seeing sheen in the drainage ditch and the holding ponds. Emergency Cleanup Contracto
Location:	Not reported
Lat/Long:	44.0003 / -123.0171
Source:	Business
Material:	Not reported
Media:	Coding for the PS/BC Oil Spill Database
Responsible Company:	Alvey Substation BPA
Responsible Contact:	Not reported
Responsible Address:	86000 Franklin Blvd
Responsible City,St,Zip:	Eugene, OR 97405-8611
Responsible Country:	LANE

Year:	Not reported
Facility ID:	06-1357
Spill Date:	Not reported
Material:	Not reported
Quantity:	700
Unit of Measure:	Gallons
How Occurred:	Not reported
Release Date:	3/31/2006
Description:	Oil circuit breaker problem caused spill of 700 gallons of transformer oil at BPA maintenance station on March 31, 2006. BPA thought they had it cleaned up and now are seeing sheen in the drainage ditch and the holding ponds. Emergency Cleanup Contracto
Location:	Not reported
Lat/Long:	44.0003 / -123.0171
Source:	Business
Material:	Not reported
Media:	Non-saturated soil, rock, etc.
Responsible Company:	Alvey Substation BPA
Responsible Contact:	Not reported
Responsible Address:	86000 Franklin Blvd
Responsible City,St,Zip:	Eugene, OR 97405-8611
Responsible Country:	LANE

Year:	Not reported
Facility ID:	06-1357
Spill Date:	Not reported
Material:	Not reported
Quantity:	700
Unit of Measure:	Gallons
How Occurred:	Not reported
Release Date:	3/31/2006
Description:	Oil circuit breaker problem caused spill of 700 gallons of transformer oil at BPA maintenance station on March 31, 2006. BPA thought they had it cleaned up and now are seeing sheen in the drainage ditch and the

USDOE BPA ALVEY SUBSTATION (Continued) **1002998758**

holding ponds. Emergency Cleanup Contracto
Location: Not reported
Lat/Long: 44.0003 / -123.0171
Source: Business
Material: Not reported
Media: Not reported
Responsible Company: Alvey Substation BPA
Responsible Contact: Not reported
Responsible Address: 86000 Franklin Blvd
Responsible City,St,Zip: Eugene, OR 97405-8611
Responsible Country: LANE

C13 **ALVEY SUBSTATION BPA** **LUST** **S100499098**
West **86000 FRANKLIN BLVD** **N/A**
1/2-1 **EUGENE, OR 97405**
0.633 mi.
3343 ft. **Site 2 of 4 in cluster C**

Relative:
Higher

Actual:
473 ft.

LUST:
Region: Western Region
Facility ID: 20-90-0456
Cleanup Received Date: 04/02/1990
Cleanup Start Date: 04/02/1990
Cleanup Complete Date: 12/20/2006

C14 **BPA - ALVEY SUBSTATION** **ECSI** **S104889566**
West **86000 FRANKLIN BLVD.** **OR CRL** **N/A**
1/2-1 **EUGENE, OR 97405**
0.633 mi.
3343 ft. **Site 3 of 4 in cluster C**

Relative:
Higher

Actual:
473 ft.

OR ECSI:

State ID Number:	623	Brown ID:	0
Study Area:	False	Region ID:	3
Legislatve ID:	0	Investigation ID:	207
FACA ID:	1356	Further Action:	258
Lat/Long (dms):	44 0 1.10 / -123 1 1.60	County Code:	20.00
Score Value:	Not reported	Cerclis ID:	8891406334
Township Coord.:	18.00	Township Zone:	S
Range Coord:	3.00	Range Zone:	W
Section Coord:	14	Qtr Section:	Not reported
Tax Lots:	Not reported	Size:	21 acres
NPL:	False	Orphan:	False
Updated By:	GWISTAR	Update Date:	07/05/2007
Alias Name:	Alvey Site		
Alias Name:	US DOE BPA - Alvey Substation		

OR ECSI HAZARDOUS RELEASE:
Substance ID.: 121639
Haz Release ID: 381911
Qty Released: Not reported
Date Released: Not reported
Update Date: 03/16/1999
Update By: Not reported
Substance Code: 7439-92-1
Substance Name: LEAD
Substance Abbrev.: Not reported

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Substance Category ID: 8466
Substance Category: Inorganics
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8466
Substance Category: Inorganics
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319256
Sub Alias Name: PB
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

Substance ID.: 121610
Haz Release ID: 385238
Qty Released: unknown
Date Released: mid 1987 or before
Update Date: 10/21/1988
Update By: Not reported
Substance Code: 71-55-6
Substance Name: TRICHLOROETHANE,1,1,1-
Substance Abbrev.: Not reported
Substance Category ID: 8521
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8552
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8521
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Substance Category ID: 8552
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319183
Sub Alias Name: BALTANA
Substance Alias ID: 319184
Sub Alias Name: CHLOROTHENE
Substance Alias ID: 319185
Sub Alias Name: METHYLCHLOROFORM
Substance Alias ID: 318151
Sub Alias Name: TCA,1,1,1-
Comment ID: 304266
Release Code: Data Sources
Release Comments: BPA sample test results
Sampling Result ID: 346860
Feature Id: Not reported
Hazard Release Id: 385238
Medium: 700
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 2,500 ppm
Last Update By: CONV
Update Date: 09/13/1994

Substance ID.: 121989
Haz Release ID: 385239
Qty Released: unknown
Date Released: Not reported
Update Date: 10/21/1988
Update By: Not reported
Substance Code: ECD200
Substance Name: OIL OR FUEL RELATED COMPOUNDS
Substance Abbrev.: Not reported
Substance Category ID: 8532
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8532
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: Not reported
Sub Alias Name: Not reported
Comment ID: Not reported
Release Code: Not reported

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Release Comments: Not reported
Sampling Result ID: 346454
Feature Id: Not reported
Hazard Release Id: 385239
Medium: 698
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 108 ppm
Last Update By: CONV
Update Date: 09/13/1994
Sampling Result ID: 346455
Feature Id: Not reported
Hazard Release Id: 385239
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 7,800 ppm
Last Update By: CONV
Update Date: 09/13/1994

Substance ID.: 120919
Haz Release ID: 385240
Qty Released: Unknown
Date Released: Not reported
Update Date: 10/21/1988
Update By: Not reported
Substance Code: 11104-28-2
Substance Name: PCB 1221
Substance Abbrev.: Not reported
Substance Category ID: 8543
Substance Category: PCB Substances for the OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8543
Substance Category: PCB Substances for the OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 316591
Sub Alias Name: AROCHLOR 1221

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Substance Alias ID: 316592
Sub Alias Name: AROCLOR 1221
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: 346456
Feature Id: Not reported
Hazard Release Id: 385240
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 1015 ppm
Last Update By: CONV
Update Date: 09/13/1994

Substance ID.: 121701
Haz Release ID: 385241
Qty Released: unknown
Date Released: Not reported
Update Date: 10/21/1988
Update By: Not reported
Substance Code: 75-35-4
Substance Name: DICHLOROETHYLENE,1,1-
Substance Abbrev.: Not reported
Substance Category ID: 8512
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8553
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8512
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8553
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319364
Sub Alias Name: DICHLOROETHENE,1,1-
Substance Alias ID: 319365
Sub Alias Name: DICHLOROETHYLENE,asym-
Substance Alias ID: 319366

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Sub Alias Name: ETHENE,1,1-DICHLORO-
Substance Alias ID: 319367
Sub Alias Name: VINYLIDENE CHLORIDE
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: 346457
Feature Id: Not reported
Hazard Release Id: 385241
Medium: 698
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 4 ppb
Last Update By: CONV
Update Date: 09/13/1994

OR ECSI NARR:
NARR ID: 5726864
NARR Code: Contamination
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Removal of three tanks in 1987. The tanks contained waste oil, diesel, and regular gas. The waste oil showed the presence of 1,1,1-trichloroethane as determined from sampling by the BPA. In 1987 BPA sampled soil in the area that was beneath the removed tanks. Sample results indicated presence of oil and grease and PCBs. No samples were taken of the soil for solvent analysis. Also, on 2/24/86, 125 gallons of insulating oil escaped from an oil storage containment facility at the BPA Alvey Substation. BPA estimated the oil contained PCBs at 2 to 5.1 ppm. Another UST (3,000 gal. leaded gasoline) was removed in October 1992. BTEX at levels below screening levels were detected under the concrete dispenser slab (soils). Groundwater had BTEX contamination below screening levels. PCB contamination has been detected at various locations on-site.

NARR ID: 5726865
NARR Code: Data Sources
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:1) EPA PA prepared by the BPA (2/20/90), including BPA's sampling results from 1987 tank removals; 2) EPA SI prepared for BPA by Riedel Environmental Services (6/22/90); 3) EPA correspondence; 4) Lab results

NARR ID: 5726866
NARR Code: Hazardous Substance/Waste Types

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:waste oil, diesel, regular gasoline, solvents, PCBs

NARR ID: 5726867
NARR Code: Site Location
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:At the intersection of Hwy 99 & I-5.

NARR ID: 5726868
NARR Code: Manner of Release
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Releases associated with USTs (waste oil, gasoline, diesel fuel). PCBs in soils at various site locations including UST locations. Feb 1986 mineral oil spill.

NARR ID: 5726869
NARR Code: Media Contamination
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Sample results of material in the waste oil tank indicated TCA present at 2,500 ppm. Soil and groundwater have been impacted. There is also a potential for migration to surface water via the site's drainage/dry well system.

NARR ID: 5726870
NARR Code: Pathways Other Hazards
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:PCBs, petroleum contamination in soils. VOCs and elevated arsenic and lead detected in groundwater.

NARR ID: 5726871
NARR Code: Remedial Action
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:BPA conducted cleanup actions for the 2/24/86 spill. (4/9/90 Al Goodman/EPA) EPA Region 10 has completed review of the PA/SI report for the Alvey Substation. The site does not score high enough to be proposed for the NPL. Therefore, no further federal action is recommended. EPA's decision does not relieve the facility from complying with Oregon regulations. The DEQ should be contacted to find out what activities may be required to comply with state cleanup

BPA - ALVEY SUBSTATION (Continued) **S104889566**

standards. PAE completed 3/99. Medium priority for XPA. (4/11/01 GMW/SAS) BPA has characterized PCB contamination and plans to conduct a self-implementing removal action to clean up PCB-contaminated soil to 25 ppm or below. The 3/22/01 cover letter and report to EPA Region 10, entitled 30-Day Notification Report for Self Implementing On-Site Cleanup and Disposal of Polychlorinated Bipphenyl (PCB) Remediation Waste - Part 2 of 2, Site-Specific Facility Information, documents BPA's cleanup plans. BPA expects to complete this work by December 2001.

NARR ID: 5726872
NARR Code: Health Threats
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Potential direct contact among on-site workers. Site is fenced. Public water lines serve area residences, lowering potential for groundwater impacts. There is the potential for impacts to surface water via facility's drywell/drainage system. VOCs have been detected on-site, although data is limited.

OR ECSI SITE CONTROL:
Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported
Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:
Permit Agency: Not reported
Permit Number: Not reported
Permit Type: Not reported
Comments: Not reported

OR ECSI Administrative Action:

Admin ID:	720293	Action ID:	9457
Agency:	Environmantal Protection Agency	Region:	Not reported
Start Date:	02/20/1990	Complete Date:	04/09/1991
Substance Code:	Not reported	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PA1	Category:	EPA Led Action
Action Flag:	True	Action Code Flag:	False
Action:	EPA Basic Preliminary Assessment		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	720431	Action ID:	9508
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	02/11/1994	Complete Date:	02/11/1994
Substance Code:	SAS	Rank Value:	0
Employee Id:	293	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Action Code:	RSSC	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Site Screening recommended (EV)		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	700252	Action ID:	9445
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	11/30/1988	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NOTIF	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Responsible party notified re 11/88 Inventory listing		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	707556	Action ID:	9465
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	03/15/1999	Complete Date:	04/23/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	730	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PRC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Facility proposed for Confirmed Release List		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	707557	Action ID:	9438
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	10/29/1999	Complete Date:	10/29/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	730	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	LSC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Facility placed on Confirmed Release List		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	706920	Action ID:	9510
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	04/26/1999	Complete Date:	04/26/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	2043	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RXPA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	State Expanded Preliminary Assessment recommended (XPA)		
Further Action:	Medium		
Comments:	Not reported		

Admin ID:	706921	Action ID:	9498
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	04/26/1999	Complete Date:	04/26/1999

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Substance Code:	SAS	Rank Value:	0
Employee Id:	2043	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RPLC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Proposal for Confirmed Release List recommended		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	718431	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	10/21/1988	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	26	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	723497	Action ID:	9444
Agency:	Environmantal Protection Agency	Region:	Not reported
Start Date:	04/09/1991	Complete Date:	04/09/1991
Substance Code:	Not reported	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NFRAP	Category:	EPA Led Action
Action Flag:	True	Action Code Flag:	False
Action:	No Further Remedial Action Planned under Federal program		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	709031	Action ID:	9459
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	12/04/1998	Complete Date:	04/26/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	2043	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PAE	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	PRELIMINARY ASSESSMENT EQUIVALENT		
Further Action:	Not reported		
Comments:	State screening.		

Admin ID:	708785	Action ID:	9425
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	12/04/1998	Complete Date:	04/26/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	2043	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	EV	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	SITE EVALUATION		
Further Action:	Not reported		
Comments:	State screening		

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Admin ID: 716075
Agency: Environmantal Protection Agency
Start Date: 11/16/1988
Substance Code: Not reported
Employee Id: Not reported
Created By: Not reported
Action Code: DS1
Action Flag: True
Action: Site added to CERCLIS
Further Action: Not reported
Comments: Not reported

Action ID: 9421
Region: Not reported
Complete Date: Not reported
Rank Value: 0
Cleanup Flag: False
Created Date: 12/17/2002
Category: EPA Led Action
Action Code Flag: False

OR ECSI OPERATIONS:
Operation Id: 131932
Operation Status: Active
Common Name: BPA Alvey Substation
Yrs of Operation: unknown
Comments: electrical substation
Updated Date: 03/22/1995
Operations SIC Id: 195111
SIC Code: 4911
Created By: Not reported
Created Date: 12/17/2002

CRL:
Facility ID: 623
Location ID: 1356
Status Code: LIS
Facility Status: State Expanded Preliminary Assessment recommended (XPA)
Lat/Long: 44.0003 / -123.0171

C15 **ALVEY SUBSTATION** **LUST** **U000435442**
West **86000 FRANKLIN** **UST** **N/A**
1/2-1 **EUGENE, OR 97405** **HSIS**
0.633 mi.
3343 ft. **Site 4 of 4 in cluster C**

Relative:
Higher

Actual:
473 ft.

LUST:
Region: Western Region
Facility ID: 20-92-4202
Cleanup Received Date: 10/15/1992
Cleanup Start Date: 10/13/1992
Cleanup Complete Date: 03/18/2005

UST:
Facility ID: 7987
Facility Telephone: (541) 465-6991
Permittee Name: Dale Coulombe
Number of Permitted Tanks: 2
Active Tanks: 2
Decommissioned Tanks: 5
Number of Tanks: 7

HSIS:
Facility Id: 019185
Physical State Of The Substance: 2
Physical State: LIQUID

ALVEY SUBSTATION (Continued) **U000435442**

Average Amount Possessed During The Year Code: 02
Maximum Amount Possessed During The Year Code: 03
Chemical Trade Name: CROSSBOW
Applicable Unit Of Measure Code: 2
Description Of The Unit Of Measure: GALLONS
Type Code: F
Description: CAN
Type Code: Not reported
Temperature Description: Not reported
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Pressure of Code: Not reported
Pressure Description: Not reported
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Temperature Description: Not reported
Temperature of The Hazardous Substance Code: Not reported
Days Hazardous Substance On Site During Year: 365
Is The Substance Protected A Trade Secret: False
Description Of The Max Qnty Code: 20-49
Description Of The Avg Qnty Code: 10-19
Most Hazardous Ingridient: 2,4D DICHLOROPHENOXY ACETIC ACID ESTER
United Nations/north America 4 Digit Class Number: 3082
Hazard Rank: 2
Chemical Abstract Service Identifier Number: 1929733
Is Substance Pure Or Mixture: Mixture
Chemical Is Extremely Hazardous Substance (EHS): Not reported
First Hazardous Class Code For Chemical: 4.5
Second Hazardous Class Code For Chemical: 6.5
Third Hazardous Class Code For Chemical: 6.3
Hazard Class 1 Of The Chemical: Combustible Material
Hazard Class 2 Of The Chemical: Pesticide
Hazard Class 3 Of The Chemical: Acute Health Hazard
Chemical Is A Toxic 313 Chemical: No
EPA Pesticide Registration Number: MULTIPLE
Department Or Division Of Company: ALVEY O&M HQ & SUBSTATION
Facility Has Written Emergency Plan: Yes
Does The Chemical Contain A 112r Chemical: No
Contains 112R: No
Contains EHS: No
Fertilizer: No
Pesticide: Yes
Contains 313: Yes
NAICS Code 1: 921190
NAICS Desc 1: OTHER GENERAL GOV SUPPORT
NAICS Code 2: 221111
NAICS Desc 2: HYDROELECTRIC POWER GENERATION
Company Name: BPA
Manager Name: DALE COULDMBE
Business Phone: 5419887011
Mailing Address: 86000 HWY 99S
Mailing City,St,Zip: EUGENE, OR 97405
No. of Employees: 25
Day Phone: 8778366632
Placard: No
Fire Dept Code: 0139
Sprinkler System: No

ALVEY SUBSTATION (Continued) **U000435442**

Emergency Contact: MUNRO DISPATCHER
Emergency Procedure: SPCC PLAN-CONTROL HOUSE
Business Type: FED ELECT SUBSTATION FACILITY

Facility Id: 019185
Physical State Of The Substance: 2
Physical State: LIQUID
Average Amount Possessed During The Year Code: 20
Maximum Amount Possessed During The Year Code: 20
Chemical Trade Name: GASOLINE UNLEADED
Applicable Unit Of Measure Code: 2
Description Of The Unit Of Measure: GALLONS
Type Code: B
Description: UNDERGROUND TANK
Type Code: Not reported
Temperature Description: Not reported
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Pressure of Code: Not reported
Pressure Description: Not reported
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Temperature Description: Not reported
Temperature of The Hazardous Substance Code: Not reported
Days Hazardous Substance On Site During Year: 365
Is The Substance Protected A Trade Secret: False
Description Of The Max Qnty Code: 1,000-4,999
Description Of The Avg Qnty Code: 1,000-4,999
Most Hazardous Ingridient: PETROLEUM DISTILLATES
United Nations/north America 4 Digit Class Number: 1203
Hazard Rank: 2
Chemical Abstract Service Identifier Number: 000000
Is Substance Pure Or Mixture: Mixture
Chemical Is Extremely Hazardous Substance (EHS): Not reported
First Hazardous Class Code For Chemical: 3.0
Second Hazardous Class Code For Chemical: 6.3
Third Hazardous Class Code For Chemical: 6.4
Hazard Class 1 Of The Chemical: Flammable and Combustible Liquid
Hazard Class 2 Of The Chemical: Acute Health Hazard
Hazard Class 3 Of The Chemical: Chronic Health Hazard
Chemical Is A Toxic 313 Chemical: No
EPA Pesticide Registration Number: Not reported
Department Or Division Of Company: ALVEY O&M HQ & SUBSTATION
Facility Has Written Emergency Plan: Yes
Does The Chemical Contain A 112r Chemical: No
Contains 112R: No
Contains EHS: No
Fertilizer: No
Pesticide: No
Contains 313: Yes
NAICS Code 1: 921190
NAICS Desc 1: OTHER GENERAL GOV SUPPORT
NAICS Code 2: 221111
NAICS Desc 2: HYDROELECTRIC POWER GENERATION
Company Name: BPA
Manager Name: DALE COULDMBE
Business Phone: 5419887011

ALVEY SUBSTATION (Continued) **U000435442**

Mailing Address: 86000 HWY 99S
Mailing City,St,Zip: EUGENE, OR 97405
No. of Employees: 25
Day Phone: 8778366632
Placard: No
Fire Dept Code: 0139
Sprinkler System: No
Emergency Contact: MUNRO DISPATCHER
Emergency Procedure: SPCC PLAN-CONTROL HOUSE
Business Type: FED ELECT SUBSTATION FACILITY

Facility Id: 019185
Physical State Of The Substance: 2
Physical State: LIQUID
Average Amount Possessed During The Year Code: 02
Maximum Amount Possessed During The Year Code: 03
Chemical Trade Name: GARLON 3A
Applicable Unit Of Measure Code: 2
Description Of The Unit Of Measure: GALLONS
Type Code: N
Description: PLASTIC BOTTLE, JUG, BUCKET
Type Code: Not reported
Temperature Description: Not reported
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Pressure of Code: Not reported
Pressure Description: Not reported
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Temperature Description: Not reported
Temperature of The Hazardous Substance Code: Not reported
Days Hazardous Substance On Site During Year: 365
Is The Substance Protected A Trade Secret: False
Description Of The Max Qnty Code: 20-49
Description Of The Avg Qnty Code: 10-19
Most Hazardous Ingridient: TRICLOPYR SALT OF TRIETHYLAMINE
United Nations/north America 4 Digit Class Number: 0000
Hazard Rank: 2
Chemical Abstract Service Identifier Number: 57213691
Is Substance Pure Or Mixture: Mixture
Chemical Is Extremely Hazardous Substance (EHS): Not reported
First Hazardous Class Code For Chemical: 3.0
Second Hazardous Class Code For Chemical: 6.5
Third Hazardous Class Code For Chemical: 6.3
Hazard Class 1 Of The Chemical: Flammable and Combustible Liquid
Hazard Class 2 Of The Chemical: Pesticide
Hazard Class 3 Of The Chemical: Acute Health Hazard
Chemical Is A Toxic 313 Chemical: No
EPA Pesticide Registration Number: 62719-37
Department Or Division Of Company: ALVEY O&M HQ & SUBSTATION
Facility Has Written Emergency Plan: Yes
Does The Chemical Contain A 112r Chemical: No
Contains 112R: No
Contains EHS: No
Fertilizer: No
Pesticide: Yes
Contains 313: Yes

ALVEY SUBSTATION (Continued) **U000435442**

NAICS Code 1: 921190
NAICS Desc 1: OTHER GENERAL GOV SUPPORT
NAICS Code 2: 221111
NAICS Desc 2: HYDROELECTRIC POWER GENERATION
Company Name: BPA
Manager Name: DALE COULDMBE
Business Phone: 5419887011
Mailing Address: 86000 HWY 99S
Mailing City,St,Zip: EUGENE, OR 97405
No. of Employees: 25
Day Phone: 8778366632
Placard: No
Fire Dept Code: 0139
Sprinkler System: No
Emergency Contact: MUNRO DISPATCHER
Emergency Procedure: SPCC PLAN-CONTROL HOUSE
Business Type: FED ELECT SUBSTATION FACILITY

16
SW
1/2-1
0.691 mi.
3647 ft.

DOYLES HARLEY DAVIDSON **RCRA-NonGen** **1012212018**
86441 COLLEGE VIEW RD **ORSTATE08269**
EUGENE, OR 97405

Relative:
Higher

Actual:
483 ft.

RCRA-NonGen:
Date form received by agency: 12/14/2009
Facility name: DOYLES HARLEY DAVIDSON
Facility address: 86441 COLLEGE VIEW RD
EUGENE, OR 97405-9631
EPA ID: ORSTATE08269
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 10
Land type: Other land type
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

DOYLES HARLEY DAVIDSON (Continued) **1012212018**

Violation Status:	No violations found

Evaluation Action Summary:

Evaluation date:	12/11/2009
Evaluation:	FOCUSED COMPLIANCE INSPECTION
Area of violation:	Not reported
Date achieved compliance:	Not reported
Evaluation lead agency:	State

D17
West
1/2-1
0.695 mi.
3669 ft.

Relative:
Higher

Actual:
486 ft.

SEQUENTIAL BIOFUELS
86714 MCVAY HWY
EUGENE, OR 97405

Site 1 of 7 in cluster D

LUST **U000435455**
UST **N/A**

LUST:

Region:	Western Region
Facility ID:	20-91-4247
Cleanup Received Date:	08/15/1991
Cleanup Start Date:	03/01/1996
Cleanup Complete Date:	**Not reported**

UST:

Facility ID:	6115
Facility Telephone:	(541) 736-5864
Permittee Name:	Ian Hill
Number of Permitted Tanks:	5
Active Tanks:	5
Decommissioned Tanks:	5
Number of Tanks:	10

D18
West
1/2-1
0.695 mi.
3669 ft.

Relative:
Higher

Actual:
486 ft.

MCVAY HIGHWAY BIOFUELING STATION SITE
86714 MCVAY HIGHWAY
EUGENE, OR 97405

Site 2 of 7 in cluster D

US BROWNFIELDS **1009569627**
N/A

US BROWNFIELDS:

Recipient name:	Lane County
Grant type:	Cleanup Grant
Property name:	McVay Highway Biofueling Station Site
Property #:	18-03-10-10-3200
Parcel size:	.6
Latitude:	44.0182
Longitude:	-123.0258
HCM label:	Global Positioning Method-Unspecified Parameters
Map scale:	Not reported
Point of reference:	Not reported
Datum:	World Geodetic System of 1984
ACRES property ID:	28622
Start date:	07/14/2007
Completed date:	N/A
Acres cleaned up:	Not reported
Cleanup funding:	$197,520.00
Cleanup funding source:	US EPA - Brownfields Cleanup Cooperative Agreement
Assessment funding:	Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Assessment funding source:	Not reported
Redevelopment funding:	$1,200,000.00
Redev. funding source:	State/Tribal Funding
Redev. funding entity name:	Oregon DOE Loan
Redevelopment start date:	09/21/2006
Assessment funding entity:	Not reported
Cleanup funding entity:	Not reported
Grant type:	N/A
Accomplishment type:	Not reported
Ownership entity:	Government
Current owner:	Lane County, OR
Did owner change:	No
Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A
State/tribal program ID:	Not reported
State/tribal NFA date:	N/A
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported
PAHs found:	Yes
PAHs cleaned up:	Yes
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water cleaned:	Not reported
Unknown found:	Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

VOCs found:	Yes
VOCs cleaned:	Yes
Cleanup other description:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
Past use commercial acreage:	.6
Past use industrial acreage:	Not reported
Future use greenspace acreage:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	Not reported
Future use industrial acreage:	Not reported
Greenspace acreage and type:	Not reported
Superfund Fed. landowner flag:	Not reported

Recipient name:	Lane County
Grant type:	Cleanup Grant
Property name:	McVay Highway Biofueling Station Site
Property #:	18-03-10-10-3200
Parcel size:	.6
Latitude:	44.0182
Longitude:	-123.0258
HCM label:	Global Positioning Method-Unspecified Parameters
Map scale:	Not reported
Point of reference:	Not reported
Datum:	World Geodetic System of 1984
ACRES property ID:	28622
Start date:	07/14/2007
Completed date:	N/A
Acres cleaned up:	Not reported
Cleanup funding:	$25,440.00
Cleanup funding source:	Local Funding
Assessment funding:	Not reported
Assessment funding source:	Not reported
Redevelopment funding:	$1,200,000.00
Redev. funding source:	State/Tribal Funding
Redev. funding entity name:	Oregon DOE Loan
Redevelopment start date:	09/21/2006
Assessment funding entity:	Not reported
Cleanup funding entity:	Lane County
Grant type:	N/A
Accomplishment type:	Not reported
Ownership entity:	Government
Current owner:	Lane County, OR
Did owner change:	No
Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

State/tribal program ID: Not reported
State/tribal NFA date: N/A
Air contaminated: Not reported
Air cleaned: Not reported
Asbestos found: Not reported
Asbestos cleaned: Not reported
Controled substance found: Not reported
Controled substance cleaned: Not reported
Drinking water affected: Yes
Drinking water cleaned: Not reported
Groundwater affected: Yes
Groundwater cleaned: Not reported
Lead contaminant found: Not reported
Lead cleaned up: Not reported
No media affected: Not reported
Unknown media affected: Not reported
Other cleaned up: Not reported
Other metals found: Yes
Other metals cleaned: Yes
Other contaminants found: Not reported
Other contams found description: Not reported
PAHs found: Yes
PAHs cleaned up: Yes
PCBs found: Not reported
PCBs cleaned up: Not reported
Petro products found: Yes
Petro products cleaned: Yes
Sediments found: Not reported
Sediments cleaned: Not reported
Soil affected: Yes
Soil cleaned up: Yes
Surface water cleaned: Not reported
Unknown found: Not reported
VOCs found: Yes
VOCs cleaned: Yes
Cleanup other description: Not reported
Num. of cleanup and re-dev. jobs: Not reported
Past use greenspace acreage: Not reported
Past use residential acreage: Not reported
Past use commercial acreage: .6
Past use industrial acreage: Not reported
Future use greenspace acreage: Not reported
Future use residential acreage: Not reported
Future use commercial acreage: Not reported
Future use industrial acreage: Not reported
Greenspace acreage and type: Not reported
Superfund Fed. landowner flag: Not reported

Recipient name: Lane County
Grant type: Cleanup Grant
Property name: McVay Highway Biofueling Station Site
Property #: 18-03-10-10-3200
Parcel size: .6
Latitude: 44.0182
Longitude: -123.0258
HCM label: Global Positioning Method-Unspecified Parameters
Map scale: Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Point of reference:	Not reported
Datum:	World Geodetic System of 1984
ACRES property ID:	28622
Start date:	07/14/2007
Completed date:	N/A
Acres cleaned up:	Not reported
Cleanup funding:	$33,000.00
Cleanup funding source:	Private/Other Funding
Assessment funding:	Not reported
Assessment funding source:	Not reported
Redevelopment funding:	$1,200,000.00
Redev. funding source:	State/Tribal Funding
Redev. funding entity name:	Oregon DOE Loan
Redevelopment start date:	09/21/2006
Assessment funding entity:	Not reported
Cleanup funding entity:	SeQuential Biofuels
Grant type:	N/A
Accomplishment type:	Not reported
Ownership entity:	Government
Current owner:	Lane County, OR
Did owner change:	No
Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A
State/tribal program ID:	Not reported
State/tribal NFA date:	N/A
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported
PAHs found:	Yes
PAHs cleaned up:	Yes
PCBs found:	Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

PCBs cleaned up: Not reported
Petro products found: Yes
Petro products cleaned: Yes
Sediments found: Not reported
Sediments cleaned: Not reported
Soil affected: Yes
Soil cleaned up: Yes
Surface water cleaned: Not reported
Unknown found: Not reported
VOCs found: Yes
VOCs cleaned: Yes
Cleanup other description: Not reported
Num. of cleanup and re-dev. jobs: Not reported
Past use greenspace acreage: Not reported
Past use residential acreage: Not reported
Past use commercial acreage: .6
Past use industrial acreage: Not reported
Future use greenspace acreage: Not reported
Future use residential acreage: Not reported
Future use commercial acreage: Not reported
Future use industrial acreage: Not reported
Greenspace acreage and type: Not reported
Superfund Fed. landowner flag: Not reported

Recipient name: Lane County
Grant type: Cleanup Grant
Property name: McVay Highway Biofueling Station Site
Property #: 18-03-10-10-3200
Parcel size: .6
Latitude: 44.0182
Longitude: -123.0258
HCM label: Global Positioning Method-Unspecified Parameters
Map scale: Not reported
Point of reference: Not reported
Datum: World Geodetic System of 1984
ACRES property ID: 28622
Start date: 07/14/2007
Completed date: N/A
Acres cleaned up: Not reported
Cleanup funding: $21,021.00
Cleanup funding source: State/Tribal Funding (non-section 128(a))
Assessment funding: Not reported
Assessment funding source: Not reported
Redevelopment funding: $1,200,000.00
Redev. funding source: State/Tribal Funding
Redev. funding entity name: Oregon DOE Loan
Redevelopment start date: 09/21/2006
Assessment funding entity: Not reported
Cleanup funding entity: ODEQ Response Program
Grant type: N/A
Accomplishment type: Not reported
Ownership entity: Government
Current owner: Lane County, OR
Did owner change: No
Cleanup required: Yes
Video available: Yes
Photo available: Yes

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A
State/tribal program ID:	Not reported
State/tribal NFA date:	N/A
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported
PAHs found:	Yes
PAHs cleaned up:	Yes
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water cleaned:	Not reported
Unknown found:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes
Cleanup other description:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
Past use commercial acreage:	.6
Past use industrial acreage:	Not reported
Future use greenspace acreage:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	Not reported
Future use industrial acreage:	Not reported
Greenspace acreage and type:	Not reported
Superfund Fed. landowner flag:	Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Recipient name:	Lane County
Grant type:	Cleanup Grant
Property name:	McVay Highway Biofueling Station Site
Property #:	18-03-10-10-3200
Parcel size:	.6
Latitude:	44.0182
Longitude:	-123.0258
HCM label:	Global Positioning Method-Unspecified Parameters
Map scale:	Not reported
Point of reference:	Not reported
Datum:	World Geodetic System of 1984
ACRES property ID:	28622
Start date:	07/14/2007
Completed date:	N/A
Acres cleaned up:	Not reported
Cleanup funding:	$197,520.00
Cleanup funding source:	US EPA - Brownfields Cleanup Cooperative Agreement
Assessment funding:	Not reported
Assessment funding source:	Not reported
Redevelopment funding:	$250,000.00
Redev. funding source:	State/Tribal Funding
Redev. funding entity name:	Oregon DOE Tax Credits
Redevelopment start date:	09/21/2006
Assessment funding entity:	Not reported
Cleanup funding entity:	Not reported
Grant type:	N/A
Accomplishment type:	Not reported
Ownership entity:	Government
Current owner:	Lane County, OR
Did owner change:	No
Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A
State/tribal program ID:	Not reported
State/tribal NFA date:	N/A
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Unknown media affected: Not reported
Other cleaned up: Not reported
Other metals found: Yes
Other metals cleaned: Yes
Other contaminants found: Not reported
Other contams found description: Not reported
PAHs found: Yes
PAHs cleaned up: Yes
PCBs found: Not reported
PCBs cleaned up: Not reported
Petro products found: Yes
Petro products cleaned: Yes
Sediments found: Not reported
Sediments cleaned: Not reported
Soil affected: Yes
Soil cleaned up: Yes
Surface water cleaned: Not reported
Unknown found: Not reported
VOCs found: Yes
VOCs cleaned: Yes
Cleanup other description: Not reported
Num. of cleanup and re-dev. jobs: Not reported
Past use greenspace acreage: Not reported
Past use residential acreage: Not reported
Past use commercial acreage: .6
Past use industrial acreage: Not reported
Future use greenspace acreage: Not reported
Future use residential acreage: Not reported
Future use commercial acreage: Not reported
Future use industrial acreage: Not reported
Greenspace acreage and type: Not reported
Superfund Fed. landowner flag: Not reported

Recipient name: Lane County
Grant type: Cleanup Grant
Property name: McVay Highway Biofueling Station Site
Property #: 18-03-10-10-3200
Parcel size: .6
Latitude: 44.0182
Longitude: -123.0258
HCM label: Global Positioning Method-Unspecified Parameters
Map scale: Not reported
Point of reference: Not reported
Datum: World Geodetic System of 1984
ACRES property ID: 28622
Start date: 07/14/2007
Completed date: N/A
Acres cleaned up: Not reported
Cleanup funding: $21,021.00
Cleanup funding source: State/Tribal Funding (non-section 128(a))
Assessment funding: Not reported
Assessment funding source: Not reported
Redevelopment funding: $50,000.00
Redev. funding source: State/Tribal Funding
Redev. funding entity name: Oregon ECDD Loan
Redevelopment start date: 09/21/2006
Assessment funding entity: Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Cleanup funding entity: ODEQ Response Program
Grant type: N/A
Accomplishment type: Not reported
Ownership entity: Government
Current owner: Lane County, OR
Did owner change: No
Cleanup required: Yes
Video available: Yes
Photo available: Yes
Institutional controls required: Yes
IC Category proprietary controls: Yes
IC cat. info. devices: Yes
IC cat. gov. controls: Yes
IC cat. enforcement permit tools: Yes
IC in place date: N/A
IC in place: Yes
Enrolled in state/tribal program: No
State/tribal program date: N/A
State/tribal program ID: Not reported
State/tribal NFA date: N/A
Air contaminated: Not reported
Air cleaned: Not reported
Asbestos found: Not reported
Asbestos cleaned: Not reported
Controled substance found: Not reported
Controled substance cleaned: Not reported
Drinking water affected: Yes
Drinking water cleaned: Not reported
Groundwater affected: Yes
Groundwater cleaned: Not reported
Lead contaminant found: Not reported
Lead cleaned up: Not reported
No media affected: Not reported
Unknown media affected: Not reported
Other cleaned up: Not reported
Other metals found: Yes
Other metals cleaned: Yes
Other contaminants found: Not reported
Other contams found description: Not reported
PAHs found: Yes
PAHs cleaned up: Yes
PCBs found: Not reported
PCBs cleaned up: Not reported
Petro products found: Yes
Petro products cleaned: Yes
Sediments found: Not reported
Sediments cleaned: Not reported
Soil affected: Yes
Soil cleaned up: Yes
Surface water cleaned: Not reported
Unknown found: Not reported
VOCs found: Yes
VOCs cleaned: Yes
Cleanup other description: Not reported
Num. of cleanup and re-dev. jobs: Not reported
Past use greenspace acreage: Not reported
Past use residential acreage: Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Past use commercial acreage:	.6
Past use industrial acreage:	Not reported
Future use greenspace acreage:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	Not reported
Future use industrial acreage:	Not reported
Greenspace acreage and type:	Not reported
Superfund Fed. landowner flag:	Not reported

Recipient name:	Lane County
Grant type:	Cleanup Grant
Property name:	McVay Highway Biofueling Station Site
Property #:	18-03-10-10-3200
Parcel size:	.6
Latitude:	44.0182
Longitude:	-123.0258
HCM label:	Global Positioning Method-Unspecified Parameters
Map scale:	Not reported
Point of reference:	Not reported
Datum:	World Geodetic System of 1984
ACRES property ID:	28622
Start date:	07/14/2007
Completed date:	N/A
Acres cleaned up:	Not reported
Cleanup funding:	$197,520.00
Cleanup funding source:	US EPA - Brownfields Cleanup Cooperative Agreement
Assessment funding:	Not reported
Assessment funding source:	Not reported
Redevelopment funding:	$1,000,000.00
Redev. funding source:	Private/Other Fundin
Redev. funding entity name:	Not reported
Redevelopment start date:	09/21/2006
Assessment funding entity:	Not reported
Cleanup funding entity:	Not reported
Grant type:	N/A
Accomplishment type:	Not reported
Ownership entity:	Government
Current owner:	Lane County, OR
Did owner change:	No
Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A
State/tribal program ID:	Not reported
State/tribal NFA date:	N/A
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported
PAHs found:	Yes
PAHs cleaned up:	Yes
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water cleaned:	Not reported
Unknown found:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes
Cleanup other description:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
Past use commercial acreage:	.6
Past use industrial acreage:	Not reported
Future use greenspace acreage:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	Not reported
Future use industrial acreage:	Not reported
Greenspace acreage and type:	Not reported
Superfund Fed. landowner flag:	Not reported

Recipient name:	Lane County
Grant type:	Cleanup Grant
Property name:	McVay Highway Biofueling Station Site
Property #:	18-03-10-10-3200
Parcel size:	.6
Latitude:	44.0182
Longitude:	-123.0258
HCM label:	Global Positioning Method-Unspecified Parameters
Map scale:	Not reported
Point of reference:	Not reported
Datum:	World Geodetic System of 1984
ACRES property ID:	28622
Start date:	07/14/2007
Completed date:	N/A
Acres cleaned up:	Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Cleanup funding:	$25,440.00
Cleanup funding source:	Local Funding
Assessment funding:	Not reported
Assessment funding source:	Not reported
Redevelopment funding:	$250,000.00
Redev. funding source:	State/Tribal Funding
Redev. funding entity name:	Oregon DOE Tax Credits
Redevelopment start date:	09/21/2006
Assessment funding entity:	Not reported
Cleanup funding entity:	Lane County
Grant type:	N/A
Accomplishment type:	Not reported
Ownership entity:	Government
Current owner:	Lane County, OR
Did owner change:	No
Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A
State/tribal program ID:	Not reported
State/tribal NFA date:	N/A
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported
PAHs found:	Yes
PAHs cleaned up:	Yes
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Soil cleaned up:	Yes
Surface water cleaned:	Not reported
Unknown found:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes
Cleanup other description:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
Past use commercial acreage:	.6
Past use industrial acreage:	Not reported
Future use greenspace acreage:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	Not reported
Future use industrial acreage:	Not reported
Greenspace acreage and type:	Not reported
Superfund Fed. landowner flag:	Not reported

Recipient name:	Lane County
Grant type:	Cleanup Grant
Property name:	McVay Highway Biofueling Station Site
Property #:	18-03-10-10-3200
Parcel size:	.6
Latitude:	44.0182
Longitude:	-123.0258
HCM label:	Global Positioning Method-Unspecified Parameters
Map scale:	Not reported
Point of reference:	Not reported
Datum:	World Geodetic System of 1984
ACRES property ID:	28622
Start date:	07/14/2007
Completed date:	N/A
Acres cleaned up:	Not reported
Cleanup funding:	$33,000.00
Cleanup funding source:	Private/Other Funding
Assessment funding:	Not reported
Assessment funding source:	Not reported
Redevelopment funding:	$250,000.00
Redev. funding source:	State/Tribal Funding
Redev. funding entity name:	Oregon DOE Tax Credits
Redevelopment start date:	09/21/2006
Assessment funding entity:	Not reported
Cleanup funding entity:	SeQuential Biofuels
Grant type:	N/A
Accomplishment type:	Not reported
Ownership entity:	Government
Current owner:	Lane County, OR
Did owner change:	No
Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

IC in place: Yes
Enrolled in state/tribal program: No
State/tribal program date: N/A
State/tribal program ID: Not reported
State/tribal NFA date: N/A
Air contaminated: Not reported
Air cleaned: Not reported
Asbestos found: Not reported
Asbestos cleaned: Not reported
Controled substance found: Not reported
Controled substance cleaned: Not reported
Drinking water affected: Yes
Drinking water cleaned: Not reported
Groundwater affected: Yes
Groundwater cleaned: Not reported
Lead contaminant found: Not reported
Lead cleaned up: Not reported
No media affected: Not reported
Unknown media affected: Not reported
Other cleaned up: Not reported
Other metals found: Yes
Other metals cleaned: Yes
Other contaminants found: Not reported
Other contams found description: Not reported
PAHs found: Yes
PAHs cleaned up: Yes
PCBs found: Not reported
PCBs cleaned up: Not reported
Petro products found: Yes
Petro products cleaned: Yes
Sediments found: Not reported
Sediments cleaned: Not reported
Soil affected: Yes
Soil cleaned up: Yes
Surface water cleaned: Not reported
Unknown found: Not reported
VOCs found: Yes
VOCs cleaned: Yes
Cleanup other description: Not reported
Num. of cleanup and re-dev. jobs: Not reported
Past use greenspace acreage: Not reported
Past use residential acreage: Not reported
Past use commercial acreage: .6
Past use industrial acreage: Not reported
Future use greenspace acreage: Not reported
Future use residential acreage: Not reported
Future use commercial acreage: Not reported
Future use industrial acreage: Not reported
Greenspace acreage and type: Not reported
Superfund Fed. landowner flag: Not reported

Recipient name: Lane County
Grant type: Cleanup Grant
Property name: McVay Highway Biofueling Station Site
Property #: 18-03-10-10-3200
Parcel size: .6
Latitude: 44.0182

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Longitude:	-123.0258
HCM label:	Global Positioning Method-Unspecified Parameters
Map scale:	Not reported
Point of reference:	Not reported
Datum:	World Geodetic System of 1984
ACRES property ID:	28622
Start date:	07/14/2007
Completed date:	N/A
Acres cleaned up:	Not reported
Cleanup funding:	$25,440.00
Cleanup funding source:	Local Funding
Assessment funding:	Not reported
Assessment funding source:	Not reported
Redevelopment funding:	$1,000,000.00
Redev. funding source:	Private/Other Fundin
Redev. funding entity name:	Not reported
Redevelopment start date:	09/21/2006
Assessment funding entity:	Not reported
Cleanup funding entity:	Lane County
Grant type:	N/A
Accomplishment type:	Not reported
Ownership entity:	Government
Current owner:	Lane County, OR
Did owner change:	No
Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A
State/tribal program ID:	Not reported
State/tribal NFA date:	N/A
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

PAHs found: Yes
PAHs cleaned up: Yes
PCBs found: Not reported
PCBs cleaned up: Not reported
Petro products found: Yes
Petro products cleaned: Yes
Sediments found: Not reported
Sediments cleaned: Not reported
Soil affected: Yes
Soil cleaned up: Yes
Surface water cleaned: Not reported
Unknown found: Not reported
VOCs found: Yes
VOCs cleaned: Yes
Cleanup other description: Not reported
Num. of cleanup and re-dev. jobs: Not reported
Past use greenspace acreage: Not reported
Past use residential acreage: Not reported
Past use commercial acreage: .6
Past use industrial acreage: Not reported
Future use greenspace acreage: Not reported
Future use residential acreage: Not reported
Future use commercial acreage: Not reported
Future use industrial acreage: Not reported
Greenspace acreage and type: Not reported
Superfund Fed. landowner flag: Not reported

Recipient name: Lane County
Grant type: Cleanup Grant
Property name: McVay Highway Biofueling Station Site
Property #: 18-03-10-10-3200
Parcel size: .6
Latitude: 44.0182
Longitude: -123.0258
HCM label: Global Positioning Method-Unspecified Parameters
Map scale: Not reported
Point of reference: Not reported
Datum: World Geodetic System of 1984
ACRES property ID: 28622
Start date: 07/14/2007
Completed date: N/A
Acres cleaned up: Not reported
Cleanup funding: $33,000.00
Cleanup funding source: Private/Other Funding
Assessment funding: Not reported
Assessment funding source: Not reported
Redevelopment funding: $1,000,000.00
Redev. funding source: Private/Other Fundin
Redev. funding entity name: Not reported
Redevelopment start date: 09/21/2006
Assessment funding entity: Not reported
Cleanup funding entity: SeQuential Biofuels
Grant type: N/A
Accomplishment type: Not reported
Ownership entity: Government
Current owner: Lane County, OR
Did owner change: No

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A
State/tribal program ID:	Not reported
State/tribal NFA date:	N/A
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported
PAHs found:	Yes
PAHs cleaned up:	Yes
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water cleaned:	Not reported
Unknown found:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes
Cleanup other description:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
Past use commercial acreage:	.6
Past use industrial acreage:	Not reported
Future use greenspace acreage:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	Not reported
Future use industrial acreage:	Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Greenspace acreage and type: Not reported
Superfund Fed. landowner flag: Not reported

Recipient name: Lane County
Grant type: Cleanup Grant
Property name: McVay Highway Biofueling Station Site
Property #: 18-03-10-10-3200
Parcel size: .6
Latitude: 44.0182
Longitude: -123.0258
HCM label: Global Positioning Method-Unspecified Parameters
Map scale: Not reported
Point of reference: Not reported
Datum: World Geodetic System of 1984
ACRES property ID: 28622
Start date: 07/14/2007
Completed date: N/A
Acres cleaned up: Not reported
Cleanup funding: $21,021.00
Cleanup funding source: State/Tribal Funding (non-section 128(a))
Assessment funding: Not reported
Assessment funding source: Not reported
Redevelopment funding: $250,000.00
Redev. funding source: State/Tribal Funding
Redev. funding entity name: Oregon DOE Tax Credits
Redevelopment start date: 09/21/2006
Assessment funding entity: Not reported
Cleanup funding entity: ODEQ Response Program
Grant type: N/A
Accomplishment type: Not reported
Ownership entity: Government
Current owner: Lane County, OR
Did owner change: No
Cleanup required: Yes
Video available: Yes
Photo available: Yes
Institutional controls required: Yes
IC Category proprietary controls: Yes
IC cat. info. devices: Yes
IC cat. gov. controls: Yes
IC cat. enforcement permit tools: Yes
IC in place date: N/A
IC in place: Yes
Enrolled in state/tribal program: No
State/tribal program date: N/A
State/tribal program ID: Not reported
State/tribal NFA date: N/A
Air contaminated: Not reported
Air cleaned: Not reported
Asbestos found: Not reported
Asbestos cleaned: Not reported
Controled substance found: Not reported
Controled substance cleaned: Not reported
Drinking water affected: Yes
Drinking water cleaned: Not reported
Groundwater affected: Yes
Groundwater cleaned: Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported
PAHs found:	Yes
PAHs cleaned up:	Yes
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water cleaned:	Not reported
Unknown found:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes
Cleanup other description:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
Past use commercial acreage:	.6
Past use industrial acreage:	Not reported
Future use greenspace acreage:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	Not reported
Future use industrial acreage:	Not reported
Greenspace acreage and type:	Not reported
Superfund Fed. landowner flag:	Not reported

Recipient name:	Lane County
Grant type:	Cleanup Grant
Property name:	McVay Highway Biofueling Station Site
Property #:	18-03-10-10-3200
Parcel size:	.6
Latitude:	44.0182
Longitude:	-123.0258
HCM label:	Global Positioning Method-Unspecified Parameters
Map scale:	Not reported
Point of reference:	Not reported
Datum:	World Geodetic System of 1984
ACRES property ID:	28622
Start date:	07/14/2007
Completed date:	N/A
Acres cleaned up:	Not reported
Cleanup funding:	$197,520.00
Cleanup funding source:	US EPA - Brownfields Cleanup Cooperative Agreement
Assessment funding:	Not reported
Assessment funding source:	Not reported
Redevelopment funding:	$50,000.00
Redev. funding source:	State/Tribal Funding

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Redev. funding entity name:	Oregon ECDD Loan
Redevelopment start date:	09/21/2006
Assessment funding entity:	Not reported
Cleanup funding entity:	Not reported
Grant type:	N/A
Accomplishment type:	Not reported
Ownership entity:	Government
Current owner:	Lane County, OR
Did owner change:	No
Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A
State/tribal program ID:	Not reported
State/tribal NFA date:	N/A
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported
PAHs found:	Yes
PAHs cleaned up:	Yes
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water cleaned:	Not reported
Unknown found:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes
Cleanup other description:	Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Num. of cleanup and re-dev. jobs: Not reported
Past use greenspace acreage: Not reported
Past use residential acreage: Not reported
Past use commercial acreage: .6
Past use industrial acreage: Not reported
Future use greenspace acreage: Not reported
Future use residential acreage: Not reported
Future use commercial acreage: Not reported
Future use industrial acreage: Not reported
Greenspace acreage and type: Not reported
Superfund Fed. landowner flag: Not reported

Recipient name: Lane County
Grant type: Cleanup Grant
Property name: McVay Highway Biofueling Station Site
Property #: 18-03-10-10-3200
Parcel size: .6
Latitude: 44.0182
Longitude: -123.0258
HCM label: Global Positioning Method-Unspecified Parameters
Map scale: Not reported
Point of reference: Not reported
Datum: World Geodetic System of 1984
ACRES property ID: 28622
Start date: 07/14/2007
Completed date: N/A
Acres cleaned up: Not reported
Cleanup funding: $21,021.00
Cleanup funding source: State/Tribal Funding (non-section 128(a))
Assessment funding: Not reported
Assessment funding source: Not reported
Redevelopment funding: $1,000,000.00
Redev. funding source: Private/Other Fundin
Redev. funding entity name: Not reported
Redevelopment start date: 09/21/2006
Assessment funding entity: Not reported
Cleanup funding entity: ODEQ Response Program
Grant type: N/A
Accomplishment type: Not reported
Ownership entity: Government
Current owner: Lane County, OR
Did owner change: No
Cleanup required: Yes
Video available: Yes
Photo available: Yes
Institutional controls required: Yes
IC Category proprietary controls: Yes
IC cat. info. devices: Yes
IC cat. gov. controls: Yes
IC cat. enforcement permit tools: Yes
IC in place date: N/A
IC in place: Yes
Enrolled in state/tribal program: No
State/tribal program date: N/A
State/tribal program ID: Not reported
State/tribal NFA date: N/A
Air contaminated: Not reported

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported
PAHs found:	Yes
PAHs cleaned up:	Yes
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes
Sediments found:	Not reported
Sediments cleaned:	Not reported
Soil affected:	Yes
Soil cleaned up:	Yes
Surface water cleaned:	Not reported
Unknown found:	Not reported
VOCs found:	Yes
VOCs cleaned:	Yes
Cleanup other description:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
Past use commercial acreage:	.6
Past use industrial acreage:	Not reported
Future use greenspace acreage:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	Not reported
Future use industrial acreage:	Not reported
Greenspace acreage and type:	Not reported
Superfund Fed. landowner flag:	Not reported

Recipient name:	Lane County
Grant type:	Cleanup Grant
Property name:	McVay Highway Biofueling Station Site
Property #:	18-03-10-10-3200
Parcel size:	.6
Latitude:	44.0182
Longitude:	-123.0258
HCM label:	Global Positioning Method-Unspecified Parameters
Map scale:	Not reported
Point of reference:	Not reported
Datum:	World Geodetic System of 1984
ACRES property ID:	28622

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Start date:	07/14/2007
Completed date:	N/A
Acres cleaned up:	Not reported
Cleanup funding:	$25,440.00
Cleanup funding source:	Local Funding
Assessment funding:	Not reported
Assessment funding source:	Not reported
Redevelopment funding:	$50,000.00
Redev. funding source:	State/Tribal Funding
Redev. funding entity name:	Oregon ECDD Loan
Redevelopment start date:	09/21/2006
Assessment funding entity:	Not reported
Cleanup funding entity:	Lane County
Grant type:	N/A
Accomplishment type:	Not reported
Ownership entity:	Government
Current owner:	Lane County, OR
Did owner change:	No
Cleanup required:	Yes
Video available:	Yes
Photo available:	Yes
Institutional controls required:	Yes
IC Category proprietary controls:	Yes
IC cat. info. devices:	Yes
IC cat. gov. controls:	Yes
IC cat. enforcement permit tools:	Yes
IC in place date:	N/A
IC in place:	Yes
Enrolled in state/tribal program:	No
State/tribal program date:	N/A
State/tribal program ID:	Not reported
State/tribal NFA date:	N/A
Air contaminated:	Not reported
Air cleaned:	Not reported
Asbestos found:	Not reported
Asbestos cleaned:	Not reported
Controled substance found:	Not reported
Controled substance cleaned:	Not reported
Drinking water affected:	Yes
Drinking water cleaned:	Not reported
Groundwater affected:	Yes
Groundwater cleaned:	Not reported
Lead contaminant found:	Not reported
Lead cleaned up:	Not reported
No media affected:	Not reported
Unknown media affected:	Not reported
Other cleaned up:	Not reported
Other metals found:	Yes
Other metals cleaned:	Yes
Other contaminants found:	Not reported
Other contams found description:	Not reported
PAHs found:	Yes
PAHs cleaned up:	Yes
PCBs found:	Not reported
PCBs cleaned up:	Not reported
Petro products found:	Yes
Petro products cleaned:	Yes

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

Sediments found: Not reported
Sediments cleaned: Not reported
Soil affected: Yes
Soil cleaned up: Yes
Surface water cleaned: Not reported
Unknown found: Not reported
VOCs found: Yes
VOCs cleaned: Yes
Cleanup other description: Not reported
Num. of cleanup and re-dev. jobs: Not reported
Past use greenspace acreage: Not reported
Past use residential acreage: Not reported
Past use commercial acreage: .6
Past use industrial acreage: Not reported
Future use greenspace acreage: Not reported
Future use residential acreage: Not reported
Future use commercial acreage: Not reported
Future use industrial acreage: Not reported
Greenspace acreage and type: Not reported
Superfund Fed. landowner flag: Not reported

Recipient name: Lane County
Grant type: Cleanup Grant
Property name: McVay Highway Biofueling Station Site
Property #: 18-03-10-10-3200
Parcel size: .6
Latitude: 44.0182
Longitude: -123.0258
HCM label: Global Positioning Method-Unspecified Parameters
Map scale: Not reported
Point of reference: Not reported
Datum: World Geodetic System of 1984
ACRES property ID: 28622
Start date: 07/14/2007
Completed date: N/A
Acres cleaned up: Not reported
Cleanup funding: $33,000.00
Cleanup funding source: Private/Other Funding
Assessment funding: Not reported
Assessment funding source: Not reported
Redevelopment funding: $50,000.00
Redev. funding source: State/Tribal Funding
Redev. funding entity name: Oregon ECDD Loan
Redevelopment start date: 09/21/2006
Assessment funding entity: Not reported
Cleanup funding entity: SeQuential Biofuels
Grant type: N/A
Accomplishment type: Not reported
Ownership entity: Government
Current owner: Lane County, OR
Did owner change: No
Cleanup required: Yes
Video available: Yes
Photo available: Yes
Institutional controls required: Yes
IC Category proprietary controls: Yes
IC cat. info. devices: Yes

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

IC cat. gov. controls: Yes
IC cat. enforcement permit tools: Yes
IC in place date: N/A
IC in place: Yes
Enrolled in state/tribal program: No
State/tribal program date: N/A
State/tribal program ID: Not reported
State/tribal NFA date: N/A
Air contaminated: Not reported
Air cleaned: Not reported
Asbestos found: Not reported
Asbestos cleaned: Not reported
Controled substance found: Not reported
Controled substance cleaned: Not reported
Drinking water affected: Yes
Drinking water cleaned: Not reported
Groundwater affected: Yes
Groundwater cleaned: Not reported
Lead contaminant found: Not reported
Lead cleaned up: Not reported
No media affected: Not reported
Unknown media affected: Not reported
Other cleaned up: Not reported
Other metals found: Yes
Other metals cleaned: Yes
Other contaminants found: Not reported
Other contams found description: Not reported
PAHs found: Yes
PAHs cleaned up: Yes
PCBs found: Not reported
PCBs cleaned up: Not reported
Petro products found: Yes
Petro products cleaned: Yes
Sediments found: Not reported
Sediments cleaned: Not reported
Soil affected: Yes
Soil cleaned up: Yes
Surface water cleaned: Not reported
Unknown found: Not reported
VOCs found: Yes
VOCs cleaned: Yes
Cleanup other description: Not reported
Num. of cleanup and re-dev. jobs: Not reported
Past use greenspace acreage: Not reported
Past use residential acreage: Not reported
Past use commercial acreage: .6
Past use industrial acreage: Not reported
Future use greenspace acreage: Not reported
Future use residential acreage: Not reported
Future use commercial acreage: Not reported
Future use industrial acreage: Not reported
Greenspace acreage and type: Not reported
Superfund Fed. landowner flag: Not reported

Property Highlights: Redevelopment use as a first of its kind biofuel station incorporating extensive sustainable development elements such as solar power, passive solar building design, bioswales, locally

MCVAY HIGHWAY BIOFUELING STATION SITE (Continued) **1009569627**

sourced and non- or low-toxic products. The site is also run on 1100 renewable power through its self-contained solar array and wind power, thus reducing its carbon footprint. Long term benefits to the community are also measurable in the reduction of emissions in the air-shed, lessening our dependence on petroleeum, and reducing threats to a nearby creek and the Willamette River. SeQuential won an Innovation Award from the Eugene Chamber of Commerce partly for their work on the redevelopment of the biofuel station. The estimated net incoe tax for this ffacility is between $15,000 to $20,000 (Note: This estimate is before depreciation of the equipment which will drive that number significantly lower). The property redevelopmen is too new to have an annual property tax assessment from Lan County. Howwever, based on other area properties, the tax is estimated to be in the $4,000 range. (PPF - McVay Highway Biofueling Station Property, 11-19-07) Property was previously blighted, attracting transients and drug users. Property was previously useed for dumping of waste tires and garbage. Property was an eyesore in the neighborhood. (PPF - 8/17/06)

Property Description: The 0.6 acre property is located at the intersection of Bloomberg Road and McVay Highway and was formerly operated as a retail fueling station. A service station building and canopy remain. Formerly owned by Mid Oil Company and Franko Oil Company,Franko #15 site.

D19
West
1/2-1
0.695 mi.
3669 ft.

PRIDE OF OREGON - MCVAY
86714 MCVAY HWY
EUGENE, OR 97405

Site 3 of 7 in cluster D

ECSI
LUST
VCP
BROWNFIELDS

S105247164
N/A

Relative:
Higher

Actual:
486 ft.

OR ECSI:

State ID Number:	4444	Brown ID:	Brownfield Site - DEQ Funding Assistance
Study Area:	False	Region ID:	3
Legislatve ID:	0	Investigation ID:	208
FACA ID:	89276	Further Action:	0
Lat/Long (dms):	44 1 5.90 / -123 1 33.60	County Code:	20.00
Score Value:	Not reported	Cerclis ID:	Not reported
Township Coord.:	18.00	Township Zone:	S
Range Coord:	3.00	Range Zone:	W
Section Coord:	11	Qtr Section:	Not reported
Tax Lots:	Not reported	Size:	0.7 acre
NPL:	False	Orphan:	False
Updated By:	BTHOMS	Update Date:	12/18/2006
Alias Name:	SeQuential Biofuels		
Alias Name:	Franko Station #15 (Former)		

OR ECSI HAZARDOUS RELEASE:

Substance ID.:	Not reported
Haz Release ID:	Not reported
Qty Released:	Not reported
Date Released:	Not reported
Update Date:	Not reported
Update By:	Not reported
Substance Code:	Not reported
Substance Name:	Not reported
Substance Abbrev.:	Not reported
Substance Category ID:	Not reported
Substance Category:	Not reported
Category Level:	Not reported
Created By:	Not reported

PRIDE OF OREGON - MCVAY (Continued) **S105247164**

Created Date: Not reported
Substance Category ID: Not reported
Substance Category: Not reported
Category Level: Not reported
Created By: Not reported
Created Date: Not reported
Substance Alias ID: Not reported
Sub Alias Name: Not reported
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

OR ECSI NARR:
NARR ID: 5747006
NARR Code: General Site Description
Created By: GWISTAR
Created Date: 08/11/2005
Updated By: GWISTAR
Updated Date: 08/11/2005
NARR Comments:A residential area of single-family homes is located directly west of the site. The former service station building, canopy, and dispenser islands currently occupy the site. No business has operated at the site since 2003.

NARR ID: 5746827
NARR Code: Hazardous Substance/Waste Types
Created By: MENGLIS
Created Date: 07/12/2005
Updated By: MENGLIS
Updated Date: 07/12/2005
NARR Comments:In January 2005, more than 400 tires and 15 drums of investigation derived waste were removed from the site.

NARR ID: 5746818
NARR Code: Site Location
Created By: MENGLIS
Created Date: 07/12/2005
Updated By: GWISTAR
Updated Date: 08/11/2005
NARR Comments:This site is located along a commercial corridor adjacent to Interstate 5 in southeast Eugene.

PRIDE OF OREGON - MCVAY (Continued) **S105247164**

NARR ID: 5746826
NARR Code: Site Ownership
Created By: MENGLIS
Created Date: 07/12/2005
Updated By: MENGLIS
Updated Date: 07/12/2005
NARR Comments: Lane County obtained the site in September 2004 through tax foreclosure.

NARR ID: 5746822
NARR Code: Remedial Action
Created By: MENGLIS
Created Date: 07/12/2005
Updated By: BTHOMS
Updated Date: 12/18/2006
NARR Comments: (7/12/05) A Site-Specific Assessment (SSA) at the McVay Highway Project Site, also known as the former Franko Station #15, located at 86714 McVay Highway in Eugene, Oregon was completed on June 17, 2005. Information and data gathered during the assessment will be used in cleaning up and redeveloping the site. Site redevelopment as a biofueling facility is expected to begin in August 2005 simultaneously with cleanup under an EPA Brownfield Cleanup Grant that was awarded during May 2005.

(12/06 BET) EPA Brownfield grant awarded in 2005, soil removal and additional soil and groundwater assesment conducted in 2005 and early 2006. One extraction is currently pumping groundwater and treating on site. Site was redeveloped as retail biofuel station. Soil cleanup completed, groundwater cleanup continuing.

NARR ID: 5746828
NARR Code: Site History
Created By: MENGLIS
Created Date: 07/12/2005
Updated By: GWISTAR
Updated Date: 10/23/2006
NARR Comments: The former Franko facility at 86741 McVay Highway in Eugene sold gasoline from 1976 until it closed in 1991, when Mid Oil Company and Franko Oil Company filed Chapter 7 bankruptcy. The property was turned over to the bankruptcy estate.

In 1991, petroleum contamination was observed along McVay highway (east of the site) during utility trenching. The contamination had also migrated off site to a residential well west of the facility. In 1996, Lucky Sites LLC purchased the property out of bankruptcy, removed the five underground storage tanks and excavated contaminated soil. Further assessment, including installation of groundwater monitoring wells, identified the pump-islands as the primary source of petroleum contamination at the site.

The site continued to fall into disrepair after several years of n eglect. Lane County acquired the property through tax foreclosure in 2004. In January 2005, the county removed over 400 tires, 15 drums of investigation wastes, hundreds of needles and other debris from the property.

At about the same time, Lane County entered into negotiations with

PRIDE OF OREGON - MCVAY (Continued) **S105247164**

DEQ and SeQuential Biofuels to reuse the site. This included a Prospective Purchaser Agreement between DEQ and the county. Lane County also applied for a Brownfields Cleanup Grant from EPA to facilitate cleanup and redevelopment, and EPA awarded the grant in the Spring of 2005.

OR ECSI SITE CONTROL:

Site Control #:	Not reported
Control Number:	Not reported
Begin Date:	Not reported
End Date:	Not reported
Frequency Of Review:	Not reported
Last Reviewed By:	Not reported
Last Reviewed Date:	Not reported
Last Update By:	Not reported
Last Updated Date:	Not reported
Site Comment:	Not reported

OR ECSI PERMIT:

Permit Agency:	Not reported
Permit Number:	Not reported
Permit Type:	Not reported
Comments:	Not reported

OR ECSI Administrative Action:

Admin ID:	730623	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	07/12/2005	Complete Date:	07/12/2005
Substance Code:	Not reported	Rank Value:	Not reported
Employee Id:	2202	Cleanup Flag:	False
Created By:	MENGLIS	Created Date:	07/12/2005
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	730624	Action ID:	9518
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	05/10/2005	Complete Date:	06/17/2005
Substance Code:	Not reported	Rank Value:	Not reported
Employee Id:	2033	Cleanup Flag:	False
Created By:	MENGLIS	Created Date:	07/12/2005
Action Code:	TBA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	TARGETED BROWNFIELD ASSESSMENT		
Further Action:	0		
Comments:	Not reported		

Admin ID:	731052	Action ID:	9464
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	03/11/2005	Complete Date:	07/19/2005
Substance Code:	CPD	Rank Value:	Not reported
Employee Id:	2097	Cleanup Flag:	False
Created By:	GWISTAR	Created Date:	09/22/2005
Action Code:	PPA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Prospective Purchaser Agreement		
Further Action:	0		

PRIDE OF OREGON - MCVAY (Continued) **S105247164**

Comments: PPA #05-03: SeQuential Retail Station #1 LLC.

Admin ID:	731227	Action ID:	9491
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	10/01/2005	Complete Date:	Not reported
Substance Code:	VCS	Rank Value:	Not reported
Employee Id:	2033	Cleanup Flag:	False
Created By:	GWISTAR	Created Date:	10/26/2005
Action Code:	RM	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	REMOVAL		
Further Action:	0		
Comments:	Funded by EPA brownfield grant.		

OR ECSI OPERATIONS:

Operation Id: Not reported
Operation Status: Not reported
Common Name: Not reported
Yrs of Operation: Not reported
Comments: Not reported
Updated Date: Not reported
Operations SIC Id: Not reported
SIC Code: Not reported
Created By: Not reported
Created Date: Not reported

LUST:

Region: Western Region
Facility ID: 20-89-4181
Cleanup Received Date: 12/27/1989
Cleanup Start Date: 04/17/1991
Cleanup Complete Date: 04/17/1991

VCS:

ECS Site ID: 4444
CRL: SUS
Facility Size: 0.7 acre
Action: REMOVAL
Start Date: 2005-10-01
End Date: Not reported
Project Manager Name: Bryn Thoms
Program: VCS

OR BROWNFIELDS:

Lat/Long: 44.018300000000004 / -123.026

D20
West
1/2-1
0.696 mi.
3677 ft.

YATES ASTRO
86742 MCVAY HWY
EUGENE, OR 97405

Site 4 of 7 in cluster D

LUST **S100675989**
N/A

Relative:
Higher

Actual:
487 ft.

LUST:

Region: Western Region
Facility ID: 20-93-4143
Cleanup Received Date: 09/02/1993
Cleanup Start Date: 09/02/1993

YATES ASTRO (Continued) **S100675989**

Cleanup Complete Date: 02/26/2001

D21
West
1/2-1
0.696 mi.
3677 ft.

ASTRO #208
86742 MCVAY HIGHWAY
EUGENE, OR 97405

UST **U004015746**
N/A

Site 5 of 7 in cluster D

Relative:
Higher

Actual:
487 ft.

UST:
Facility ID: 11270
Facility Telephone: (503) 243-2929
Permittee Name: Glenn Zirkle
Number of Permitted Tanks: 2
Active Tanks: 2
Decommissioned Tanks: Not reported
Number of Tanks: 2

D22
West
1/2-1
0.699 mi.
3692 ft.

UNOCAL 4458
86770 MCVAY HWY
EUGENE, OR 97405

LUST **U004015754**
UST **N/A**

Site 6 of 7 in cluster D

Relative:
Higher

Actual:
487 ft.

LUST:
Region: Western Region
Facility ID: 20-88-4020
Cleanup Received Date: 09/29/1988
Cleanup Start Date: 02/22/1991
Cleanup Complete Date: Not reported

UST:
Facility ID: 986
Facility Telephone: (503) 746-2401
Permittee Name: KENNETH OTTINGER JR, DEALER
Number of Permitted Tanks: Not reported
Active Tanks: Not reported
Decommissioned Tanks: 5
Number of Tanks: 5

D23
West
1/2-1
0.700 mi.
3695 ft.

EMPORIUM
86776 MCVAY HWY
EUGENE, OR 97477

UST **U000435452**
N/A

Site 7 of 7 in cluster D

Relative:
Higher

Actual:
487 ft.

UST:
Facility ID: 5145
Facility Telephone: (503)746-9611
Permittee Name: ROGER L SNYDER, WAREHOUSE MANAGER
Number of Permitted Tanks: Not reported
Active Tanks: Not reported
Decommissioned Tanks: 2
Number of Tanks: 2

24
WNW
1/2-1
0.853 mi.
4502 ft.

GOULTER PROPERTY
86430 FRANKLIN BLVD
EUGENE, OR 97403

LUST **S100499071**
N/A

Relative:
Higher

Actual:
508 ft.

LUST:

Region:	Western Region
Facility ID:	20-91-4153
Cleanup Received Date:	05/24/1991
Cleanup Start Date:	07/12/1991
Cleanup Complete Date:	**07/12/1991**

E25
WNW
1/2-1
0.936 mi.
4940 ft.

EL-JAY DIVISION - CEDARAPIDS INC
86470 FRANKLIN BLVD
EUGENE, OR 97405

Site 1 of 3 in cluster E

LUST **U001330354**
UST **N/A**

Relative:
Higher

Actual:
489 ft.

LUST:

Region:	Western Region
Facility ID:	20-93-4083
Cleanup Received Date:	06/10/1993
Cleanup Start Date:	06/05/1993
Cleanup Complete Date:	**12/30/2002**

UST:

Facility ID:	5777
Facility Telephone:	(503)726-6541
Permittee Name:	GERALD HAWES, SAFETY & ENVIRONMENTAL DIR
Number of Permitted Tanks:	Not reported
Active Tanks:	Not reported
Decommissioned Tanks:	1
Number of Tanks:	1

E26
WNW
1/2-1
0.936 mi.
4940 ft.

EL-JAY FACTORY #2
86470 FRANKLIN BLVD.
EUGENE, OR 97405

Site 2 of 3 in cluster E

ECSI **S103841512**
VCP **N/A**

Relative:
Higher

Actual:
489 ft.

OR ECSI:

State ID Number:	199	Brown ID:	0
Study Area:	False	Region ID:	3
Legislatve ID:	0	Investigation ID:	206
FACA ID:	1370	Further Action:	0
Lat/Long (dms):	44 0 43.60 / -123 1 11.60	County Code:	20.00
Score Value:	Not reported	Cerclis ID:	Not reported
Township Coord.:	18.00	Township Zone:	S
Range Coord:	3.00	Range Zone:	W
Section Coord:	11	Qtr Section:	Not reported
Tax Lots:	3600	Size:	2.3 acres
NPL:	False	Orphan:	False
Updated By:	GWISTAR	Update Date:	02/25/2009
Alias Name:	Mobius, Inc.		
Alias Name:	Johnson Crushers International, Inc.		

OR ECSI HAZARDOUS RELEASE:

EL-JAY FACTORY #2 (Continued) **S103841512**

Substance ID.: 121989
Haz Release ID: 382919
Qty Released: Unknown
Date Released: Unknown
Update Date: 08/24/1988
Update By: Not reported
Substance Code: ECD200
Substance Name: OIL OR FUEL RELATED COMPOUNDS
Substance Abbrev.: Not reported
Substance Category ID: 8532
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8532
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: Not reported
Sub Alias Name: Not reported
Comment ID: 303474
Release Code: Data Sources
Release Comments: WVR HW DEQ source file
Sampling Result ID: 337486
Feature Id: Not reported
Hazard Release Id: 382919
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: CONV
Update Date: 09/13/1994

OR ECSI NARR:
NARR ID: 5729988
NARR Code: Contamination
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Oil was released into the soil. Other hazardous substances that are used at the facility may have been disposed of or leaked on-site.

NARR ID: 5729989
NARR Code: Data Sources
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002

EL-JAY FACTORY #2 (Continued) **S103841512**

NARR Comments:Environmental Site Assessment, Cascade Pacific Engineering (1/96); Environmental Site Investigation for the Former El-Jay F2 facility, GEM (5/96); Soil Investigation & Remediation System Progress Report, Century West (1/98); Remediation System Final Closure Report, Century West (3/99).

NARR ID: 5729990
NARR Code: Hazardous Substance/Waste Types
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:oil

NARR ID: 5729991
NARR Code: Manner of Release
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Time of release unknown.

NARR ID: 5729992
NARR Code: Pathways Other Hazards
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Soil contamination

NARR ID: 5729993
NARR Code: Remedial Action
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Company removed soil from the spill area. (8/27/92 LSK/SAS) Low-priority site. (1/18/00 JGR) Installed remediation system (11 extraction wells/passive injection wells) in 1/97. System remained in operation until 5/98. (3/14/01 GJW) Remediation system decommissioned and removed in 2000. NFA issued 2/01 and project closed.

OR ECSI SITE CONTROL:
Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported
Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:
Permit Agency: Not reported
Permit Number: Not reported
Permit Type: Not reported

EL-JAY FACTORY #2 (Continued) **S103841512**

Comments: Not reported

OR ECSI Administrative Action:

Admin ID:	708446	Action ID:	9519
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	10/09/1998	Complete Date:	06/01/1999
Substance Code:	VCP	Rank Value:	3
Employee Id:	1872	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	VWL	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	VCS Waiting List		
Further Action:	Low		
Comments:	Not reported		

Admin ID:	718733	Action ID:	9425
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/27/1992	Complete Date:	08/27/1992
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	EV	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	SITE EVALUATION		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	718734	Action ID:	9437
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/28/1992	Complete Date:	08/28/1992
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	LRC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Listing Review completed		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	718735	Action ID:	9449
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/29/1992	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NSFL	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Insufficient information to list		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	718736	Action ID:	9496
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/30/1992	Complete Date:	08/30/1992
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RPA	Category:	Remedial Action

EL-JAY FACTORY #2 (Continued) **S103841512**

Action Flag:	True	Action Code Flag:	False
Action:	State Basic Preliminary Assessment recommended (PA)		
Further Action:	Low		
Comments:	Not reported		

Admin ID:	707199	Action ID:	9440
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	06/01/1999	Complete Date:	06/01/1999
Substance Code:	VCP	Rank Value:	3
Employee Id:	1929	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	LTAG	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Letter Agreement		
Further Action:	Low		
Comments:	Not reported		

Admin ID:	718257	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/24/1988	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	1804	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	703737	Action ID:	9413
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	03/14/2001	Complete Date:	03/14/2001
Substance Code:	VCP	Rank Value:	0
Employee Id:	2164	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	CO	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Closeout activities on completed project		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	703668	Action ID:	9443
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	02/05/2001	Complete Date:	02/05/2001
Substance Code:	VCP	Rank Value:	0
Employee Id:	2164	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NFA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	NO FURTHER STATE ACTION REQUIRED		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	703375	Action ID:	9425
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	11/01/1999	Complete Date:	11/01/1999
Substance Code:	VCP	Rank Value:	0

EL-JAY FACTORY #2 (Continued) **S103841512**

Employee Id:	2164	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	EV	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	SITE EVALUATION		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	704700	Action ID:	9491
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	01/10/1997	Complete Date:	05/30/1998
Substance Code:	VCP	Rank Value:	0
Employee Id:	1929	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RM	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	REMOVAL		
Further Action:	Not reported		
Comments:	Not reported		

OR ECSI OPERATIONS:
Operation Id: 131618
Operation Status: Active
Common Name: El-Jay Factory #2
Yrs of Operation: Not reported
Comments: Manufacturer - large rock processing equipment.
Updated Date: 01/24/2000
Operations SIC Id: 195387
SIC Code: 3532
Created By: Not reported
Created Date: 12/17/2002

VCS:
ECS Site ID: 199
CRL: NFA
Facility Size: 2.3 acres
Action: NO FURTHER STATE ACTION REQUIRED
Start Date: 2001-02-05
End Date: 2001-02-05
Project Manager Name: Gene Wong
Program: VCP

E27 **EL JAY DIVISION** **LUST** **S100499116**
WNW **86470 FRANKLIN BLVD** **N/A**
1/2-1 **EUGENE, OR 97405**
0.936 mi.
4940 ft. **Site 3 of 3 in cluster E**

Relative:
Higher

Actual:
489 ft.

LUST:
Region: Western Region
Facility ID: 20-92-4102
Cleanup Received Date: 06/15/1992
Cleanup Start Date: 06/15/1992
Cleanup Complete Date: 11/22/2002

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
28 **WSW** **> 1** **1.276 mi.** **6735 ft.** **Relative: Higher** **Actual: 501 ft.**	**LANE COMMUNITY COLLEGE** **4000 E 30TH AVE** **EUGENE, OR 97405**	**RCRA-CESQG** **FINDS** **ECSI** **LUST** **UST** **AST** **MANIFEST** **HAZNET** **NPDES** **HSIS**	**1000196276** **ORD048980288**

RCRA-CESQG:

Date form received by agency: 12/31/2004
Facility name: LANE COMMUNITY COLLEGE
Facility address: 4000 E 30TH AVE
EUGENE, OR 97405
EPA ID: ORD048980288
Mailing address: 4000 E 30TH AVENUE
EUGENE, OR 97405-0640
Contact: JENNIFER HAYWARD
Contact address: 4000 E 30TH AVENUE
EUGENE, OR 97405-0640
Contact country: US
Contact telephone: 541 463 5594
Contact email: Not reported
EPA Region: 10
Land type: Other land type
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name: LANE COMMUNITY COLLEGE
Owner/operator address: 4000 E 30TH AVENUE
EUGENE, OR 97405
Owner/operator country: US
Owner/operator telephone: (541) 463-3000
Legal status: Other
Owner/Operator Type: Owner
Owner/Op start date: 12/31/2004
Owner/Op end date: Not reported

Owner/operator name: LANE COMMUNITY COLLEGE
Owner/operator address: 4000 E 30TH AVENUE
EUGENE, OR 97405
Owner/operator country: US
Owner/operator telephone: 541 463 3000

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Legal status:	Other
Owner/Operator Type:	Operator
Owner/Op start date:	12/31/2004
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	Yes
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Historical Generators:

Date form received by agency:	12/31/2003
Facility name:	LANE COMMUNITY COLLEGE
Classification:	Small Quantity Generator
Date form received by agency:	03/03/2003
Facility name:	LANE COMMUNITY COLLEGE
Classification:	Small Quantity Generator
Date form received by agency:	03/01/2002
Facility name:	LANE COMMUNITY COLLEGE
Classification:	Small Quantity Generator
Date form received by agency:	03/01/2001
Facility name:	LANE COMMUNITY COLLEGE
Classification:	Small Quantity Generator
Date form received by agency:	04/05/2000
Facility name:	LANE COMMUNITY COLLEGE
Classification:	Small Quantity Generator
Date form received by agency:	04/16/1999
Facility name:	LANE COMMUNITY COLLEGE
Classification:	Small Quantity Generator
Date form received by agency:	07/02/1998
Facility name:	LANE COMMUNITY COLLEGE
Classification:	Small Quantity Generator
Date form received by agency:	02/21/1997
Facility name:	LANE COMMUNITY COLLEGE
Classification:	Small Quantity Generator
Date form received by agency:	01/29/1996

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Facility name: LANE COMMUNITY COLLEGE
Classification: Small Quantity Generator

Date form received by agency: 02/27/1995
Facility name: LANE COMMUNITY COLLEGE
Classification: Small Quantity Generator

Date form received by agency: 03/02/1994
Facility name: LANE COMMUNITY COLLEGE
Classification: Small Quantity Generator

Date form received by agency: 09/23/1993
Facility name: LANE COMMUNITY COLLEGE
Classification: Small Quantity Generator

Date form received by agency: 03/02/1992
Facility name: LANE COMMUNITY COLLEGE
Classification: Small Quantity Generator

Hazardous Waste Summary:
Waste code: NA
Waste name: NA

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Used Oil - Generators
Date violation determined: 03/19/2003
Date achieved compliance: 06/02/2003
Violation lead agency: State
Enforcement action: NOTICE OF NONCOMPLIANCE
Enforcement action date: 05/02/2003
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 03/19/2003
Date achieved compliance: 02/02/2004
Violation lead agency: State
Enforcement action: NOTICE OF NONCOMPLIANCE
Enforcement action date: 05/02/2003
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 10/03/2006
Evaluation: COMPLIANCE ASSISTANCE VISIT
Area of violation: Not reported

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 03/19/2003
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Used Oil - Generators
Date achieved compliance: 06/02/2003
Evaluation lead agency: State

Evaluation date: 03/19/2003
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 02/02/2004
Evaluation lead agency: State

FINDS:

Registry ID: 110004783253

Environmental Interest/Information System

OR-DEQ (Oregon - Department Of Environmental Quality) is a regulatory agency whose job is to protect the quality of Oregon's Environment. DEQ uses a combination of technical assistance, inspections and permitting to help public and private facilities and citizens understand and comply with state and federal environmental regulations.

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

PCS (Permit Compliance System) is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

OR ECSI:

State ID Number:	212	Brown ID:	0
Study Area:	False	Region ID:	3
Legislatve ID:	0	Investigation ID:	208
FACA ID:	801	Further Action:	258
Lat/Long (dms):	44 0 32.80 / -123 1 57.00	County Code:	20.00
Score Value:	Not reported	Cerclis ID:	Not reported
Township Coord.:	18.00	Township Zone:	S
Range Coord:	3.00	Range Zone:	W
Section Coord:	10	Qtr Section:	Not reported
Tax Lots:	1400	Size:	10.2 acres

LANE COMMUNITY COLLEGE (Continued) **1000196276**

NPL:	False	Orphan:	False
Updated By:	GWISTAR	Update Date:	02/25/2009
Alias Name:	Not reported		

OR ECSI HAZARDOUS RELEASE:

Substance ID.:	120883
Haz Release ID:	382969
Qty Released:	Unknown
Date Released:	Unknown
Update Date:	08/25/1988
Update By:	Not reported
Substance Code:	108-88-3
Substance Name:	TOLUENE
Substance Abbrev.:	Not reported
Substance Category ID:	8520
Substance Category:	Volatiles
Category Level:	Not reported
Created By:	Not reported
Created Date:	12/17/2002
Substance Category ID:	8520
Substance Category:	Volatiles
Category Level:	Not reported
Created By:	Not reported
Created Date:	12/17/2002
Substance Alias ID:	316466
Sub Alias Name:	BENZENE,METHYL-
Substance Alias ID:	316467
Sub Alias Name:	METHACIDE
Substance Alias ID:	316468
Sub Alias Name:	METHYLBENZENE
Substance Alias ID:	316469
Sub Alias Name:	METHYLBENZOL
Substance Alias ID:	316470
Sub Alias Name:	PHENYLMETHANE
Substance Alias ID:	316471
Sub Alias Name:	TOLUOL
Comment ID:	Not reported
Release Code:	Not reported
Release Comments:	Not reported
Sampling Result ID:	346118
Feature Id:	Not reported
Hazard Release Id:	382969
Medium:	703
Substance Abbrev.:	Not reported
Unit Code:	Not reported
Observation:	False
Owner Operator:	False
Lab Data:	False
Sample Depth:	Not reported
Start Date:	Not reported
End Date:	Not reported
Min Concentration:	Not reported
Max Concentration:	Not reported
Sample Comment:	420 ppb
Last Update By:	CONV
Update Date:	09/13/1994

Substance ID.: 120781

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Haz Release ID: 382970
Qty Released: Unknown
Date Released: Unknown
Update Date: 08/25/1988
Update By: Not reported
Substance Code: 100-41-4
Substance Name: ETHYLBENZENE
Substance Abbrev.: Not reported
Substance Category ID: 8515
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8515
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 316146
Sub Alias Name: ETHYLBENZOL
Substance Alias ID: 316147
Sub Alias Name: PHENYLETHANE
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: 346117
Feature Id: Not reported
Hazard Release Id: 382970
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 38 ppb
Last Update By: CONV
Update Date: 09/13/1994

OR ECSI NARR:
NARR ID: 5730756
NARR Code: Contamination
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:College maintenance department disposed of paint wastes in storm drains on property.

NARR ID: 5730757
NARR Code: Hazardous Substance/Waste Types
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Updated Date: 12/17/2002
NARR Comments:Acetone, toluene, mineral spirits, lacquer thinners, ketones.

NARR ID: 5730758
NARR Code: Manner of Release
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:On-site disposal into storm drain; time unknown.

NARR ID: 5730759
NARR Code: Pathways Other Hazards
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Soil contamination confirmed; surface water contamination likely.

NARR ID: 5730760
NARR Code: Remedial Action
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:(1/16/02 MME/SAS) Status of remedial action is unknown at this time.

OR ECSI SITE CONTROL:
Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported
Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:
Permit Agency: DEQ
Permit Number: 212
Permit Type: Closure permit
Comments: Not reported

OR ECSI Administrative Action:

Admin ID:	718266	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	08/25/1988	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	1804	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		
Admin ID:	721994	Action ID:	9508

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Agency: Dept Of Environmental Quality
Start Date: 02/11/1994
Substance Code: SAS
Employee Id: 293
Created By: Not reported
Action Code: RSSC
Action Flag: True
Action: Site Screening recommended (EV)
Further Action: Medium
Comments: Not reported

Region: Not reported
Complete Date: 02/11/1994
Rank Value: 0
Cleanup Flag: False
Created Date: 12/17/2002
Category: Remedial Action
Action Code Flag: False

OR ECSI OPERATIONS:
Operation Id: 131631
Operation Status: Active
Common Name: Lane Community College
Yrs of Operation: Not reported
Comments: College
Updated Date: 09/13/1994
Operations SIC Id: 195400
SIC Code: 8222
Created By: Not reported
Created Date: 12/17/2002

LUST:
Region: Western Region
Facility ID: 20-90-4312
Cleanup Received Date: 12/03/1990
Cleanup Start Date: 12/30/1990
Cleanup Complete Date: 04/22/2002

UST:
Facility ID: 5529
Facility Telephone: (503) 726-2216
Permittee Name: DAVID WIENECKE, CAMPUS SERVICES
Number of Permitted Tanks: Not reported
Active Tanks: Not reported
Decommissioned Tanks: 7
Number of Tanks: 7

AST:
Facility Id: 019511
Hazardous Substance: GASOLINE
Reporting Quantities: 1,000-4,999
Quantity Units: GALLONS
Physical State: LIQUID
Storage 1: ABOVEGROUND TANK
Storage 2: CAN

OR MANIFEST:
Manifest Year: Manifest Year - 2004
Epa Id: ORD048980288
Inactive Status: Not reported
Year: 2004
Facility Status: CEG
Organization Name: Not reported
Contact First Name: Jennifer

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Contact Last Name:	Hayward
Contact Telephone Number:	541 463 5594
Mailing Address:	4000 E 30th Avenue
Mailing City:	Eugene
Mailing State:	OR
Mailing Zip:	97405-0640

HAZNET:

Year:	2002
Gepaid:	ORD048980288
Contact:	COLVIN, PAUL
Telephone:	5037474501
Mailing Name:	Not reported
Mailing Address:	4000 E 30TH AVE
Mailing City,St,Zip:	EUGENE, OR 97405
Gen County:	Not reported
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Alkaline solution (pH >= 12.5) with metals
Disposal Method:	D99
Tons:	0.01
Facility County:	Not reported

Year:	2002
Gepaid:	ORD048980288
Contact:	COLVIN, PAUL
Telephone:	5037474501
Mailing Name:	Not reported
Mailing Address:	4000 E 30TH AVE
Mailing City,St,Zip:	EUGENE, OR 97405
Gen County:	Not reported
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Liquids with mercury >= 20 Mg./L
Disposal Method:	D99
Tons:	0.00
Facility County:	Not reported

Year:	2002
Gepaid:	ORD048980288
Contact:	COLVIN, PAUL
Telephone:	5037474501
Mailing Name:	Not reported
Mailing Address:	4000 E 30TH AVE
Mailing City,St,Zip:	EUGENE, OR 97405
Gen County:	Not reported
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Unspecified organic liquid mixture
Disposal Method:	D99
Tons:	0.08
Facility County:	Not reported

Year:	2002
Gepaid:	ORD048980288
Contact:	COLVIN, PAUL

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Telephone:	5037474501
Mailing Name:	Not reported
Mailing Address:	4000 E 30TH AVE
Mailing City,St,Zip:	EUGENE, OR 97405
Gen County:	Not reported
TSD EPA ID:	Not reported
TSD County:	Sacramento
Waste Category:	Other inorganic solid waste
Disposal Method:	D99
Tons:	0.00
Facility County:	Not reported

NPDES:

WQ File Nbr:	48854
Legal Name:	LANE COMMUNITY COLLEGE
Region:	WR
Pri SIC:	8221
Facility Type:	COLLEGES & UNIVERSITIES
Latitude:	44.0091
Longitude:	-123.0325
Category:	DOM
Permit Type:	NPDES-DOM-Db
Permit Active:	True
Is Active?:	Not reported
Permit Description:	Sewage - less than 1 MGD with lagoons
Expiration Date:	12/31/2005
EPA Number:	OR0026875
UIC Facility:	False
Admin Agent:	Salem Office
Last Action Date:	7/18/2005
Permit Writer:	Kennedy
Compliance Inspector:	Kennedy
DMR Reviewer:	Kennedy
Application Number:	980920
Class:	MINOR
Start Date:	1/29/2001

WQ File Nbr:	119750
Legal Name:	LANE COMMUNITY COLLEGE
Region:	WR
Pri SIC:	1542
Facility Type:	NONRESIDENTIAL CONSTRUCT, NEC
Latitude:	44.0036
Longitude:	-123.0202
Category:	STM
Permit Type:	GEN12C
Permit Active:	True
Is Active?:	Not reported
Permit Description:	Stormwater; NPDES construction more than 1 acre disturbed ground
Expiration Date:	11/30/2015
EPA Number:	ORR10C680
UIC Facility:	False
Admin Agent:	Salem Office
Last Action Date:	12/16/2010 9:44:03 A
Permit Writer:	English
Compliance Inspector:	Sewell
DMR Reviewer:	Not reported

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Application Number:	969606
Class:	MINOR
Start Date:	5/4/2010

WQ File Nbr:	48854
Legal Name:	LANE COMMUNITY COLLEGE
Region:	Not reported
Pri SIC:	8221
Facility Type:	Not reported
Latitude:	Not reported
Longitude:	Not reported
Category:	Not reported
Permit Type:	GEN12C
Permit Active:	Not reported
Is Active?:	FALSE
Permit Description:	Not reported
Expiration Date:	Not reported
EPA Number:	Not reported
UIC Facility:	Not reported
Admin Agent:	Not reported
Last Action Date:	Not reported
Permit Writer:	Not reported
Compliance Inspector:	Not reported
DMR Reviewer:	Not reported
Application Number:	Not reported
Class:	Not reported
Start Date:	Not reported

WQ File Nbr:	48854
Legal Name:	LANE COMMUNITY COLLEGE
Region:	Not reported
Pri SIC:	8221
Facility Type:	Not reported
Latitude:	Not reported
Longitude:	Not reported
Category:	Not reported
Permit Type:	NPDES-DOM-D
Permit Active:	Not reported
Is Active?:	FALSE
Permit Description:	Not reported
Expiration Date:	Not reported
EPA Number:	Not reported
UIC Facility:	Not reported
Admin Agent:	Not reported
Last Action Date:	Not reported
Permit Writer:	Not reported
Compliance Inspector:	Not reported
DMR Reviewer:	Not reported
Application Number:	Not reported
Class:	Not reported
Start Date:	Not reported

WQ File Nbr:	48854
Legal Name:	LANE COMMUNITY COLLEGE
Region:	Not reported
Pri SIC:	8221
Facility Type:	Not reported

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Latitude: Not reported
Longitude: Not reported
Category: Not reported
Permit Type: NPDES-DOM-Db
Permit Active: Not reported
Is Active?: FALSE
Permit Description: Not reported
Expiration Date: Not reported
EPA Number: Not reported
UIC Facility: Not reported
Admin Agent: Not reported
Last Action Date: Not reported
Permit Writer: Not reported
Compliance Inspector: Not reported
DMR Reviewer: Not reported
Application Number: Not reported
Class: Not reported
Start Date: Not reported

HSIS:
Facility Id: 019511
Physical State Of The Substance: 2
Physical State: LIQUID
Average Amount Possessed During The Year Code: 03
Maximum Amount Possessed During The Year Code: 04
Chemical Trade Name: FORMULA 315
Applicable Unit Of Measure Code: 2
Description Of The Unit Of Measure: GALLONS
Type Code: E
Description: PLASTIC OR NON-METALLIC DRUM
Type Code: Not reported
Temperature Description: Not reported
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Pressure of Code: Not reported
Pressure Description: Not reported
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Temperature Description: Not reported
Temperature of The Hazardous Substance Code: Not reported
Days Hazardous Substance On Site During Year: 365
Is The Substance Protected A Trade Secret: False
Description Of The Max Qnty Code: 50-199
Description Of The Avg Qnty Code: 20-49
Most Hazardous Ingridient: 5-CHLORO-2-METHYL-4-ISOTHIAZOLIN
United Nations/north America 4 Digit Class Number: 3265
Hazard Rank: 2
Chemical Abstract Service Identifier Number: 26172554
Is Substance Pure Or Mixture: Mixture
Chemical Is Extremely Hazardous Substance (EHS): Not reported
First Hazardous Class Code For Chemical: 6.3
Second Hazardous Class Code For Chemical: 8.0
Third Hazardous Class Code For Chemical: 6.5
Hazard Class 1 Of The Chemical: Acute Health Hazard
Hazard Class 2 Of The Chemical: Corrosive Material
Hazard Class 3 Of The Chemical: Pesticide
Chemical Is A Toxic 313 Chemical: No

LANE COMMUNITY COLLEGE (Continued) **1000196276**

EPA Pesticide Registration Number: 8540-23
Department Or Division Of Company: FACILITIES MGT & PLANNING
Facility Has Written Emergency Plan: Yes
Does The Chemical Contain A 112r Chemical: No
Contains 112R: No
Contains EHS: No
Fertilizer: No
Pesticide: Yes
Contains 313: No
NAICS Code 1: 611310
NAICS Desc 1: COLLEGES, UNIVERSITIES, & PROFESSIONAL SC
NAICS Code 2: 000000
NAICS Desc 2: Not reported
Company Name: LANE COMMUNITY COLLEGE
Manager Name: DAVID WILLIS
Business Phone: 5414633000
Mailing Address: 4000 E 30TH AVE
Mailing City,St,Zip: EUGENE, OR 97405
No. of Employees: 1000
Day Phone: 5414635216
Placard: Yes
Fire Dept Code: 0139
Sprinkler System: Yes
Emergency Contact: DAVID WILLIS
Emergency Procedure: WWW.LANECC.EDU/COPS/EPLAN.HTM
Business Type: COMMUNITY COLLEGE

Facility Id: 019511
Physical State Of The Substance: 2
Physical State: LIQUID
Average Amount Possessed During The Year Code: 11
Maximum Amount Possessed During The Year Code: 20
Chemical Trade Name: GASOLINE
Applicable Unit Of Measure Code: 2
Description Of The Unit Of Measure: GALLONS
Type Code: A
Description: ABOVEGROUND TANK
Type Code: F
Temperature Description: CAN
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Days Hazardous Substance On Site During Year: 365
Is The Substance Protected A Trade Secret: False
Description Of The Max Qnty Code: 1,000-4,999
Description Of The Avg Qnty Code: 500-999
Most Hazardous Ingridient: PETROLEUM DISTILLATES
United Nations/north America 4 Digit Class Number: 1203
Hazard Rank: 2
Chemical Abstract Service Identifier Number: 8006619
Is Substance Pure Or Mixture: Mixture
Chemical Is Extremely Hazardous Substance (EHS): Not reported

LANE COMMUNITY COLLEGE (Continued) **1000196276**

First Hazardous Class Code For Chemical: 3.0
Second Hazardous Class Code For Chemical: 6.3
Third Hazardous Class Code For Chemical: 6.4
Hazard Class 1 Of The Chemical: Flammable and Combustible Liquid
Hazard Class 2 Of The Chemical: Acute Health Hazard
Hazard Class 3 Of The Chemical: Chronic Health Hazard
Chemical Is A Toxic 313 Chemical: No
EPA Pesticide Registration Number: Not reported
Department Or Division Of Company: FACILITIES MGT & PLANNING
Facility Has Written Emergency Plan: Yes
Does The Chemical Contain A 112r Chemical: No
Contains 112R: No
Contains EHS: No
Fertilizer: No
Pesticide: No
Contains 313: Yes
NAICS Code 1: 611310
NAICS Desc 1: COLLEGES, UNIVERSITIES, & PROFESSIONAL SC
NAICS Code 2: 000000
NAICS Desc 2: Not reported
Company Name: LANE COMMUNITY COLLEGE
Manager Name: DAVID WILLIS
Business Phone: 5414633000
Mailing Address: 4000 E 30TH AVE
Mailing City,St,Zip: EUGENE, OR 97405
No. of Employees: 1000
Day Phone: 5414635216
Placard: Yes
Fire Dept Code: 0139
Sprinkler System: Yes
Emergency Contact: DAVID WILLIS
Emergency Procedure: WWW.LANECC.EDU/COPS/EPLAN.HTM
Business Type: COMMUNITY COLLEGE

Facility Id: 019511
Physical State Of The Substance: 2
Physical State: LIQUID
Average Amount Possessed During The Year Code: 03
Maximum Amount Possessed During The Year Code: 04
Chemical Trade Name: SE66 DISINFECTANT SANITIZER
Applicable Unit Of Measure Code: 2
Description Of The Unit Of Measure: GALLONS
Type Code: N
Description: PLASTIC BOTTLE, JUG, BUCKET
Type Code: Not reported
Temperature Description: Not reported
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Pressure of Code: Not reported
Pressure Description: Not reported
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Temperature Description: Not reported
Temperature of The Hazardous Substance Code: Not reported
Days Hazardous Substance On Site During Year: 365
Is The Substance Protected A Trade Secret: False
Description Of The Max Qnty Code: 50-199

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Description Of The Avg Qnty Code: 20-49
Most Hazardous Ingridient: ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDE
United Nations/north America 4 Digit Class Number: 3267
Hazard Rank: 2
Chemical Abstract Service Identifier Number: 68391015
Is Substance Pure Or Mixture: Mixture
Chemical Is Extremely Hazardous Substance (EHS): Not reported
First Hazardous Class Code For Chemical: 6.3
Second Hazardous Class Code For Chemical: 4.5
Third Hazardous Class Code For Chemical: 8.0
Hazard Class 1 Of The Chemical: Acute Health Hazard
Hazard Class 2 Of The Chemical: Combustible Material
Hazard Class 3 Of The Chemical: Corrosive Material
Chemical Is A Toxic 313 Chemical: No
EPA Pesticide Registration Number: Not reported
Department Or Division Of Company: FACILITIES MGT & PLANNING
Facility Has Written Emergency Plan: Yes
Does The Chemical Contain A 112r Chemical: No
Contains 112R: No
Contains EHS: No
Fertilizer: No
Pesticide: No
Contains 313: No
NAICS Code 1: 611310
NAICS Desc 1: COLLEGES, UNIVERSITIES, & PROFESSIONAL SC
NAICS Code 2: 000000
NAICS Desc 2: Not reported
Company Name: LANE COMMUNITY COLLEGE
Manager Name: DAVID WILLIS
Business Phone: 5414633000
Mailing Address: 4000 E 30TH AVE
Mailing City,St,Zip: EUGENE, OR 97405
No. of Employees: 1000
Day Phone: 5414635216
Placard: Yes
Fire Dept Code: 0139
Sprinkler System: Yes
Emergency Contact: DAVID WILLIS
Emergency Procedure: WWW.LANECC.EDU/COPS/EPLAN.HTM
Business Type: COMMUNITY COLLEGE

Facility Id: 019511
Physical State Of The Substance: 2
Physical State: LIQUID
Average Amount Possessed During The Year Code: 03
Maximum Amount Possessed During The Year Code: 04
Chemical Trade Name: FORMULA 150
Applicable Unit Of Measure Code: 2
Description Of The Unit Of Measure: GALLONS
Type Code: E
Description: PLASTIC OR NON-METALLIC DRUM
Type Code: Not reported
Temperature Description: Not reported
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Pressure of Code: Not reported
Pressure Description: Not reported

LANE COMMUNITY COLLEGE (Continued) **1000196276**

Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Temperature Description: Not reported
Temperature of The Hazardous Substance Code: Not reported
Days Hazardous Substance On Site During Year: 365
Is The Substance Protected A Trade Secret: False
Description Of The Max Qnty Code: 50-199
Description Of The Avg Qnty Code: 20-49
Most Hazardous Ingridient: SODIUM HYDROXIDE
United Nations/north America 4 Digit Class Number: 1824
Hazard Rank: 2
Chemical Abstract Service Identifier Number: 1310732
Is Substance Pure Or Mixture: Mixture
Chemical Is Extremely Hazardous Substance (EHS): Not reported
First Hazardous Class Code For Chemical: 8.0
Second Hazardous Class Code For Chemical: 6.3
Third Hazardous Class Code For Chemical: 6.5
Hazard Class 1 Of The Chemical: Corrosive Material
Hazard Class 2 Of The Chemical: Acute Health Hazard
Hazard Class 3 Of The Chemical: Pesticide
Chemical Is A Toxic 313 Chemical: Not reported
EPA Pesticide Registration Number: 1685-45
Department Or Division Of Company: FACILITIES MGT & PLANNING
Facility Has Written Emergency Plan: Yes
Does The Chemical Contain A 112r Chemical: No
Contains 112R: Not reported
Contains EHS: Not reported
Fertilizer: Not reported
Pesticide: Yes
Contains 313: Not reported
NAICS Code 1: 611310
NAICS Desc 1: COLLEGES, UNIVERSITIES, & PROFESSIONAL SC
NAICS Code 2: 000000
NAICS Desc 2: Not reported
Company Name: LANE COMMUNITY COLLEGE
Manager Name: DAVID WILLIS
Business Phone: 5414633000
Mailing Address: 4000 E 30TH AVE
Mailing City,St,Zip: EUGENE, OR 97405
No. of Employees: 1000
Day Phone: 5414635216
Placard: Yes
Fire Dept Code: 0139
Sprinkler System: Yes
Emergency Contact: DAVID WILLIS
Emergency Procedure: WWW.LANECC.EDU/COPS/EPLAN.HTM
Business Type: COMMUNITY COLLEGE

MAP FINDINGS

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
29 **South** **> 1** **1.478 mi.** **7804 ft.**	**GOSHEN EQUIPMENT** **34024 OLD WILLAMETTE HIGHWAY** **EUGENE, OR 97405**	**ECSI** **SWF/LF** **LUST**	**S109494055** **N/A**

Relative:
Lower

Actual:
0 ft.

OR ECSI:

State ID Number:	5280	Brown ID:	0
Study Area:	False	Region ID:	3
Legislatve ID:	0	Investigation ID:	208
FACA ID:	109361	Further Action:	0
Lat/Long (dms):	43 59 49.20 / -123 0 40.00	County Code:	20.00
Score Value:	Not reported	Cerclis ID:	Not reported
Township Coord.:	18.00	Township Zone:	S
Range Coord:	3.00	Range Zone:	W
Section Coord:	24	Qtr Section:	Not reported
Tax Lots:	Not reported	Size:	Not reported
NPL:	False	Orphan:	False
Updated By:	GWISTAR	Update Date:	06/17/2010
Alias Name:	Not reported		

OR ECSI HAZARDOUS RELEASE:

Substance ID.:	121994
Haz Release ID:	387425
Qty Released:	Not reported
Date Released:	Not reported
Update Date:	12/16/2009
Update By:	IBALCOM
Substance Code:	ECD222
Substance Name:	PETROLEUM
Substance Abbrev.:	Not reported
Substance Category ID:	8533
Substance Category:	Petroleum Related Releases for OSPIRG Report
Category Level:	Not reported
Created By:	Not reported
Created Date:	12/17/2002
Substance Category ID:	8533
Substance Category:	Petroleum Related Releases for OSPIRG Report
Category Level:	Not reported
Created By:	Not reported
Created Date:	12/17/2002
Substance Alias ID:	Not reported
Sub Alias Name:	Not reported
Comment ID:	Not reported
Release Code:	Not reported
Release Comments:	Not reported
Sampling Result ID:	Not reported
Feature Id:	Not reported
Hazard Release Id:	Not reported
Medium:	Not reported
Substance Abbrev.:	Not reported
Unit Code:	Not reported
Observation:	Not reported
Owner Operator:	Not reported
Lab Data:	Not reported
Sample Depth:	Not reported
Start Date:	Not reported
End Date:	Not reported
Min Concentration:	Not reported
Max Concentration:	Not reported

GOSHEN EQUIPMENT (Continued) **S109494055**

Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

OR ECSI NARR:
NARR ID: 5751877
NARR Code: Hazardous Substance/Waste Types
Created By: IBALCOM
Created Date: 12/16/2009
Updated By: IBALCOM
Updated Date: 12/16/2009
NARR Comments:Diesel and Heavy Weight Oil

NARR ID: 5751876
NARR Code: Manner of Release
Created By: IBALCOM
Created Date: 12/16/2009
Updated By: IBALCOM
Updated Date: 12/16/2009
NARR Comments:UST excavation pit and surface spills.

NARR ID: 5752262
NARR Code: Remedial Action
Created By: GWISTAR
Created Date: 06/17/2010
Updated By: GWISTAR
Updated Date: 06/17/2010
NARR Comments:(IBalcom 12/16/09) Six USTs were removed from the property in 2008. Petroleum-contaminated soil and groundwater were identified following decommissioning of the tanks. A petroleum release was reported to DEQ and log #20-08-1394 was assigned to the facility. Impacted soil was stockpiled on-site until a treatment plan was developed and approved. Solid Waste Letter of Authorization #1396 was issued for the project in June 2009. Contaminated soil excavated from the UST cavities was placed on a plastic liner in an area east of the tanks. Surface soil samples from this area were not collected prior to setting up the treatment
cell.
Treatment of petroleum-contaminated soil (PCS) from the UST locati on was successful based on soil samples collected during the six-month period. Confirmation soil samples collected beneath the treatment cell in November 2009 revealed diesel and oil contamination varying from levels originally measured in PCS from the UST cavity. The source of this petroleum contamination appears to be related to surface spills from equipment and other materials previously stored in this portion of the property, rather than from the USTs.

NARR ID: 5751875
NARR Code: 1922
Created By: IBALCOM
Created Date: 12/16/2009
Updated By: GWISTAR
Updated Date: 06/17/2010
NARR Comments:[Dec. 2009] DEQ|s Tanks Program investigated and oversaw cleanup actions in the wake of a reported UST release at the site (log #20-08-1394). Cleanup included excavation and treatment of petroleum-contaminated soil in a surface treatment cell to the east of the tank cavity. Subsequently discovered petroleum contamination

GOSHEN EQUIPMENT (Continued) **S109494055**

beneath the treatment cell appeared to be related to surface spills from equipment and other materials previously stored in this portion of the property, and not from the UST releases. Therefore, Tanks has referred this site to Cleanup for follow-up action.

OR ECSI SITE CONTROL:

Site Control #:	Not reported
Control Number:	Not reported
Begin Date:	Not reported
End Date:	Not reported
Frequency Of Review:	Not reported
Last Reviewed By:	Not reported
Last Reviewed Date:	Not reported
Last Update By:	Not reported
Last Updated Date:	Not reported
Site Comment:	Not reported

OR ECSI PERMIT:

Permit Agency:	Not reported
Permit Number:	Not reported
Permit Type:	Not reported
Comments:	Not reported

OR ECSI Administrative Action:

Admin ID:	737056	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	12/16/2009	Complete Date:	12/16/2009
Substance Code:	Not reported	Rank Value:	Not reported
Employee Id:	2965	Cleanup Flag:	False
Created By:	IBALCOM	Created Date:	12/16/2009
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	737057	Action ID:	9476
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	12/14/2009	Complete Date:	12/14/2009
Substance Code:	SRS	Rank Value:	Not reported
Employee Id:	2713	Cleanup Flag:	False
Created By:	IBALCOM	Created Date:	12/16/2009
Action Code:	REFER	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Refer to Program		
Further Action:	Low		
Comments:	Refered to Cleanup from Spills for ECSI entry, will be a Tanks project.		

OR ECSI OPERATIONS:

Operation Id:	Not reported
Operation Status:	Not reported
Common Name:	Not reported
Yrs of Operation:	Not reported
Comments:	Not reported
Updated Date:	Not reported
Operations SIC Id:	Not reported
SIC Code:	Not reported
Created By:	Not reported

GOSHEN EQUIPMENT (Continued) **S109494055**

Created Date:	Not reported

LF:

Permit Number:	1396
Facility Id:	112130
Facility Telephone:	541-741-2025
Facility Telephone 2:	Not reported
Lat/Long:	43.997 / -123.0111
Solid Waste Class:	SWLA
Solid Waste Type:	Treatment-PCS
Date Opened:	6/4/2009
End Date:	Not reported
Date Closed:	6/10/2010
Permit Status:	Terminated
Organization:	Goshen Equipment Inc.
Contact Name:	Homer Cochrum
Mailing Address:	34024 Old Willamette Hwy S
Mailing City:	Eugene
Mailing Zip:	97405-8609

LUST:

Region:	Western Region
Facility ID:	20-08-1394
Cleanup Received Date:	10/22/2008
Cleanup Start Date:	10/22/2008
Cleanup Complete Date:	**Not reported**

Count: 20 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
EUGENE	1004770383	WEYERHAEUSER NR CO SOUTH VALLEY	85647 HWY 99 S	97405	FINDS,RCRA-CESQG
EUGENE	1006853996	WESTERN COATING, INC.	90340 HWY 99N		FINDS,NPDES
OREGON CITY	1006854720	JAMES RIVER TAG FUELING SITE	MILEPOST 752, HIGHWAY 99E	97405	FINDS
EUGENE	1008404775	STATON COMPANIES	85386 HWY 99 S	97405	RCRA-NLR
EUGENE	1011490948	GOSHEN AUTO RECYCLERS	85741 S HWY 99	97405	RCRA-NLR
GOSHEN	1014400756	OIL RE-REFINING COMPANY	85951 OLD HIGHWAY 99	97405	RCRA-NLR
OREGON CITY	S100499089	JAMES RIVER TAG FUELING SITE	MILEPOST 752, HIGHWAY 99E	97405	LUST
EUGENE	S100499505	FUTURE LOGGING	34531 HWY 58	97478	LUST
EUGENE	S104335347	STATON COMPANIES INC	85386 HWY 99 S	97405	AST,HSIS
EUGENE	S104337256	WEYERHAEUSER NR COMPANY	85647 S HWY 99	97405	HSIS
EUGENE	S105225676	WASTE ALTERNATIVES TERMINATED	85507 HWY 99 SOUTH	97405	LF
	S105524274		MP 16 MCKENZIE HWY	97478	HAZMAT
	S105524278		MCKENZIE HWY, MP#19.2	97478	HAZMAT
EUGENE	S108659178	CONE LUMBER COMPANY	85810 HWY 99 S	97405	NPDES
SPRINGFIELD	S108661375	MOUNTAIN GATE PHASE 4	HWY 126/58TH-67TH	97477	NPDES
	S108987022		INTERSTATE 5 NEAR HWY 58	97477	HAZMAT
EUGENE	S108987584	REMOTE AUTO DISMANTLING	85709 HWY 99 SOUTH	97405	NPDES
	S109577609		MCKENZIE HWY 126E MP 49		HAZMAT
EUGENE	S110121603	GOSHEN AUTO RECYCLERS	85741 HWY 99 SOUTH	97405	NPDES
EUGENE	S110292497	ZIP-O-LOG MILLS INC	85810 S HWY 99	97405	HSIS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/31/2011	Source: EPA
Date Data Arrived at EDR: 04/13/2011	Telephone: N/A
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 04/13/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1 Telephone 617-918-1143	EPA Region 6 Telephone: 214-655-6659
EPA Region 3 Telephone 215-814-5418	EPA Region 7 Telephone: 913-551-7247
EPA Region 4 Telephone 404-562-8033	EPA Region 8 Telephone: 303-312-6774
EPA Region 5 Telephone 312-886-6686	EPA Region 9 Telephone: 415-947-4246
EPA Region 10 Telephone 206-553-8665	

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/31/2011	Source: EPA
Date Data Arrived at EDR: 04/13/2011	Telephone: N/A
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 04/13/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991	Source: EPA
Date Data Arrived at EDR: 02/02/1994	Telephone: 202-564-4267
Date Made Active in Reports: 03/30/1994	Last EDR Contact: 05/16/2011
Number of Days to Update: 56	Next Scheduled EDR Contact: 08/29/2011
	Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/31/2011	Source: EPA
Date Data Arrived at EDR: 04/13/2011	Telephone: N/A
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 04/13/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/25/2011	Source: EPA
Date Data Arrived at EDR: 03/01/2011	Telephone: 703-412-9810
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 06/14/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing
A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPAa??s Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/11/2011	Telephone: 703-603-8704
Date Made Active in Reports: 02/16/2011	Last EDR Contact: 04/15/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/25/2011	Source: EPA
Date Data Arrived at EDR: 03/01/2011	Telephone: 703-412-9810
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 06/14/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/09/2011	Source: EPA
Date Data Arrived at EDR: 03/15/2011	Telephone: 800-424-9346
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/16/2011
Number of Days to Update: 91	Next Scheduled EDR Contact: 08/29/2011
	Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/05/2011	Telephone: (206) 553-1200
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 07/07/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/05/2011	Telephone: (206) 553-1200
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 07/07/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/05/2011	Telephone: (206) 553-1200
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 07/07/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/05/2011	Telephone: (206) 553-1200
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 07/07/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/16/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/25/2011	Telephone: 703-603-0695
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 81	Next Scheduled EDR Contact: 09/26/2011
	Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/16/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/25/2011	Telephone: 703-603-0695
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 81	Next Scheduled EDR Contact: 09/26/2011
	Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 04/05/2011	Source: National Response Center, United States Coast Guard
Date Data Arrived at EDR: 04/05/2011	Telephone: 202-267-2180
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 07/05/2011
Number of Days to Update: 70	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Annually

State- and tribal - equivalent NPL

ECSI: Environmental Cleanup Site Information System

Sites that are or may be contaminated and may require cleanup.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/03/2011	Telephone: 503-229-6629
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/03/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

CRL: Confirmed Release List and Inventory

All facilities with a confirmed release.

Date of Government Version: 05/24/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 05/25/2011	Telephone: 503-229-6170
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 05/25/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 09/05/2011
	Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Facilities List

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 06/13/2011
Date Data Arrived at EDR: 06/15/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 15

Source: Department of Environmental Quality
Telephone: 503-229-6299
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Semi-Annually

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 04/01/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 503-229-5790
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/31/2011
Date Data Arrived at EDR: 02/01/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 48

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 03/03/2011
Date Data Arrived at EDR: 03/18/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 45

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 05/17/2011
Date Data Arrived at EDR: 05/19/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 26

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 05/20/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 25

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/03/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 11/04/2009
Date Data Arrived at EDR: 05/04/2010
Date Made Active in Reports: 07/07/2010
Number of Days to Update: 64

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/04/2010
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/16/2011
Date Data Arrived at EDR: 05/17/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 28

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Underground Storage Tank Database

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 04/01/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/29/2011
Number of Days to Update: 35

Source: Department of Environmental Quality
Telephone: 503-229-5815
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Quarterly

AST: Aboveground Storage Tanks

Aboveground storage tank locations reported to the Office of State Fire Marshal.

Date of Government Version: 12/01/2010
Date Data Arrived at EDR: 01/25/2011
Date Made Active in Reports: 02/24/2011
Number of Days to Update: 30

Source: Office of State Fire Marshal
Telephone: 503-378-3473
Last EDR Contact: 05/13/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Semi-Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 03/03/2011
Date Data Arrived at EDR: 03/18/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 45

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 05/18/2011
Date Data Arrived at EDR: 05/26/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 19

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 05/16/2011
Date Data Arrived at EDR: 05/17/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 28

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 05/17/2011
Date Data Arrived at EDR: 05/19/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 26

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 05/04/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 41

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/03/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 01/01/2011
Date Data Arrived at EDR: 02/23/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 68

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/01/2011	Source: EPA Region 7
Date Data Arrived at EDR: 06/01/2011	Telephone: 913-551-7003
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 02/03/2011
Number of Days to Update: 13	Next Scheduled EDR Contact: 05/16/2011
	Data Release Frequency: Varies

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010	Source: FEMA
Date Data Arrived at EDR: 02/16/2010	Telephone: 202-646-5797
Date Made Active in Reports: 04/12/2010	Last EDR Contact: 04/18/2011
Number of Days to Update: 55	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Recorded at ESCI Sites

Engineering controls are physical measures selected or approved by the Director for the purpose of preventing or minimizing exposure to hazardous substances. Engineering controls may include, but are not limited to, fencing, capping, horizontal or vertical barriers, hydraulic controls, and alternative water supplies.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/03/2011	Telephone: 503-229-5193
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/03/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Quarterly

INST CONTROL: Institutional Controls Recorded at ESCI Sites

An institutional control is a legal or administrative tool or action taken to reduce the potential for exposure to hazardous substances. Institutional controls may include, but are not limited to, use restrictions, environmental monitoring requirements, and site access and security measures.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/03/2011	Telephone: 503-229-5193
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/03/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

VCS: Voluntary Cleanup Program Sites

Responsible parties have entered into an agreement with DEQ to voluntarily address contamination associated with their property.

Date of Government Version: 04/22/2011	Source: DEQ
Date Data Arrived at EDR: 04/27/2011	Telephone: 503-229-5256
Date Made Active in Reports: 05/16/2011	Last EDR Contact: 04/11/2011
Number of Days to Update: 19	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 02/25/2011	Source: EPA, Region 1
Date Data Arrived at EDR: 04/05/2011	Telephone: 617-918-1102
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 07/05/2011
Number of Days to Update: 70	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Projects

Brownfields investigations and/or cleanups that have been conducted in Oregon.

Date of Government Version: 05/24/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 503-229-6801
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Semi-Annually

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 03/29/2011
Date Data Arrived at EDR: 03/29/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: No Update Planned

HIST LF: Old Closed SW Disposal Sites

A list of solid waste disposal sites that have been closed for a long while.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 07/08/2003
Date Made Active in Reports: 07/18/2003
Number of Days to Update: 10

Source: Department of Environmental Quality
Telephone: 503-229-5409
Last EDR Contact: 07/08/2003
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 05/09/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/02/2011
Date Data Arrived at EDR: 03/17/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 46

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 06/07/2011
Next Scheduled EDR Contact: 09/19/2011
Data Release Frequency: Quarterly

AOC MU: East Multnomah County Area

Approximate extent of TSA VOC plume February , 2002

Date of Government Version: N/A
Date Data Arrived at EDR: 10/07/2002
Date Made Active in Reports: 10/22/2002
Number of Days to Update: 15

Source: City of Portland Environmental Services
Telephone: 503-823-5310
Last EDR Contact: 03/13/2007
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

AOC COL: Columbia Slough

Columbia Slough waterway boundaries.

Date of Government Version: 08/10/2005
Date Data Arrived at EDR: 05/17/2006
Date Made Active in Reports: 06/16/2006
Number of Days to Update: 30

Source: City of Portland Environmental Services
Telephone: 503-823-5310
Last EDR Contact: 03/13/2007
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CDL 2: Clandestine Drug Lab Site Listing

A listing of clandestine drug lab site locations included in the Incident database.

Date of Government Version: 02/02/2011
Date Data Arrived at EDR: 05/04/2011
Date Made Active in Reports: 06/22/2011
Number of Days to Update: 49

Source: Oregon State Police
Telephone: 503-373-1540
Last EDR Contact: 05/04/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

CDL: Uninhabitable Drug Lab Properties

The properties listed on these county pages have been declared by a law enforcement agency to be unfit for use due to meth lab and/or storage activities. The properties are considered uninhabitable until cleaned up by a state certified decontamination contractor and a certificate of fitness is issued by the Oregon Health Division.

Date of Government Version: 04/27/2011
Date Data Arrived at EDR: 05/27/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 34

Source: Department of Consumer & Business Services
Telephone: 503-378-4133
Last EDR Contact: 11/24/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 06/21/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/05/2011
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 51

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Annually

SPILLS: Spill Data

Oil and hazardous material spills reported to the Environmental Response Program.

Date of Government Version: 04/12/2011
Date Data Arrived at EDR: 04/14/2011
Date Made Active in Reports: 05/16/2011
Number of Days to Update: 32

Source: Department of Environmental Quality
Telephone: 503-229-5815
Last EDR Contact: 04/11/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Semi-Annually

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/12/2011
Date Data Arrived at EDR: 02/11/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 05/11/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 08/12/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 112

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2010	Source: Department of Justice, Consent Decree Library
Date Data Arrived at EDR: 04/05/2011	Telephone: Varies
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 07/01/2011
Number of Days to Update: 70	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 02/25/2011	Source: EPA
Date Data Arrived at EDR: 03/16/2011	Telephone: 703-416-0223
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 06/15/2011
Number of Days to Update: 5	Next Scheduled EDR Contact: 09/26/2011
	Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010	Source: Department of Energy
Date Data Arrived at EDR: 10/21/2010	Telephone: 505-845-0011
Date Made Active in Reports: 01/28/2011	Last EDR Contact: 06/02/2011
Number of Days to Update: 99	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/08/2011	Source: Department of Labor, Mine Safety and Health Administration
Date Data Arrived at EDR: 03/09/2011	Telephone: 303-231-5959
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 06/08/2011
Number of Days to Update: 54	Next Scheduled EDR Contact: 09/19/2011
	Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009	Source: EPA
Date Data Arrived at EDR: 12/17/2010	Telephone: 202-566-0250
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 05/27/2011
Number of Days to Update: 94	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006	Source: EPA
Date Data Arrived at EDR: 09/29/2010	Telephone: 202-260-5521
Date Made Active in Reports: 12/02/2010	Last EDR Contact: 06/30/2011
Number of Days to Update: 64	Next Scheduled EDR Contact: 10/10/2011
	Data Release Frequency: Every 4 Years

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/07/2011
Date Data Arrived at EDR: 01/21/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 59

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/22/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/18/2010
Date Data Arrived at EDR: 04/06/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 51

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010
Date Data Arrived at EDR: 04/16/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 41

Source: EPA
Telephone: (206) 553-1200
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 04/17/1995	Source: EPA
Date Data Arrived at EDR: 07/03/1995	Telephone: 202-564-4104
Date Made Active in Reports: 08/07/1995	Last EDR Contact: 06/02/2008
Number of Days to Update: 35	Next Scheduled EDR Contact: 09/01/2008
	Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2009	Source: EPA/NTIS
Date Data Arrived at EDR: 03/01/2011	Telephone: 800-424-9346
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/27/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Biennially

UIC: Underground Injection Control Program Database

DEQ's Underground Injection Control Program is authorized by the Environmental Protection Agency (EPA) to regulate all underground injection in Oregon to protect groundwater resources.

Date of Government Version: 03/03/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 03/04/2011	Telephone: 503-229-5945
Date Made Active in Reports: 03/29/2011	Last EDR Contact: 07/05/2011
Number of Days to Update: 25	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Varies

OR MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009	Source: Department of Environmental Quality
Date Data Arrived at EDR: 09/08/2010	Telephone: N/A
Date Made Active in Reports: 10/15/2010	Last EDR Contact: 05/16/2011
Number of Days to Update: 37	Next Scheduled EDR Contact: 08/29/2011
	Data Release Frequency: Annually

HAZMAT: Hazmat/Incidents

Hazardous material incidents reported to the State Fire Marshal by emergency responders. The hazardous material may or may not have been released.

Date of Government Version: 02/02/2011	Source: State Fire Marshal's Office
Date Data Arrived at EDR: 05/04/2011	Telephone: 503-373-1540
Date Made Active in Reports: 06/22/2011	Last EDR Contact: 05/04/2011
Number of Days to Update: 49	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Semi-Annually

DRYCLEANERS: Drycleaning Facilities

A listing of registered drycleaning facilities in Oregon.

Date of Government Version: 02/07/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 02/09/2011	Telephone: 503-229-6783
Date Made Active in Reports: 02/23/2011	Last EDR Contact: 06/06/2011
Number of Days to Update: 14	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Varies

NPDES: Wastewater Permits Database

A listing of permitted wastewater facilities.

Date of Government Version: 05/10/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 05/12/2011	Telephone: 503-229-5657
Date Made Active in Reports: 06/22/2011	Last EDR Contact: 06/27/2011
Number of Days to Update: 41	Next Scheduled EDR Contact: 08/29/2011
	Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: Oregon Title V Facility Listing

A listing of Title V facility source and emissions information.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 12/28/2009
Date Made Active in Reports: 01/19/2010
Number of Days to Update: 22

Source: Department of Environmental Quality
Telephone: 503-229-6459
Last EDR Contact: 06/20/2011
Next Scheduled EDR Contact: 09/19/2011
Data Release Frequency: Varies

HSIS: Hazardous Substance Information Survey

Companies in Oregon submitting the Hazardous Substance Information Survey and either reporting or not reporting hazardous substances.

Date of Government Version: 12/01/2010
Date Data Arrived at EDR: 01/25/2011
Date Made Active in Reports: 02/24/2011
Number of Days to Update: 30

Source: State Fire Marshal's Office
Telephone: 503-373-1540
Last EDR Contact: 05/13/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Semi-Annually

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 06/06/2011
Next Scheduled EDR Contact: 08/08/2011
Data Release Frequency: Varies

FINANCIAL ASSURANCE 1: Financial Assurance Information Listing

Financial assurance information for hazardous waste facilities.

Date of Government Version: 03/29/2011
Date Data Arrived at EDR: 03/31/2011
Date Made Active in Reports: 05/06/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 541-633-2011
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites Listing

A listing of coal ash disposal sites.

Date of Government Version: 06/01/2011
Date Data Arrived at EDR: 06/02/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 28

Source: Department of Environmental Quality
Telephone: 541-298-7255
Last EDR Contact: 05/31/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

FINANCIAL ASSURANCE 2: Financial Assurance Information Listing
Financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 06/13/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/15/2011	Telephone: 503-229-5521
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 15	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005	Source: Department of Energy
Date Data Arrived at EDR: 08/07/2009	Telephone: 202-586-8719
Date Made Active in Reports: 10/22/2009	Last EDR Contact: 04/19/2011
Number of Days to Update: 76	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/03/2011	Telephone: N/A
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 06/14/2011
Number of Days to Update: 77	Next Scheduled EDR Contact: 09/26/2011
	Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008	Source: Environmental Protection Agency
Date Data Arrived at EDR: 02/18/2009	Telephone: 202-566-0517
Date Made Active in Reports: 05/29/2009	Last EDR Contact: 05/05/2011
Number of Days to Update: 100	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands
Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005	Source: U.S. Geological Survey
Date Data Arrived at EDR: 02/06/2006	Telephone: 888-275-8747
Date Made Active in Reports: 01/11/2007	Last EDR Contact: 04/21/2011
Number of Days to Update: 339	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: N/A

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2010	Source: Department of Environmental Conservation
Date Data Arrived at EDR: 05/12/2011	Telephone: 518-402-8651
Date Made Active in Reports: 05/24/2011	Last EDR Contact: 05/12/2011
Number of Days to Update: 12	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2009	Source: Department of Natural Resources
Date Data Arrived at EDR: 07/06/2010	Telephone: N/A
Date Made Active in Reports: 07/26/2010	Last EDR Contact: 06/20/2011
Number of Days to Update: 20	Next Scheduled EDR Contact: 10/03/2011
	Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.
Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.
Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.
Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Private Schools
  Source: National Center for Education Statistics
  Telephone: 202-502-7300
  The National Center for Education Statistics' primary database on private school locations in the United States.
Daycare Centers: Child Care Listings
  Source: Employment Department
  Telephone: 503-947-1420

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory Data
  Source: Oregon Geospatial Enterprise Office
  Telephone: 503-378-2166

Scanned Digital USGS 7.5' Topographic Map (DRG)
  Source: United States Geologic Survey
  A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

COAST FORK CONFLUENCE SITE
FRANKLIN BLVD/SEAVEY LOOP RD
EUGENE, OR 97405

TARGET PROPERTY COORDINATES

Latitude (North):	44.01840 - 44° 1' 6.2"
Longitude (West):	123.0114 - 123° 0' 41.0"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	499086.3
UTM Y (Meters):	4873700.5
Elevation:	454 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	44123-A1 EUGENE EAST, OR
Most Recent Revision:	1986
East Map:	44122-A8 SPRINGFIELD, OR
Most Recent Revision:	1986

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

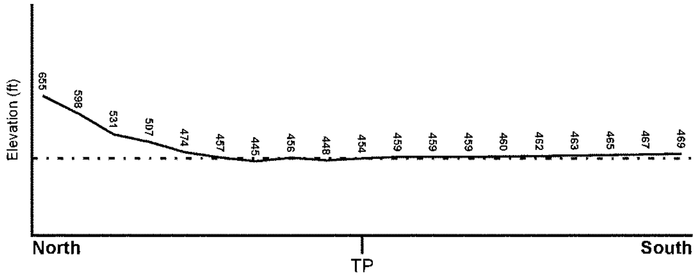
TOPOGRAPHIC INFORMATION

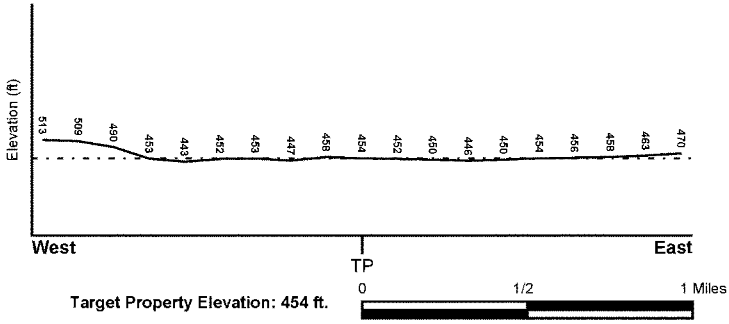
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General WSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 454 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
LANE, OR	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 41039C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
EUGENE EAST	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT		GEOLOGIC AGE IDENTIFICATION	
Era:	Cenozoic	Category:	Stratifed Sequence
System:	Tertiary		
Series:	Eocene		
Code:	Te *(decoded above as Era, System & Series)*		

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3118160.6s

SITE NAME:	Coast Fork Confluence Site	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Franklin Blvd/Seavey Loop Rd Eugene OR 97405	CONTACT:	Merri Martz
		INQUIRY #:	3118160.6s
LAT/LONG:	44.0184 / 123.0114	DATE:	July 07, 2011 7:15 pm

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name:	Fluvents
Soil Surface Texture:	
Hydrologic Group:	Not reported
Soil Drainage Class:	Poorly drained
Hydric Status: All hydric	
Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

No Layer Information available.

Soil Map ID: 2

Soil Component Name:	Water
Soil Surface Texture:	
Hydrologic Group:	Not reported
Soil Drainage Class:	
Hydric Status: Unknown	
Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

No Layer Information available.

Soil Map ID: 3

Soil Component Name:	Newberg
Soil Surface Texture:	fine sandy loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**		
1	0 inches	14 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6
2	14 inches	64 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6

Soil Map ID: 4

Soil Component Name:	Cloquato
Soil Surface Texture:	silt loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	14 inches	50 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	50 inches	59 inches	stratified sand to silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

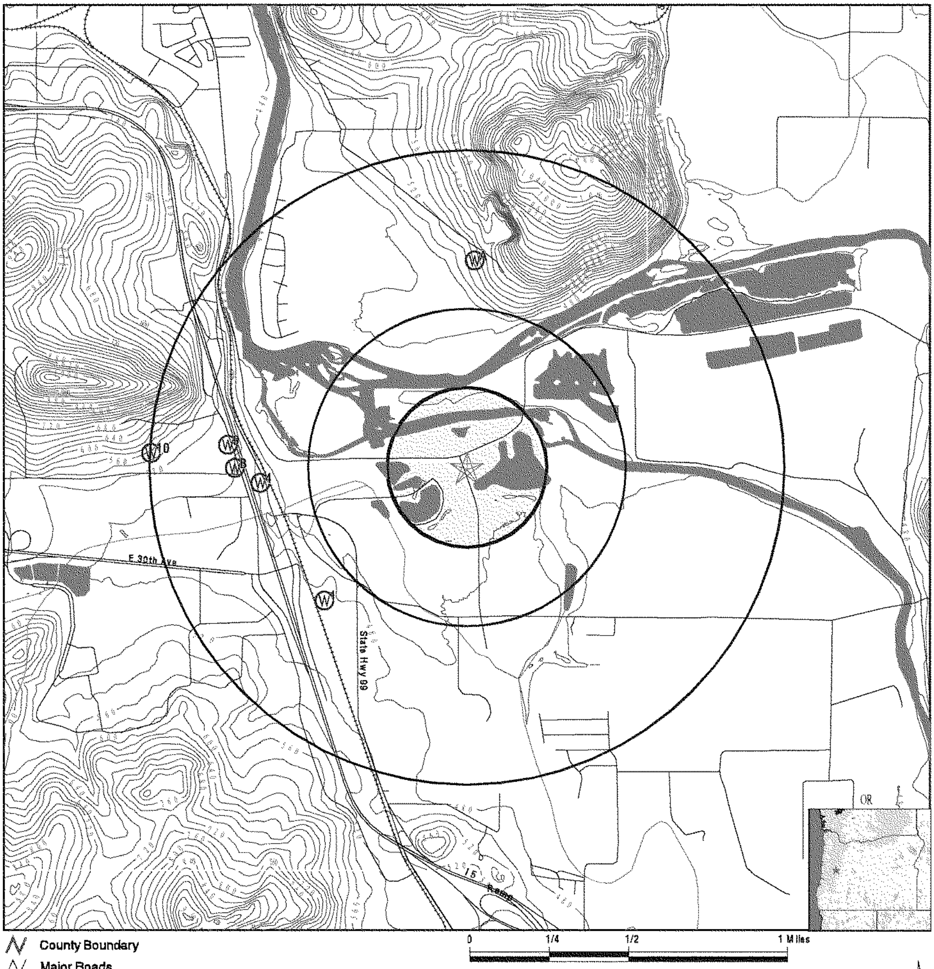
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	ORW400000001757	1/2 - 1 Mile SW
A2	ORI400000003331	1/2 - 1 Mile North
A3	ORI400000003332	1/2 - 1 Mile North
4	ORI400000003174	1/2 - 1 Mile West
B5	ORI400000003181	1/2 - 1 Mile West
B6	ORI400000003179	1/2 - 1 Mile West
B7	ORI400000003183	1/2 - 1 Mile West
B8	ORI400000003190	1/2 - 1 Mile West
9	ORI400000003198	1/2 - 1 Mile West
10	ORI400000003196	1/2 - 1 Mile West

PHYSICAL SETTING SOURCE MAP - 3118160.6s



- County Boundary
- Major Roads
- Contour Lines
- ◎ Earthquake epicenter, Richter 5 or greater
- Ⓦ Water Wells
- Ⓟ Public Water Supply Wells
- ● Cluster of Multiple Icons

- Groundwater Flow Direction
- (GI) Indeterminate Groundwater Flow at Location
- (GV) Groundwater Flow Varies at Location

SITE NAME:	Coast Fork Confluence Site	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Franklin Blvd/Seavey Loop Rd Eugene OR 97405	CONTACT:	Merri Martz
		INQUIRY #:	3118160.6s
LAT/LONG:	44.0184 / 123.0114	DATE:	July 07, 2011 7:15 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation	Database	EDR ID Number
1 **SW** **1/2 - 1 Mile** **Higher**	**OR WELLS**	**ORW400000001757**

Logid:	LANE 16177	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	480	Site id:	ORW400000001757

A2 **North** **1/2 - 1 Mile** **Higher**	**OR WELLS**	**ORI400000003331**

Well inspe:	29938		
Physical l:	Not Reported	Inspection:	02/19/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	ALLEN, ALFRED; 1405 S 2ND AVE, SPRINGFIELD		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	NO WELL LOG YET; SEAL SLUMPED 2.90 FT		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0

Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	600		
Township:	18		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	2		
Qtr40:	NE	Qtr160:	SE
Latitude d:	44.02785		
Longitude :	123.01091		
Gps horizo:	Not Reported		
Year const:	2002		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	U	Previous i:	0
Inspected1:	KRB	Wm region:	NW
Well tag a:	BANDED		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	byrdkr
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	44.02785		
Newlong:	-123.01091		
Site id:	ORI400000003331		

A3
North **OR WELLS** **ORI400000003332**
1/2 - 1 Mile
Higher

Well inspe:	34591		
Physical l:	Not Reported	Inspection:	03/12/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	ALLEN, ALFRED; 1405 S 2ND AVE, SPRINGFIELD		
Street:	Not Reported	City:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	SEAL TOPPED OFF		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	600		
Township:	18		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	2		
Qtr40:	NE	Qtr160:	SE
Latitude d:	44.02785		
Longitude :	123.01091		
Gps horizo:	Not Reported		
Year const:	2002		
Date const:	Not Reported	Date con 1:	Not Reported

Deficienci:	U	Previous i:	-1
Inspected1:	KRB	Wm region:	NW
Well tag a:	BANDED		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	byrdkr
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	44.02785		
Newlong:	-123.01091		
Site id:	ORI400000003332		

4
West
1/2 - 1 Mile
Higher

OR WELLS **ORI400000003174**

Well inspe:	47776		
Physical l:	Not Reported	Inspection:	04/29/2008
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	DAVIS, BARRY		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0

Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	1701		
Township:	18		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	30		
Qtr40:	NW	Qtr160:	SW
Latitude d:	44.01769		
Longitude :	-123.02447		
Gps horizo:	Not Reported		
Year const:	2009		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	U	Previous i:	0
Inspected1:	JWJ	Wm region:	NW
Well tag a:	WELL BEING DRILLED - NO ATTACHED ID		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	EAST OF 31660 FOX HOLLOW RD		
Last updt :	05/01/2009	Last updt1:	jefferjw
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	44.01769		
Newlong:	-123.02447		
Site id:	ORI400000003174		

B5
West
1/2 - 1 Mile
Higher

OR WELLS **ORI400000003181**

Well inspe:	41772		
Physical l:	Not Reported	Inspection:	06/14/2006
Startcard :	Not Reported	Wl county :	LANE
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	-1	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	COUNTY OF LANE		
Street:	Not Reported	City:	Not Reported

State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	0	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	-1
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	3200		
Township:	18		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	11		
Qtr40:	NW	Qtr160:	SW
Latitude d:	44.01826		
Longitude :	123.02592		
Gps horizo:	Not Reported		
Year const:	0		
Date const:	Not Reported	Date con 1:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Deficienci:	U	Previous i:	0
Inspected1:	JWJ	Wm region:	NW
Well tag a:	SC STAMPED ON VAULT LIP		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	M
Casing cap:	OT	Pictures t:	-1
Street of :	86714 MCVAY HWY		
Street of1:	86714 MCVAY HWY		
Last updt :	06/23/2006	Last updt1:	jefferjw
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	44.01826		
Newlong:	-123.02592		
Site id:	ORI400000003181		

B6
West
1/2 - 1 Mile
Higher

OR WELLS **ORI400000003179**

Well inspe:	41773		
Physical l:	Not Reported	Inspection:	06/14/2006
Startcard :	Not Reported	Wl county :	LANE
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	MUSICK, JIM		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	0	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	-1
Work other:	Not Reported	Drill rota:	0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	3200		
Township:	18		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	11		
Qtr40:	NW	Qtr160:	SW
Latitude d:	44.01812		
Longitude :	123.026		
Gps horizo:	Not Reported		
Year const:	0		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	U	Previous i:	0
Inspected1:	JWJ	Wm region:	NW
Well tag a:	SC STAMPED ON VAULT LIP		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	M
Casing cap:	OT	Pictures t:	-1
Street of :	87614 MCVAY HWY, EUGENE		
Street of1:	87614 MCVAY HWY, EUGENE		
Last updt :	06/23/2006	Last updt1:	jefferjw
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	44.01812		
Newlong:	-123.026		
Site id:	ORI400000003179		

B7
West
1/2 - 1 Mile
Higher

OR WELLS **ORI400000003183**

Well inspe:	41774		
Physical l:	Not Reported	Inspection:	06/14/2006
Startcard :	Not Reported	Wl county :	LANE
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	MUSICK, MR JIM		
Street:	Not Reported	City:	Not Reported

State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	Not Reported		
Township:	18		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	11		
Qtr40:	NW	Qtr160:	SW
Latitude d:	44.01846		
Longitude :	123.02613		
Gps horizo:	Not Reported		
Year const:	0		
Date const:	Not Reported	Date con 1:	Not Reported

Deficienci:	U	Previous i:	0
Inspected1:	JWJ	Wm region:	NW
Well tag a:	Not Reported		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	M
Casing cap:	OT	Pictures t:	-1
Street of :	87614 MCVAY HWY, EUGENE		
Street of1:	87614 MCVAY HWY, EUGENE		
Last updt :	06/23/2006	Last updt1:	jefferjw
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	44.01846		
Newlong:	-123.02613		
Site id:	ORI400000003183		

B8
West
1/2 - 1 Mile
Higher

OR WELLS **ORI400000003190**

Well inspe:	48323		
Physical l:	Not Reported	Inspection:	09/21/2009
Startcard :	Not Reported	Wl county :	LANE
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	WIN
Inspecti 2:	ROC	Witnesses:	Not Reported
Name owner:	WILLAMETTE BEVERAGE CO.		
Street:	86776 MCVAY HIGHWAY	City:	EUGENE
State:	OR	Zip:	97405
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	0
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	0
Tape missi:	0	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0

Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	SONIC	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	-1
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	J TRENT, CASTNER
Unbonded d:	B. Wieberdink	County cod:	LANE
Tax lot:	2500		
Township:	18		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	11		
Qtr40:	SW	Qtr160:	NW
Latitude d:	44.01866		
Longitude :	-123.02628		
Gps horizo:	Not Reported		
Year const:	0		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	Not Reported	Previous i:	0
Inspected1:	DMP	Wm region:	NW
Well tag a:	quick tie		
Well tag 2:	DRL	Depth:	Not Reported
Static wat:	Not Reported	Status of :	Not Reported
Location r:	Not Reported		
Site visit:	0	Type of lo:	M
Casing cap:	JPG	Pictures t:	0
Street of :	86770 MCVAY HIGHWAY, EUGENE, OR 97405		
Street of1:	86770 MCVAY HIGHWAY, EUGENE, OR 97405		
Last updt :	09/23/2009	Last updt1:	poedm
Rec creati:	09/23/2009	Rec crea 1:	poedm
Newlat:	44.01866		
Newlong:	-123.02628		
Site id:	ORI400000003190		

9
West
1/2 - 1 Mile
Higher

OR WELLS ORI400000003198

Well inspe:	48322		
Physical l:	Not Reported	Inspection:	09/21/2009
Startcard :	Not Reported	Wl county :	LANE
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	CMP
Special st:	0	Title:	WIN
Inspecti 2:	ROC	Witnesses:	Not Reported
Name owner:	SEQUENTIAL BIOFUELS RETAIL 1 LLC		
Street:	86714 MCVAY HIGHWAY	City:	EUGENE

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

State:	OR	Zip:	97405
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	-1
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	0
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	0
Tape missi:	0	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	SONIC	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	-1
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	J TRENT, CASTNER
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	3200		
Township:	18		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	11		
Qtr40:	SW	Qtr160:	NW
Latitude d:	44.01943		
Longitude :	-123.02652		
Gps horizo:	Not Reported		
Year const:	0		
Date const:	Not Reported	Date con 1:	Not Reported

Deficienci:	Not Reported	Previous i:	0
Inspected1:	DMP	Wm region:	NW
Well tag a:	quick tie		
Well tag 2:	DRL	Depth:	Not Reported
Static wat:	Not Reported	Status of :	Not Reported
Location r:	Not Reported		
Site visit:	0	Type of lo:	M
Casing cap:	JPG	Pictures t:	0
Street of :	86714 MCVAY HIGHWAY, EUGENE, OR 97405		
Street of1:	86714 MCVAY HIGHWAY, EUGENE, OR 97405		
Last updt :	09/23/2009	Last updt1:	poedm
Rec creati:	09/23/2009	Rec crea 1:	poedm
Newlat:	44.01943		
Newlong:	-123.02652		
Site id:	ORI400000003198		

10
West
1/2 - 1 Mile
Higher

OR WELLS **ORI400000003196**

Well inspe:	48577		
Physical l:	Not Reported	Inspection:	10/09/2009
Startcard :	Not Reported	Wl county :	LANE
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	CMP
Special st:	0	Title:	WIN
Inspecti 2:	NEW	Witnesses:	Not Reported
Name owner:	KASSIA, DELLABOUGH		
Street:	33461 BLOOMBERG ROAD	City:	EUGENE
State:	OR	Zip:	97401
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	-1	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	1.4
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	0
Tape missi:	0	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	-1

Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	-1
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	JEFF, HENDRICKSON
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	1700		
Township:	18		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	10		
Qtr40:	SE	Qtr160:	NE
Latitude d:	44.01906		
Longitude :	-123.03138		
Gps horizo:	Not Reported		
Year const:	0		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	U	Previous i:	0
Inspected1:	J U	Wm region:	NW
Well tag a:	Not Reported		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	Not Reported
Location r:	Not Reported		
Site visit:	0	Type of lo:	W
Casing cap:	SNT	Pictures t:	0
Street of :	33461 BLOOMBERG ROAD, EUGENE		
Street of1:	Not Reported		
Last updt :	11/17/2009	Last updt1:	ungerjj
Rec creati:	11/17/2009	Rec crea 1:	ungerjj
Newlat:	44.01906		
Newlong:	-123.03138		
Site id:	ORI400000003196		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: OR Radon

Radon Test Results

Zipcode	Num Tests	Maximum	Minimum	Average	# > 4 pCi/L
97405	31	6.4	0.1	1.6	2

Federal EPA Radon Zone for LANE County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for LANE COUNTY, OR

Number of sites tested: 19

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area	0.850 pCi/L	100%	0%	0%
Basement	1.360 pCi/L	88%	12%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory Data
Source: Oregon Geospatial Enterprise Office
Telephone: 503-378-2166

HYDROGEOLOGIC INFORMATION

AQUIFLOW^R Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Data
Source: Department of Water Resources
Telephone: 503-986-0843

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Locations
Source: Department of Geology and Mineral Industries
Telephone: 971-673-1540
A listing of oil and gas well locations in the state.

RADON

State Database: OR Radon
Source: Oregon Health Services
Telephone: 503-731-4272
Radon Levels in Orgeon

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

Site C3A
Davisson Rd
Creswell, OR 97426

Inquiry Number: 3118160.14s
July 08, 2011

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

FORM-BPF-ASH

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

DAVISSON RD
CRESWELL, OR 97426

COORDINATES

Latitude (North):	43.863500 - 43° 51' 48.6"
Longitude (West):	123.023200 - 123° 1' 23.5"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	498135.7
UTM Y (Meters):	4856496.5
Elevation:	584 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	43123-G1 COTTAGE GROVE, OR
Most Recent Revision:	1984
North Map:	43123-H1 CRESWELL, OR
Most Recent Revision:	1984

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	2006, 2005
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL........................ National Priority List

EXECUTIVE SUMMARY

Proposed NPL	Proposed National Priority List Sites
NPL LIENS	Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL	National Priority List Deletions

Federal CERCLIS list

CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY	Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP	CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS	Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF	RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG	RCRA - Large Quantity Generators
RCRA-SQG	RCRA - Small Quantity Generators
RCRA-CESQG	RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS	Engineering Controls Sites List
US INST CONTROL	Sites with Institutional Controls

Federal ERNS list

ERNS	Emergency Response Notification System

State- and tribal - equivalent CERCLIS

OR CRL	Confirmed Release List and Inventory

State and tribal landfill and/or solid waste disposal site lists

SWF/LF	Solid Waste Facilities List

State and tribal leaking storage tank lists

LUST	Leaking Underground Storage Tank Database
INDIAN LUST	Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

UST	Underground Storage Tank Database

EXECUTIVE SUMMARY

AST	Aboveground Storage Tanks
INDIAN UST	Underground Storage Tanks on Indian Land
FEMA UST	Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

ENG CONTROLS	Engineering Controls Recorded at ESCI Sites
INST CONTROL	Institutional Controls Recorded at ESCI Sites

State and tribal voluntary cleanup sites

VCP	Voluntary Cleanup Program Sites
INDIAN VCP	Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS	Brownfields Projects

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS	A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
HIST LF	Old Closed SW Disposal Sites
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL	Clandestine Drug Labs
AOCONCERN	Columbia Slough
CDL	Uninhabitable Drug Lab Properties
US HIST CDL	National Clandestine Laboratory Register

Local Land Records

LIENS 2	CERCLA Lien Information
LUCIS	Land Use Control Information System

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	Spill Database

Other Ascertainable Records

RCRA-NonGen	RCRA - Non Generators
DOT OPS	Incident and Accident Data
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites

EXECUTIVE SUMMARY

CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
FINDS	Facility Index System/Facility Registry System
RAATS	RCRA Administrative Action Tracking System
UIC	Underground Injection Control Program Database
MANIFEST	Manifest Information
OR HAZMAT	Hazmat/Incidents
DRYCLEANERS	Drycleaning Facilities
NPDES	Wastewater Permits Database
AIRS	Oregon Title V Facility Listing
HSIS	Hazardous Substance Information Survey
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER	PCB Transformer Registration Database
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
COAL ASH DOE	Sleam-Electric Plan Operation Data
FINANCIAL ASSURANCE	Financial Assurance Information Listing
COAL ASH	Coal Ash Disposal Sites Listing

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

STANDARD ENVIRONMENTAL RECORDS

State- and tribal - equivalent NPL

ECSI: The Environmental Cleanup Site Information System records information about sites in Oregon that may be of environmental interest. The data come from the Department of Environmental Quality.

A review of the ECSI list, as provided by EDR, and dated 06/01/2011 has revealed that there is 1 ECSI site within approximately 1.5 miles of the target property.

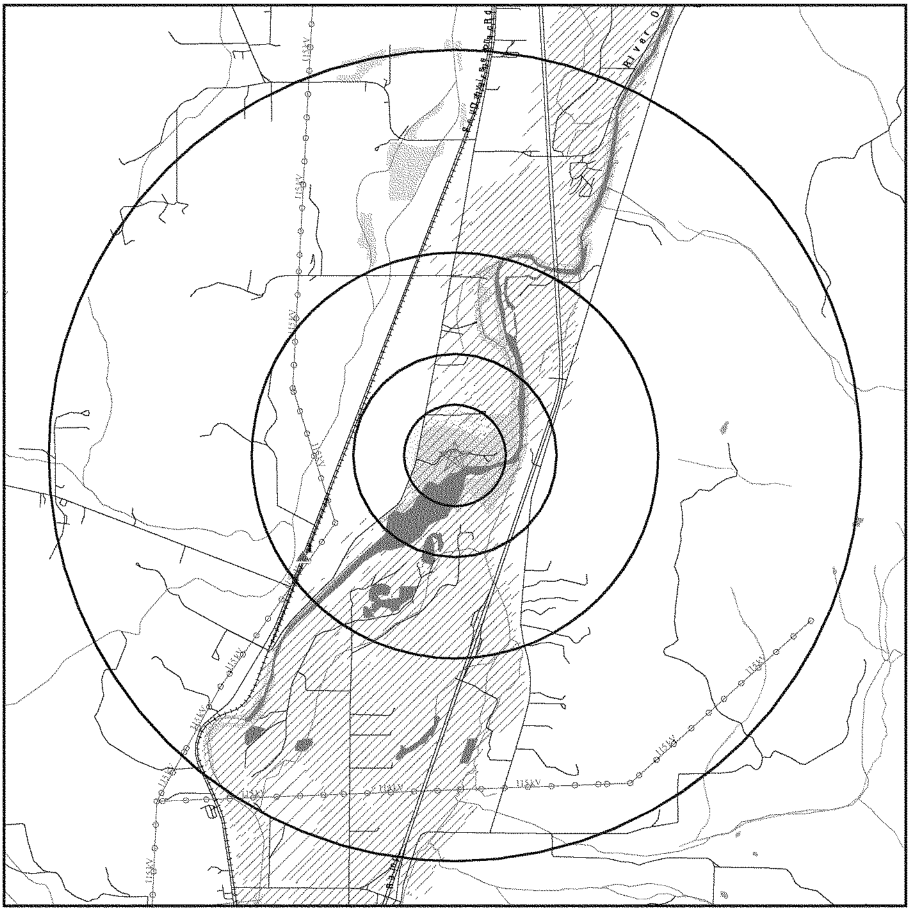
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
COTTAGE GROVE-EUGENE SPORTSMAN	81078 NORTH PACIFIC HIG	WSW 1/2 - 1 (0.898 mi.)	1	7

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 27 records.

Site Name	Database(s)
KENNER INC	MANIFEST
COTTAGE GROVE INDUSTRIAL PARK	ECSI
USDA FS UMPQUA NF: CHAMPION MINE	CERCLIS
UPPER ROW RIVER WATERSHED	CERCLIS
PLAZA CLEANERS	DRYCLEANERS
WEYERHAEUSER-COTTAGE GROV	LUST
COTTAGE GROVE ROAD MAINT.	LUST
MOSBY CREEK MILL SITE	LUST
LONE PINE MARKET	LUST, UST
LANE COUNTY	UST
COTTAGE GROVE TRANSFER STATION	UST
A&G AUTO RECYCLING, INC.	RCRA-NonGen
PGT WALKER MT MICROWAVE SITE	RCRA-NonGen, FINDS
AUTO CARE NORTHWEST	RCRA-CESQG, FINDS
ODOT - GETTINGS CREEK REST AREA	FINDS, NPDES
I 5 EXIT 173 S	OR HAZMAT
I 5 SB & MP	OR HAZMAT
I 5 SBMP	OR HAZMAT
I 5 MP	OR HAZMAT
I 5 SBMP 170	OR HAZMAT
1320 HWY 99 N	OR HAZMAT
I 5 M & P 182	OR HAZMAT
MCKENZIE HWY 126E MP 49	OR HAZMAT
KIMWOOD CORP	HSIS
RIVER WALK SUBDIVISION	NPDES
WEYERHAEUSER COMPANY-COTTAGE GROVE	NPDES
A & G AUTO RECYCLING	NPDES

OVERVIEW MAP - 3118160.14s



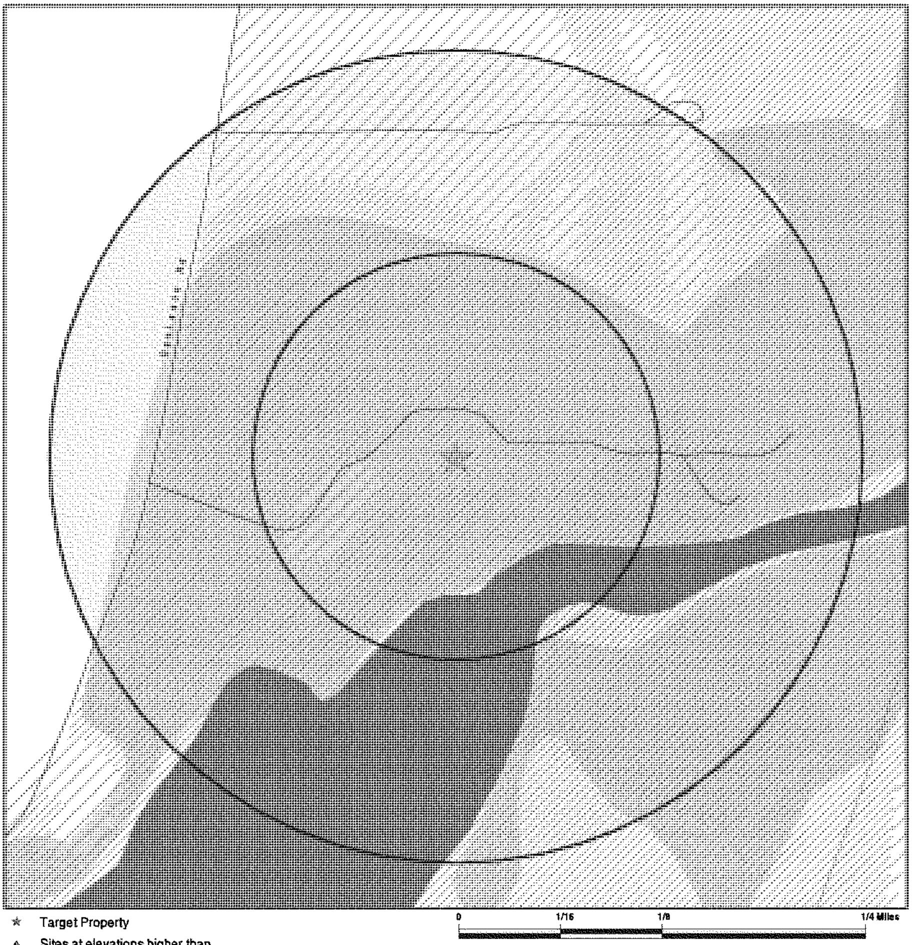
- ☆ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Manufactured Gas Plants
- ▨ National Priority List Sites
- ▨ Dept. Defense Sites
- ▨ Indian Reservations BIA
- ⁄ Power transmission lines
- ⁄ Oil & Gas pipelines
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- ▨ National Wetland Inventory
- ▨ State Wetlands
- ▦ Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Site C3A
ADDRESS: Davisson Rd
Creswell OR 97426
LAT/LONG: 43.8635 / 123.0232

CLIENT: Tetra Tech EM, Inc.
CONTACT: Merri Martz
INQUIRY #: 3118160.14s
DATE: July 08, 2011 10:15 am

DETAIL MAP - 3118160.14s



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Manufactured Gas Plants
- ⚑ Sensitive Receptors
- ▨ National Priority List Sites
- ▨ Dept. Defense Sites
- ▨ Indian Reservations BIA
- ∿ Oil & Gas pipelines
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- ▩ National Wetland Inventory
- ▒ State Wetlands
- ▦ Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Site C3A	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Davisson Rd Creswell OR 97426	CONTACT:	Merri Martz
		INQUIRY #:	3118160.14s
LAT/LONG:	43.8635 / 123.0232	DATE:	July 08, 2011 10:15 am

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.500	0	0	0	0	0	0
Proposed NPL		1.500	0	0	0	0	0	0
NPL LIENS		0.500	0	0	0	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.500	0	0	0	0	0	0
Federal CERCLIS list								
CERCLIS		1.000	0	0	0	0	NR	0
FEDERAL FACILITY		1.500	0	0	0	0	0	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		1.000	0	0	0	0	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS		1.500	0	0	0	0	0	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		1.000	0	0	0	0	NR	0
Federal RCRA generators list								
RCRA-LQG		0.750	0	0	0	0	NR	0
RCRA-SQG		0.750	0	0	0	0	NR	0
RCRA-CESQG		0.750	0	0	0	0	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		1.000	0	0	0	0	NR	0
US INST CONTROL		1.000	0	0	0	0	NR	0
Federal ERNS list								
ERNS		0.500	0	0	0	NR	NR	0
State- and tribal - equivalent NPL								
ECSI		1.500	0	0	0	1	0	1
State- and tribal - equivalent CERCLIS								
OR CRL		1.000	0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		1.000	0	0	0	0	NR	0
State and tribal leaking storage tank lists								
LUST		1.000	0	0	0	0	NR	0
INDIAN LUST		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
State and tribal registered storage tank lists								
UST		0.750	0	0	0	0	NR	0
AST		0.750	0	0	0	0	NR	0
INDIAN UST		0.750	0	0	0	0	NR	0
FEMA UST		0.750	0	0	0	0	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS		1.000	0	0	0	0	NR	0
INST CONTROL		1.000	0	0	0	0	NR	0
State and tribal voluntary cleanup sites								
VCP		1.000	0	0	0	0	NR	0
INDIAN VCP		1.000	0	0	0	0	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		1.000	0	0	0	0	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		1.000	0	0	0	0	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9		1.000	0	0	0	0	NR	0
ODI		1.000	0	0	0	0	NR	0
HIST LF		1.000	0	0	0	0	NR	0
INDIAN ODI		1.000	0	0	0	0	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		0.500	0	0	0	NR	NR	0
AOCONCERN		1.500	0	0	0	0	0	0
CDL		0.500	0	0	0	NR	NR	0
US HIST CDL		0.500	0	0	0	NR	NR	0
Local Land Records								
LIENS 2		0.500	0	0	0	NR	NR	0
LUCIS		1.000	0	0	0	0	NR	0
Records of Emergency Release Reports								
HMIRS		0.500	0	0	0	NR	NR	0
SPILLS		0.500	0	0	0	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.750	0	0	0	0	NR	0
DOT OPS		0.500	0	0	0	NR	NR	0
DOD		1.500	0	0	0	0	0	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FUDS		1.500	0	0	0	0	0	0
CONSENT		1.500	0	0	0	0	0	0
ROD		1.500	0	0	0	0	0	0
UMTRA		1.000	0	0	0	0	NR	0
MINES		0.750	0	0	0	0	NR	0
TRIS		0.500	0	0	0	NR	NR	0
TSCA		0.500	0	0	0	NR	NR	0
FTTS		0.500	0	0	0	NR	NR	0
HIST FTTS		0.500	0	0	0	NR	NR	0
SSTS		0.500	0	0	0	NR	NR	0
ICIS		0.500	0	0	0	NR	NR	0
PADS		0.500	0	0	0	NR	NR	0
MLTS		0.500	0	0	0	NR	NR	0
RADINFO		0.500	0	0	0	NR	NR	0
FINDS		0.500	0	0	0	NR	NR	0
RAATS		0.500	0	0	0	NR	NR	0
UIC		0.500	0	0	0	NR	NR	0
MANIFEST		0.750	0	0	0	0	NR	0
OR HAZMAT		0.500	0	0	0	NR	NR	0
DRYCLEANERS		0.750	0	0	0	0	NR	0
NPDES		0.500	0	0	0	NR	NR	0
AIRS		0.500	0	0	0	NR	NR	0
HSIS		0.500	0	0	0	NR	NR	0
INDIAN RESERV		1.500	0	0	0	0	0	0
SCRD DRYCLEANERS		1.000	0	0	0	0	NR	0
PCB TRANSFORMER		0.500	0	0	0	NR	NR	0
COAL ASH EPA		1.000	0	0	0	0	NR	0
COAL ASH DOE		0.500	0	0	0	NR	NR	0
FINANCIAL ASSURANCE		0.500	0	0	0	NR	NR	0
COAL ASH		1.000	0	0	0	0	NR	0
EDR PROPRIETARY RECORDS								
EDR Proprietary Records								
Manufactured Gas Plants		1.500	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1 **WSW** **1/2-1** **0.898 mi.** **4741 ft.**	**COTTAGE GROVE-EUGENE SPORTSMAN'S CLUB** **81078 NORTH PACIFIC HIGHWAY** **CRESWELL, OR 97426**	**ECSI**	**S110764031** **N/A**

Relative:
Higher

Actual:
589 ft.

OR ECSI:

State ID Number:	5427	Brown ID:	0
Study Area:	False	Region ID:	3
Legislatve ID:	0	Investigation ID:	208
FACA ID:	115343	Further Action:	258
Lat/Long (dms):	43 51 50.40 / -123 2 4.20	County Code:	20.00
Score Value:	Not reported	Cerclis ID:	Not reported
Township Coord.:	20.00	Township Zone:	S
Range Coord:	3.00	Range Zone:	W
Section Coord:	3	Qtr Section:	Not reported
Tax Lots:	Not reported	Size:	Not reported
NPL:	False	Orphan:	False
Updated By:	GWISTAR	Update Date:	03/25/2011
Alias Name:	Not reported		

OR ECSI HAZARDOUS RELEASE:

Substance ID.:	Not reported
Haz Release ID:	Not reported
Qty Released:	Not reported
Date Released:	Not reported
Update Date:	Not reported
Update By:	Not reported
Substance Code:	Not reported
Substance Name:	Not reported
Substance Abbrev.:	Not reported
Substance Category ID:	Not reported
Substance Category:	Not reported
Category Level:	Not reported
Created By:	Not reported
Created Date:	Not reported
Substance Category ID:	Not reported
Substance Category:	Not reported
Category Level:	Not reported
Created By:	Not reported
Created Date:	Not reported
Substance Alias ID:	Not reported
Sub Alias Name:	Not reported
Comment ID:	Not reported
Release Code:	Not reported
Release Comments:	Not reported
Sampling Result ID:	Not reported
Feature Id:	Not reported
Hazard Release Id:	Not reported
Medium:	Not reported
Substance Abbrev.:	Not reported
Unit Code:	Not reported
Observation:	Not reported
Owner Operator:	Not reported
Lab Data:	Not reported
Sample Depth:	Not reported
Start Date:	Not reported
End Date:	Not reported
Min Concentration:	Not reported
Max Concentration:	Not reported

COTTAGE GROVE-EUGENE SPORTSMAN'S CLUB (Continued) **S110764031**

Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

OR ECSI NARR:

NARR ID: 5752502
NARR Code: Contamination
Created By: SSADOFS
Created Date: 10/13/2010
Updated By: SSADOFS
Updated Date: 10/13/2010
NARR Comments:The Club claims that they have been periodically recovering shot and bullets from the shooting range, but it is likely that significant quantities of lead and/or arsenic are present on areas of the site that have not been subject to recovery or have leached between recovery events. There is no record of confirmation sampling to determine if recovery is successful.

NARR ID: 5752504
NARR Code: Hazardous Substance/Waste Types
Created By: SSADOFS
Created Date: 10/13/2010
Updated By: SSADOFS
Updated Date: 10/13/2010
NARR Comments:Lead shot, possibly also bullets.

NARR ID: 5752505
NARR Code: Manner of Release
Created By: SSADOFS
Created Date: 10/13/2010
Updated By: SSADOFS
Updated Date: 10/13/2010
NARR Comments:Shooting range

NARR ID: 5752506
NARR Code: Substances of Concern
Created By: SSADOFS
Created Date: 10/13/2010
Updated By: SSADOFS
Updated Date: 10/13/2010
NARR Comments:Lead and Arsenic

NARR ID: 5752503
NARR Code: Site History
Created By: SSADOFS
Created Date: 10/13/2010
Updated By: SSADOFS
Updated Date: 10/13/2010
NARR Comments:The Cottage-Grove Eugene Sportsmen's Club has been operating at this site since the 1960's.

OR ECSI SITE CONTROL:

Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported

COTTAGE GROVE-EUGENE SPORTSMAN'S CLUB (Continued) **S110764031**

Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:
Permit Agency: Not reported
Permit Number: Not reported
Permit Type: Not reported
Comments: Not reported

OR ECSI Administrative Action:

Admin ID:	738046	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	10/13/2010	Complete Date:	10/13/2010
Substance Code:	Not reported	Rank Value:	Not reported
Employee Id:	2843	Cleanup Flag:	False
Created By:	SSADOFS	Created Date:	10/13/2010
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	738047	Action ID:	9508
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	10/13/2010	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	Not reported
Employee Id:	2843	Cleanup Flag:	False
Created By:	SSADOFS	Created Date:	10/13/2010
Action Code:	RSSC	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Site Screening recommended (EV)		
Further Action:	Medium		
Comments:	Not reported		

OR ECSI OPERATIONS:
Operation Id: Not reported
Operation Status: Not reported
Common Name: Not reported
Yrs of Operation: Not reported
Comments: Not reported
Updated Date: Not reported
Operations SIC Id: Not reported
SIC Code: Not reported
Created By: Not reported
Created Date: Not reported

Count: 27 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
COTTAGE GROVE	S105527273		I 5 EXIT 173 S	97424	OR HAZMAT
COTTAGE GROVE	S108390796		I 5 SB & MP	97424	OR HAZMAT
COTTAGE GROVE	S108390801		I 5 SBMP	97424	OR HAZMAT
COTTAGE GROVE	S108390782		I 5 MP	97424	OR HAZMAT
COTTAGE GROVE	S108390798		I 5 SBMP 170	97424	OR HAZMAT
COTTAGE GROVE	1007693566	ODOT - GETTINGS CREEK REST AREA	I 5 NORTHBOUNDMILEPOST 1782	97424	FINDS, NPDES
COTTAGE GROVE	S105523991		1320 HWY 99 N	97424	OR HAZMAT
COTTAGE GROVE	S109052457	RIVER WALK SUBDIVISION	HWY 99 S & HARRISON AVE	97424	NPDES
COTTAGE GROVE	S104791370	PLAZA CLEANERS	1441 HWY 99 N	97424	DRYCLEANERS
COTTAGE GROVE	S108572030	WEYERHAEUSER-COTTAGE GROV	HWY 99S	97424	LUST
COTTAGE GROVE	S110948072	KENNER INC	80179 DELIGHT VLY	97424	MANIFEST
COTTAGE GROVE	S104055297	KIMWOOD CORP	77684 S HWY 99	97424	HSIS
COTTAGE GROVE	S108169730	COTTAGE GROVE INDUSTRIAL PARK	S HWY 99	97424	ECSI
COTTAGE GROVE	U000435755	LANE COUNTY	LANE SEARS DELIGHT VLY	97424	UST
COTTAGE GROVE	S102076518	COTTAGE GROVE ROAD MAINT.	LANE SEARS DELIGHT VLY	97424	LUST
COTTAGE GROVE	S104189491	MOSBY CREEK MILL SITE	LAYNG RD	97424	LUST
COTTAGE GROVE	S108663550	WEYERHAEUSER COMPANY-COTTAGE GROVE	77629 S PACIFIC HWY	97424	NPDES
COTTAGE GROVE	1012210110	USDA FS UMPQUA NF: CHAMPION MINE	T23S R1E SEC13	97424	CERCLIS
COTTAGE GROVE	U000435738	COTTAGE GROVE TRANSFER STATION	SEARS RD	97424	UST
COTTAGE GROVE	1008377459	UPPER ROW RIVER WATERSHED	T21S,T22S,T23S,R1W,R1E,R2E	97424	CERCLIS
CRESWELL	S105523999		I 5 M & P 182	97426	OR HAZMAT
CRESWELL	1011863673	A&G AUTO RECYCLING, INC.	80760 HIGHWAY 99 N	97426	RCRA-NonGen
CRESWELL	S110048214	A & G AUTO RECYCLING	80760 HWY 99 N	97426	NPDES
CRESWELL	U000435795	LONE PINE MARKET	82442 HWY 99N	97426	LUST, UST
CRESWELL	1004771214	AUTO CARE NORTHWEST	5 WEST F ST BAYS 3 & 4	97426	RCRA-CESQG, FINDS
LANE COUNTY	S109577609		MCKENZIE HWY 126E MP 49		OR HAZMAT
WALKER MOUNTAIN	1000252060	PGT WALKER MT MICROWAVE SITE	SEC 24 T26S R8E WM	97426	RCRA-NonGen, FINDS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 05/16/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPAa??s Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010
Date Data Arrived at EDR: 01/11/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/15/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/09/2011
Date Data Arrived at EDR: 03/15/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 91

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 05/16/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/16/2011
Date Data Arrived at EDR: 03/25/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 81

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/16/2011
Date Data Arrived at EDR: 03/25/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 81

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 04/05/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 70

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Annually

State- and tribal - equivalent NPL

ECSI: Environmental Cleanup Site Information System

Sites that are or may be contaminated and may require cleanup.

Date of Government Version: 06/01/2011
Date Data Arrived at EDR: 06/03/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 27

Source: Department of Environmental Quality
Telephone: 503-229-6629
Last EDR Contact: 06/03/2011
Next Scheduled EDR Contact: 08/08/2011
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

CRL: Confirmed Release List and Inventory

All facilities with a confirmed release.

Date of Government Version: 05/24/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 503-229-6170
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Facilities List

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 06/13/2011
Date Data Arrived at EDR: 06/15/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 15

Source: Department of Environmental Quality
Telephone: 503-229-6299
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Semi-Annually

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 04/01/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 503-229-5790
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/31/2011
Date Data Arrived at EDR: 02/01/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 48

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 03/03/2011
Date Data Arrived at EDR: 03/18/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 45

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 05/17/2011
Date Data Arrived at EDR: 05/19/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 26

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 05/20/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 25

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/03/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/10/2011	Source: EPA Region 6
Date Data Arrived at EDR: 05/11/2011	Telephone: 214-665-6597
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 34	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 11/04/2009	Source: EPA Region 7
Date Data Arrived at EDR: 05/04/2010	Telephone: 913-551-7003
Date Made Active in Reports: 07/07/2010	Last EDR Contact: 05/04/2010
Number of Days to Update: 64	Next Scheduled EDR Contact: 05/16/2011
	Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/16/2011	Source: EPA Region 8
Date Data Arrived at EDR: 05/17/2011	Telephone: 303-312-6271
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 28	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 04/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 05/25/2011	Telephone: 503-229-5815
Date Made Active in Reports: 06/29/2011	Last EDR Contact: 05/25/2011
Number of Days to Update: 35	Next Scheduled EDR Contact: 09/05/2011
	Data Release Frequency: Quarterly

AST: Aboveground Storage Tanks
Aboveground storage tank locations reported to the Office of State Fire Marshal.

Date of Government Version: 12/01/2010	Source: Office of State Fire Marshal
Date Data Arrived at EDR: 01/25/2011	Telephone: 503-378-3473
Date Made Active in Reports: 02/24/2011	Last EDR Contact: 05/13/2011
Number of Days to Update: 30	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Semi-Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 03/03/2011	Source: EPA Region 4
Date Data Arrived at EDR: 03/18/2011	Telephone: 404-562-9424
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 45	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 05/18/2011	Source: EPA Region 9
Date Data Arrived at EDR: 05/26/2011	Telephone: 415-972-3368
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 19	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 05/16/2011	Source: EPA Region 8
Date Data Arrived at EDR: 05/17/2011	Telephone: 303-312-6137
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 28	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 05/17/2011	Source: EPA Region 10
Date Data Arrived at EDR: 05/19/2011	Telephone: 206-553-2857
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 26	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 03/07/2011	Source: EPA, Region 1
Date Data Arrived at EDR: 05/04/2011	Telephone: 617-918-1313
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/03/2011
Number of Days to Update: 41	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 01/01/2011	Source: EPA Region 5
Date Data Arrived at EDR: 02/23/2011	Telephone: 312-886-6136
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 68	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011	Source: EPA Region 6
Date Data Arrived at EDR: 05/11/2011	Telephone: 214-665-7591
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 34	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/01/2011	Source: EPA Region 7
Date Data Arrived at EDR: 06/01/2011	Telephone: 913-551-7003
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 02/03/2011
Number of Days to Update: 13	Next Scheduled EDR Contact: 05/16/2011
	Data Release Frequency: Varies

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010	Source: FEMA
Date Data Arrived at EDR: 02/16/2010	Telephone: 202-646-5797
Date Made Active in Reports: 04/12/2010	Last EDR Contact: 04/18/2011
Number of Days to Update: 55	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Recorded at ESCI Sites

Engineering controls are physical measures selected or approved by the Director for the purpose of preventing or minimizing exposure to hazardous substances. Engineering controls may include, but are not limited to, fencing, capping, horizontal or vertical barriers, hydraulic controls, and alternative water supplies.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/03/2011	Telephone: 503-229-5193
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/03/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Quarterly

INST CONTROL: Institutional Controls Recorded at ESCI Sites

An institutional control is a legal or administrative tool or action taken to reduce the potential for exposure to hazardous substances. Institutional controls may include, but are not limited to, use restrictions, environmental monitoring requirements, and site access and security measures.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/03/2011	Telephone: 503-229-5193
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/03/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

VCS: Voluntary Cleanup Program Sites

Responsible parties have entered into an agreement with DEQ to voluntarily address contamination associated with their property.

Date of Government Version: 04/22/2011	Source: DEQ
Date Data Arrived at EDR: 04/27/2011	Telephone: 503-229-5256
Date Made Active in Reports: 05/16/2011	Last EDR Contact: 04/11/2011
Number of Days to Update: 19	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 02/25/2011	Source: EPA, Region 1
Date Data Arrived at EDR: 04/05/2011	Telephone: 617-918-1102
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 07/05/2011
Number of Days to Update: 70	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Projects

Brownfields investigations and/or cleanups that have been conducted in Oregon.

Date of Government Version: 05/24/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 503-229-6801
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Semi-Annually

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 03/29/2011
Date Data Arrived at EDR: 03/29/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009	Source: EPA, Region 9
Date Data Arrived at EDR: 05/07/2009	Telephone: 415-947-4219
Date Made Active in Reports: 09/21/2009	Last EDR Contact: 06/27/2011
Number of Days to Update: 137	Next Scheduled EDR Contact: 10/10/2011
	Data Release Frequency: No Update Planned

HIST LF: Old Closed SW Disposal Sites
A list of solid waste disposal sites that have been closed for a long while.

Date of Government Version: 04/01/2000	Source: Department of Environmental Quality
Date Data Arrived at EDR: 07/08/2003	Telephone: 503-229-5409
Date Made Active in Reports: 07/18/2003	Last EDR Contact: 07/08/2003
Number of Days to Update: 10	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/03/2007	Telephone: 703-308-8245
Date Made Active in Reports: 01/24/2008	Last EDR Contact: 05/09/2011
Number of Days to Update: 52	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/02/2011	Source: Drug Enforcement Administration
Date Data Arrived at EDR: 03/17/2011	Telephone: 202-307-1000
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 06/07/2011
Number of Days to Update: 46	Next Scheduled EDR Contact: 09/19/2011
	Data Release Frequency: Quarterly

AOC MU: East Multnomah County Area
Approximate extent of TSA VOC plume February , 2002

Date of Government Version: N/A	Source: City of Portland Environmental Services
Date Data Arrived at EDR: 10/07/2002	Telephone: 503-823-5310
Date Made Active in Reports: 10/22/2002	Last EDR Contact: 03/13/2007
Number of Days to Update: 15	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

AOC COL: Columbia Slough
Columbia Slough waterway boundaries.

Date of Government Version: 08/10/2005	Source: City of Portland Environmental Services
Date Data Arrived at EDR: 05/17/2006	Telephone: 503-823-5310
Date Made Active in Reports: 06/16/2006	Last EDR Contact: 03/13/2007
Number of Days to Update: 30	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

CDL 2: Clandestine Drug Lab Site Listing
A listing of clandestine drug lab site locations included in the Incident database.

Date of Government Version: 02/02/2011
Date Data Arrived at EDR: 05/04/2011
Date Made Active in Reports: 06/22/2011
Number of Days to Update: 49

Source: Oregon State Police
Telephone: 503-373-1540
Last EDR Contact: 05/04/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

CDL: Uninhabitable Drug Lab Properties

The properties listed on these county pages have been declared by a law enforcement agency to be unfit for use due to meth lab and/or storage activities. The properties are considered uninhabitable until cleaned up by a state certified decontamination contractor and a certificate of fitness is issued by the Oregon Health Division.

Date of Government Version: 04/27/2011
Date Data Arrived at EDR: 05/27/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 34

Source: Department of Consumer & Business Services
Telephone: 503-378-4133
Last EDR Contact: 11/24/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 06/21/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/05/2011
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 51

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Annually

SPILLS: Spill Data

Oil and hazardous material spills reported to the Environmental Response Program.

Date of Government Version: 04/12/2011
Date Data Arrived at EDR: 04/14/2011
Date Made Active in Reports: 05/16/2011
Number of Days to Update: 32

Source: Department of Environmental Quality
Telephone: 503-229-5815
Last EDR Contact: 04/11/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Semi-Annually

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/12/2011
Date Data Arrived at EDR: 02/11/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 05/11/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 08/12/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 112

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 70

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/16/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 5

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 06/15/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/21/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 99

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 06/02/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/08/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 06/08/2011
Next Scheduled EDR Contact: 09/19/2011
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/17/2010
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 94

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/30/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Every 4 Years

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/07/2011
Date Data Arrived at EDR: 01/21/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 59

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/22/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/18/2010
Date Data Arrived at EDR: 04/06/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 51

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010
Date Data Arrived at EDR: 04/16/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 41

Source: EPA
Telephone: (206) 553-1200
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Biennially

UIC: Underground Injection Control Program Database

DEQ's Underground Injection Control Program is authorized by the Environmental Protection Agency (EPA) to regulate all underground injection in Oregon to protect groundwater resources.

Date of Government Version: 03/03/2011
Date Data Arrived at EDR: 03/04/2011
Date Made Active in Reports: 03/29/2011
Number of Days to Update: 25

Source: Department of Environmental Quality
Telephone: 503-229-5945
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

OR MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 09/08/2010
Date Made Active in Reports: 10/15/2010
Number of Days to Update: 37

Source: Department of Environmental Quality
Telephone: N/A
Last EDR Contact: 05/16/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: Annually

HAZMAT: Hazmat/Incidents

Hazardous material incidents reported to the State Fire Marshal by emergency responders. The hazardous material may or may not have been released.

Date of Government Version: 02/02/2011
Date Data Arrived at EDR: 05/04/2011
Date Made Active in Reports: 06/22/2011
Number of Days to Update: 49

Source: State Fire Marshal's Office
Telephone: 503-373-1540
Last EDR Contact: 05/04/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

DRYCLEANERS: Drycleaning Facilities

A listing of registered drycleaning facilities in Oregon.

Date of Government Version: 02/07/2011
Date Data Arrived at EDR: 02/09/2011
Date Made Active in Reports: 02/23/2011
Number of Days to Update: 14

Source: Department of Environmental Quality
Telephone: 503-229-6783
Last EDR Contact: 06/06/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Varies

NPDES: Wastewater Permits Database

A listing of permitted wastewater facilities.

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/12/2011
Date Made Active in Reports: 06/22/2011
Number of Days to Update: 41

Source: Department of Environmental Quality
Telephone: 503-229-5657
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: Oregon Title V Facility Listing

A listing of Title V facility source and emissions information.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 12/28/2009
Date Made Active in Reports: 01/19/2010
Number of Days to Update: 22

Source: Department of Environmental Quality
Telephone: 503-229-6459
Last EDR Contact: 06/20/2011
Next Scheduled EDR Contact: 09/19/2011
Data Release Frequency: Varies

HSIS: Hazardous Substance Information Survey

Companies in Oregon submitting the Hazardous Substance Information Survey and either reporting or not reporting hazardous substances.

Date of Government Version: 12/01/2010
Date Data Arrived at EDR: 01/25/2011
Date Made Active in Reports: 02/24/2011
Number of Days to Update: 30

Source: State Fire Marshal's Office
Telephone: 503-373-1540
Last EDR Contact: 05/13/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Semi-Annually

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 06/06/2011
Next Scheduled EDR Contact: 08/08/2011
Data Release Frequency: Varies

FINANCIAL ASSURANCE 1: Financial Assurance Information Listing

Financial assurance information for hazardous waste facilities.

Date of Government Version: 03/29/2011
Date Data Arrived at EDR: 03/31/2011
Date Made Active in Reports: 05/06/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 541-633-2011
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites Listing

A listing of coal ash disposal sites.

Date of Government Version: 06/01/2011
Date Data Arrived at EDR: 06/02/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 28

Source: Department of Environmental Quality
Telephone: 541-298-7255
Last EDR Contact: 05/31/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

FINANCIAL ASSURANCE 2: Financial Assurance Information Listing

Financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 06/13/2011
Date Data Arrived at EDR: 06/15/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 15

Source: Department of Environmental Quality
Telephone: 503-229-5521
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

COAL ASH DOE: Steam-Electric Plan Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 04/19/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008
Date Data Arrived at EDR: 02/18/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 100

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 05/05/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: N/A

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2010	Source: Department of Environmental Conservation
Date Data Arrived at EDR: 05/12/2011	Telephone: 518-402-8651
Date Made Active in Reports: 05/24/2011	Last EDR Contact: 05/12/2011
Number of Days to Update: 12	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Annually

WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009	Source: Department of Natural Resources
Date Data Arrived at EDR: 07/06/2010	Telephone: N/A
Date Made Active in Reports: 07/26/2010	Last EDR Contact: 06/20/2011
Number of Days to Update: 20	Next Scheduled EDR Contact: 10/03/2011
	Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.
Daycare Centers: Child Care Listings
Source: Employment Department
Telephone: 503-947-1420

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory Data
Source: Oregon Geospatial Enterprise Office
Telephone: 503-378-2166

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

GEOCHECK®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

SITE C3A
DAVISSON RD
CRESWELL, OR 97426

TARGET PROPERTY COORDINATES

Latitude (North):	43.86350 - 43° 51' 48.6"
Longitude (West):	123.0232 - 123° 1' 23.5"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	498135.7
UTM Y (Meters):	4856496.5
Elevation:	584 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	43123-G1 COTTAGE GROVE, OR
Most Recent Revision:	1984
North Map:	43123-H1 CRESWELL, OR
Most Recent Revision:	1984

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

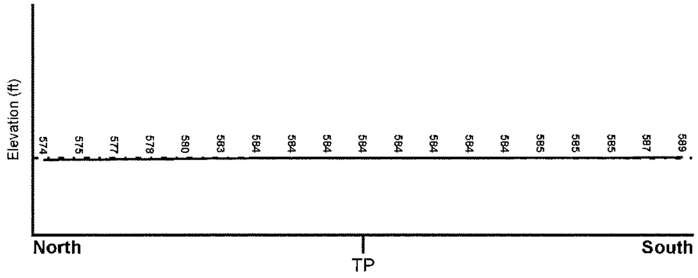
TOPOGRAPHIC INFORMATION

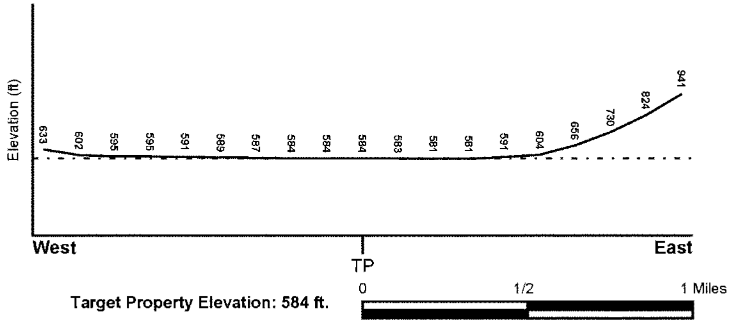
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General East

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 584 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
LANE, OR	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property:	41039C - FEMA DFIRM Flood data
Additional Panels in search area:	Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
COTTAGE GROVE SE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

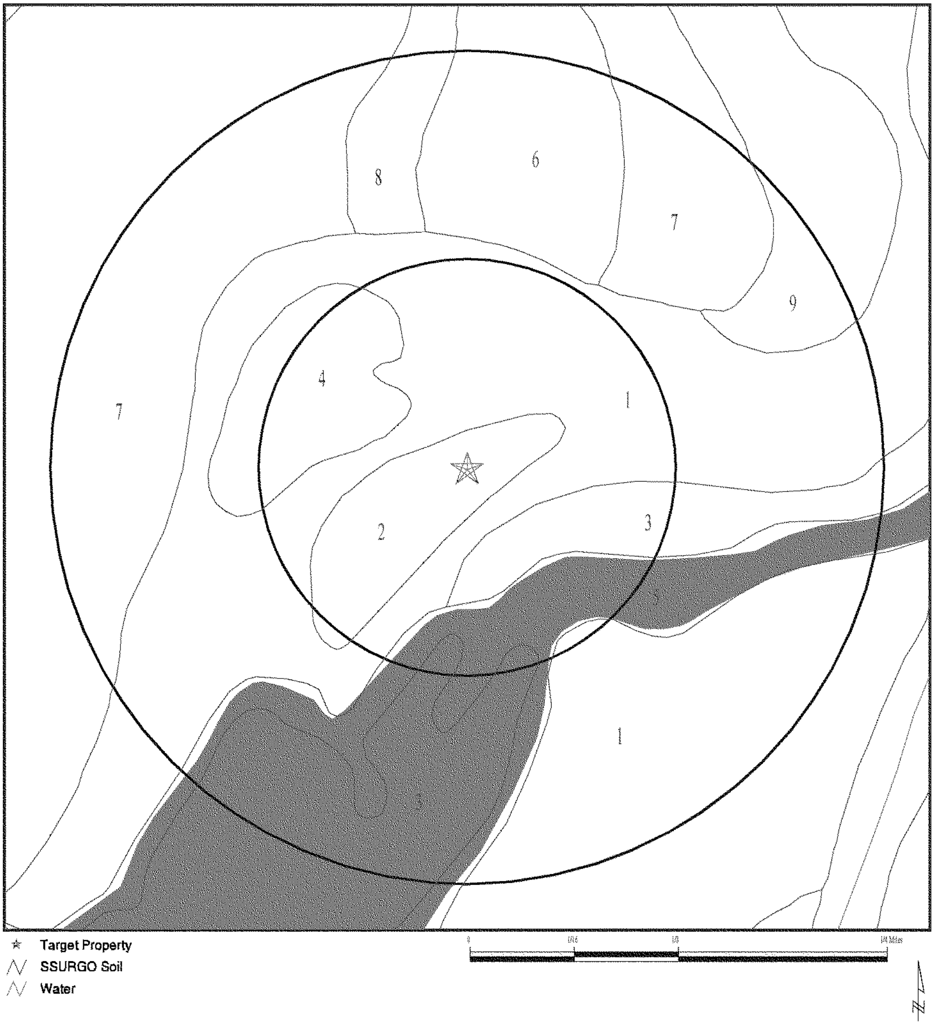
GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT		GEOLOGIC AGE IDENTIFICATION	
Era:	Cenozoic	Category:	Volcanic Rocks
System:	Tertiary		
Series:	Miocene volcanic rocks		
Code:	Tmv *(decoded above as Era, System & Series)*		

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3118160.14s



SITE NAME:	Site C3A	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Davisson Rd Creswell OR 97426	CONTACT:	Merri Martz
		INQUIRY #:	3118160.14s
LAT/LONG:	43.8635 / 123.0232	DATE:	July 08, 2011 10:16 am

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name:	Camas
Soil Surface Texture:	gravelly sandy loam
Hydrologic Group:	Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.
Soil Drainage Class:	Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**		**Soil Reaction (pH)**
1	0 inches	14 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 7.3 Min: 5.6
2	14 inches	59 inches	very gravelly sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 7.3 Min: 5.6

Soil Map ID: 2

Soil Component Name:	Newberg
Soil Surface Texture:	loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**		**Soil Reaction (pH)**
1	0 inches	14 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6
2	14 inches	64 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6

Soil Map ID: 3

Soil Component Name:	Riverwash
Soil Surface Texture:	stratified gravel to sand
Hydrologic Group:	Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
Soil Drainage Class:	Poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 31 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
1	0 inches	59 inches	stratified gravel to sand	Not reported	Not reported	Max: Min:	Max: Min:

Soil Map ID: 4

Soil Component Name: Pits

Soil Surface Texture: stratified gravel to sand

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

Soil Map ID: 5

Soil Component Name: Water

Soil Surface Texture: stratified gravel to sand

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class:

Hydric Status: Unknown

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

Soil Map ID: 6

Soil Component Name: Salem

Soil Surface Texture: gravelly silt loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	gravelly silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 6.5 Min: 6.1
2	7 inches	25 inches	gravelly clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 6.5 Min: 6.1

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
3	25 inches	59 inches	very gravelly sand	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 6.5 Min: 6.1

Soil Map ID: 7

Soil Component Name:	Malabon
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 7.3 Min: 6.1

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
2	11 inches	42 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	42 inches	59 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 7.3 Min: 6.1

Soil Map ID: 8

Soil Component Name:	Coburg
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	Moderately well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 61 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	18 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 7.3 Min: 6.6

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	18 inches	53 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 7.3 Min: 6.6
3	53 inches	64 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 7.3 Min: 6.6

Soil Map ID: 9

Soil Component Name:	Wapato
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
Soil Drainage Class:	Poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	16 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Elastic silt.	Max: 4 Min: 1.4	Max: 6.5 Min: 5.6

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	16 inches	33 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Elastic silt.	Max: 4 Min: 1.4	Max: 6.5 Min: 5.6
3	33 inches	59 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Elastic silt.	Max: 4 Min: 1.4	Max: 6.5 Min: 5.6

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

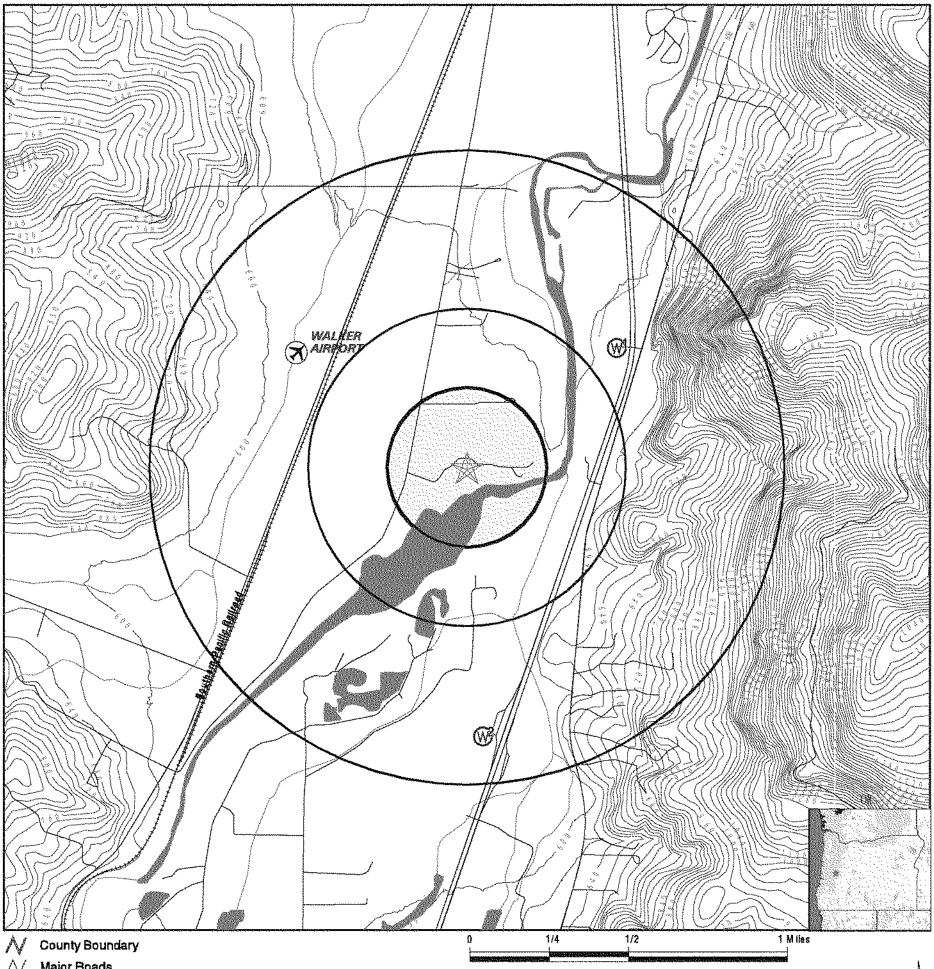
Note: PWS System location is not always the same as well location.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	ORI400000002550	1/2 - 1 Mile NE
2	ORW400000001524	1/2 - 1 Mile South

PHYSICAL SETTING SOURCE MAP - 3118160.14s



- County Boundary
- Major Roads
- Contour Lines
- ▨ Airports
- ◎ Earthquake epicenter, Richter 5 or greater
- Ⓦ Water Wells
- Ⓟ Public Water Supply Wells
- ● Cluster of Multiple Icons

- ↑ Groundwater Flow Direction
- (GI) Indeterminate Groundwater Flow at Location
- (GV) Groundwater Flow Varies at Location

SITE NAME:	Site C3A	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Davisson Rd Creswell OR 97426	CONTACT:	Merri Martz
		INQUIRY #:	3118160.14s
LAT/LONG:	43.8635 / 123.0232	DATE:	July 08, 2011 10:16 am

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation	Database	EDR ID Number
1 **NE** **1/2 - 1 Mile** **Higher**	**OR WELLS**	**ORI400000002550**

Well inspe:	44849		
Physical l:	Not Reported	Inspection:	11/16/2007
Startcard :	Not Reported	Wl county :	LANE
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	REINER, CARL		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0

Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	100		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	2		
Qtr40:	NW	Qtr160:	NE
Latitude d:	43.86895		
Longitude :	-123.01375		
Gps horizo:	Not Reported		
Year const:	2007		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	U	Previous i:	0
Inspected1:	JWJ	Wm region:	NW
Well tag a:	BANDED TO CASING		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	W
Casing cap:	SS	Pictures t:	0
Street of :	81150 SEARS RD		
Street of1:	81150 SEARS RD		
Last updt :	12/03/2007	Last updt1:	jefferjw
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.86895		
Newlong:	-123.01375		
Site id:	ORI400000002550		

2
South
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001524**

Logid:	LANE 22027	Lstupdate:	Not Reported
Estabiby:	MARC NORTON	Xysource:	GPS
Horizerr:	10	Sourceorg:	OWRD
Sourceowrd:	GWATER		
Welltag:	0		
Sownum:	476	Obswell:	C
Recwell:	N	Obsflagall:	SC
Lsdelev:	587	Site id:	ORW400000001524

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: OR Radon

Radon Test Results

Zipcode	Num Tests	Maximum	Minimum	Average	# > 4 pCi/L
97426	3	1.9	0.3	0.9	0

Federal EPA Radon Zone for LANE County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for LANE COUNTY, OR

Number of sites tested: 19

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area	0.850 pCi/L	100%	0%	0%
Basement	1.360 pCi/L	88%	12%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory Data
Source: Oregon Geospatial Enterprise Office
Telephone: 503-378-2166

HYDROGEOLOGIC INFORMATION

AQUIFLOW^R Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Data
Source: Department of Water Resources
Telephone: 503-986-0843

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Locations
Source: Department of Geology and Mineral Industries
Telephone: 971-673-1540
A listing of oil and gas well locations in the state.

RADON

State Database: OR Radon
Source: Oregon Health Services
Telephone: 503-731-4272
Radon Levels in Orgeon

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

Site C3B
Delight Valley School Rd
Creswell, OR 97426

Inquiry Number: 3118160.18s
July 08, 2011

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

FORM-BPF-ASH

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

DELIGHT VALLEY SCHOOL RD
CRESWELL, OR 97426

COORDINATES

Latitude (North):	43.854500 - 43° 51' 16.2"
Longitude (West):	123.029400 - 123° 1' 45.8"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	497637.1
UTM Y (Meters):	4855497.0
Elevation:	584 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	43123-G1 COTTAGE GROVE, OR
Most Recent Revision:	1984

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	2006, 2005
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL________________________ National Priority List

EXECUTIVE SUMMARY

Proposed NPL................ Proposed National Priority List Sites
NPL LIENS.................. Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL................ National Priority List Deletions

Federal CERCLIS list

CERCLIS.................... Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY.......... Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP................ CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS.................. Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF................. RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG.................. RCRA - Large Quantity Generators
RCRA-SQG.................. RCRA - Small Quantity Generators

Federal institutional controls / engineering controls registries

US ENG CONTROLS.......... Engineering Controls Sites List
US INST CONTROL.......... Sites with Institutional Controls

Federal ERNS list

ERNS....................... Emergency Response Notification System

State- and tribal - equivalent CERCLIS

OR CRL..................... Confirmed Release List and Inventory

State and tribal landfill and/or solid waste disposal site lists

SWF/LF..................... Solid Waste Facilities List

State and tribal leaking storage tank lists

INDIAN LUST................ Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

INDIAN UST................. Underground Storage Tanks on Indian Land
FEMA UST................... Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

ENG CONTROLS.............. Engineering Controls Recorded at ESCI Sites

EXECUTIVE SUMMARY

INST CONTROL	Institutional Controls Recorded at ESCI Sites

State and tribal voluntary cleanup sites

VCP	Voluntary Cleanup Program Sites
INDIAN VCP	Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS	Brownfields Projects

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS	A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
HIST LF	Old Closed SW Disposal Sites
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL	Clandestine Drug Labs
AOCONCERN	Columbia Slough
CDL	Uninhabitable Drug Lab Properties
US HIST CDL	National Clandestine Laboratory Register

Local Land Records

LIENS 2	CERCLA Lien Information
LUCIS	Land Use Control Information System

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	Spill Database

Other Ascertainable Records

DOT OPS	Incident and Accident Data
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

EXECUTIVE SUMMARY

HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
RAATS	RCRA Administrative Action Tracking System
UIC	Underground Injection Control Program Database
MANIFEST	Manifest Information
OR HAZMAT	Hazmat/Incidents
DRYCLEANERS	Drycleaning Facilities
NPDES	Wastewater Permits Database
AIRS	Oregon Title V Facility Listing
HSIS	Hazardous Substance Information Survey
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER	PCB Transformer Registration Database
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
COAL ASH DOE	Sleam-Electric Plan Operation Data
FINANCIAL ASSURANCE	Financial Assurance Information Listing
COAL ASH	Coal Ash Disposal Sites Listing

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal RCRA generators list

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 03/11/2011 has revealed that there is 1 RCRA-CESQG site within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
J D RINALDI FABRICATORS INC	***80996 N PACIFIC HWY # 9***	***W 1/2 - 1 (0.504 mi.)***	***5***	***11***

State- and tribal - equivalent NPL

ECSI: The Environmental Cleanup Site Information System records information about sites in Oregon that may be of environmental interest. The data come from the Department of Environmental Quality.

A review of the ECSI list, as provided by EDR, and dated 06/01/2011 has revealed that there is 1 ECSI site within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
COTTAGE GROVE-EUGENE SPORTSMAN	81078 NORTH PACIFIC HIG	WNW 1/4 - 1/2 (0.457 mi.)	A3	7

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environmental Quality's LUST Database List.

A review of the LUST list, as provided by EDR, and dated 04/01/2011 has revealed that there is 1 LUST site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
GREEN RIVER LUMBER Cleanup Complete: 11/30/1999	80616 DAVIDSON RD	WSW 1/4 - 1/2 (0.412 mi.)	2	7

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Quality's UST List on Disk.

A review of the UST list, as provided by EDR, and dated 04/01/2011 has revealed that there is 1 UST site within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
GREEN RIVER LUMBER	80616 DAVISSON RD	WSW 1/2 - 1 (0.554 mi.)	6	16

EXECUTIVE SUMMARY

AST: The Aboveground Storage Tank database contains registered ASTs. The data comes from the list of ASTs reported to the Office of State Fire Marshal.

A review of the AST list, as provided by EDR, and dated 12/01/2010 has revealed that there is 1 AST site within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
J D RINALDI FABRICATORS INC	***80996 N PACIFIC HWY # 9***	***W 1/2 - 1 (0.504 mi.)***	***5***	***11***

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

RCRA-NonGen: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA-NonGen list, as provided by EDR, and dated 03/11/2011 has revealed that there is 1 RCRA-NonGen site within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
COTTAGE GROVE-EUGENE SPORTSMAN	81078 N PACIFIC HWY	WNW 1/4 - 1/2 (0.457 mi.)	A4	10

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 04/14/2010 has revealed that there is 1 FINDS site within approximately 0.5 miles of the target property.

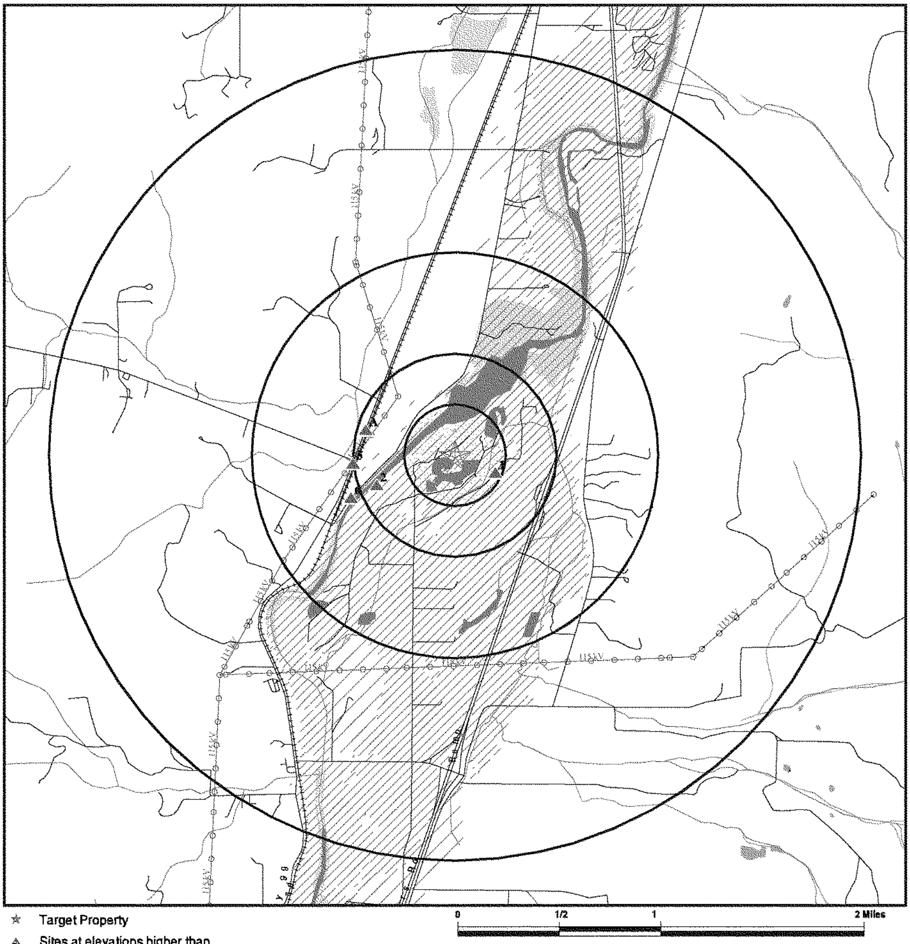
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SAGINAW DISPOSAL SITE	80460 DELIGHT VALLEY SC	ESE 1/8 - 1/4 (0.217 mi.)	1	7

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 27 records.

Site Name	Database(s)
KENNER INC	MANIFEST
COTTAGE GROVE INDUSTRIAL PARK	ECSI
USDA FS UMPQUA NF: CHAMPION MINE	CERCLIS
UPPER ROW RIVER WATERSHED	CERCLIS
PLAZA CLEANERS	DRYCLEANERS
WEYERHAEUSER-COTTAGE GROV	LUST
COTTAGE GROVE ROAD MAINT.	LUST
MOSBY CREEK MILL SITE	LUST
LONE PINE MARKET	LUST, UST
LANE COUNTY	UST
COTTAGE GROVE TRANSFER STATION	UST
A&G AUTO RECYCLING, INC.	RCRA-NonGen
PGT WALKER MT MICROWAVE SITE	RCRA-NonGen, FINDS
AUTO CARE NORTHWEST	RCRA-CESQG, FINDS
ODOT - GETTINGS CREEK REST AREA	FINDS, NPDES
I 5 EXIT 173 S	OR HAZMAT
I 5 SB & MP	OR HAZMAT
I 5 SBMP	OR HAZMAT
I 5 MP	OR HAZMAT
I 5 SBMP 170	OR HAZMAT
1320 HWY 99 N	OR HAZMAT
I 5 M & P 182	OR HAZMAT
MCKENZIE HWY 126E MP 49	OR HAZMAT
KIMWOOD CORP	HSIS
RIVER WALK SUBDIVISION	NPDES
WEYERHAEUSER COMPANY-COTTAGE GROVE	NPDES
A & G AUTO RECYCLING	NPDES

OVERVIEW MAP - 3118160.18s

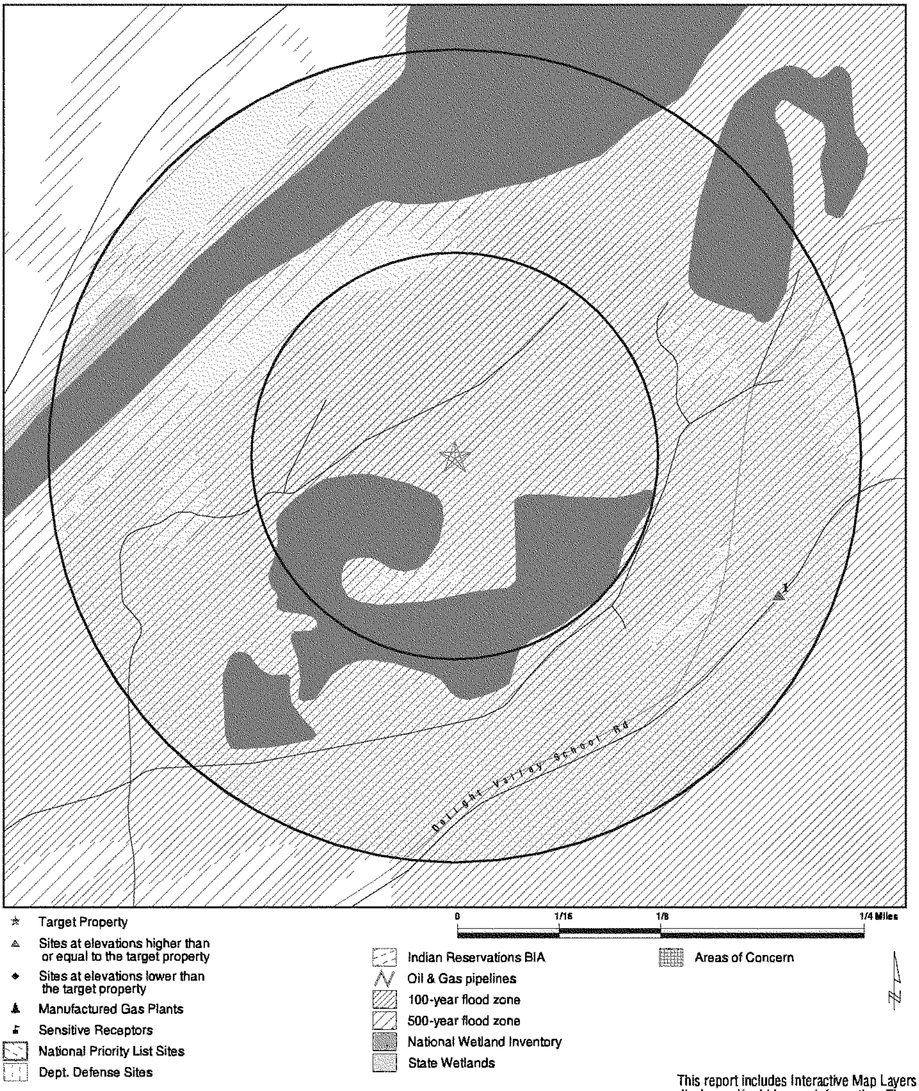


- ☆ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Manufactured Gas Plants
- ▨ National Priority List Sites
- ▨ Dept. Defense Sites
- ▨ Indian Reservations BIA
- ∕∕ Power transmission lines
- ∕∕ Oil & Gas pipelines
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- ■ National Wetland Inventory
- ▨ State Wetlands
- ▦ Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Site C3B	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Delight Valley School Rd Creswell OR 97426	CONTACT:	Merri Martz
		INQUIRY #:	3118160.18s
LAT/LONG:	43.8545 / 123.0294	DATE:	July 08, 2011 10:28 am

DETAIL MAP - 3118160.18s



This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Site C3B ADDRESS: Delight Valley School Rd Creswell OR 97426 LAT/LONG: 43.8545 / 123.0294	CLIENT: Tetra Tech EM, Inc. CONTACT: Merri Martz INQUIRY #: 3118160.18s DATE: July 08, 2011 10:28 am

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.500	0	0	0	0	0	0
Proposed NPL		1.500	0	0	0	0	0	0
NPL LIENS		0.500	0	0	0	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.500	0	0	0	0	0	0
Federal CERCLIS list								
CERCLIS		1.000	0	0	0	0	NR	0
FEDERAL FACILITY		1.500	0	0	0	0	0	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		1.000	0	0	0	0	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS		1.500	0	0	0	0	0	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		1.000	0	0	0	0	NR	0
Federal RCRA generators list								
RCRA-LQG		0.750	0	0	0	0	NR	0
RCRA-SQG		0.750	0	0	0	0	NR	0
RCRA-CESQG		0.750	0	0	0	1	NR	1
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		1.000	0	0	0	0	NR	0
US INST CONTROL		1.000	0	0	0	0	NR	0
Federal ERNS list								
ERNS		0.500	0	0	0	NR	NR	0
State- and tribal - equivalent NPL								
ECSI		1.500	0	0	1	0	0	1
State- and tribal - equivalent CERCLIS								
OR CRL		1.000	0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		1.000	0	0	0	0	NR	0
State and tribal leaking storage tank lists								
LUST		1.000	0	0	1	0	NR	1
INDIAN LUST		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
State and tribal registered storage tank lists								
UST		0.750	0	0	0	1	NR	1
AST		0.750	0	0	0	1	NR	1
INDIAN UST		0.750	0	0	0	0	NR	0
FEMA UST		0.750	0	0	0	0	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS		1.000	0	0	0	0	NR	0
INST CONTROL		1.000	0	0	0	0	NR	0
State and tribal voluntary cleanup sites								
VCP		1.000	0	0	0	0	NR	0
INDIAN VCP		1.000	0	0	0	0	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		1.000	0	0	0	0	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		1.000	0	0	0	0	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9		1.000	0	0	0	0	NR	0
ODI		1.000	0	0	0	0	NR	0
HIST LF		1.000	0	0	0	0	NR	0
INDIAN ODI		1.000	0	0	0	0	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		0.500	0	0	0	NR	NR	0
AOCONCERN		1.500	0	0	0	0	0	0
CDL		0.500	0	0	0	NR	NR	0
US HIST CDL		0.500	0	0	0	NR	NR	0
Local Land Records								
LIENS 2		0.500	0	0	0	NR	NR	0
LUCIS		1.000	0	0	0	0	NR	0
Records of Emergency Release Reports								
HMIRS		0.500	0	0	0	NR	NR	0
SPILLS		0.500	0	0	0	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.750	0	0	1	0	NR	1
DOT OPS		0.500	0	0	0	NR	NR	0
DOD		1.500	0	0	0	0	0	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FUDS		1.500	0	0	0	0	0	0
CONSENT		1.500	0	0	0	0	0	0
ROD		1.500	0	0	0	0	0	0
UMTRA		1.000	0	0	0	0	NR	0
MINES		0.750	0	0	0	0	NR	0
TRIS		0.500	0	0	0	NR	NR	0
TSCA		0.500	0	0	0	NR	NR	0
FTTS		0.500	0	0	0	NR	NR	0
HIST FTTS		0.500	0	0	0	NR	NR	0
SSTS		0.500	0	0	0	NR	NR	0
ICIS		0.500	0	0	0	NR	NR	0
PADS		0.500	0	0	0	NR	NR	0
MLTS		0.500	0	0	0	NR	NR	0
RADINFO		0.500	0	0	0	NR	NR	0
FINDS		0.500	0	1	0	NR	NR	1
RAATS		0.500	0	0	0	NR	NR	0
UIC		0.500	0	0	0	NR	NR	0
MANIFEST		0.750	0	0	0	0	NR	0
OR HAZMAT		0.500	0	0	0	NR	NR	0
DRYCLEANERS		0.750	0	0	0	0	NR	0
NPDES		0.500	0	0	0	NR	NR	0
AIRS		0.500	0	0	0	NR	NR	0
HSIS		0.500	0	0	0	NR	NR	0
INDIAN RESERV		1.500	0	0	0	0	0	0
SCRD DRYCLEANERS		1.000	0	0	0	0	NR	0
PCB TRANSFORMER		0.500	0	0	0	NR	NR	0
COAL ASH EPA		1.000	0	0	0	0	NR	0
COAL ASH DOE		0.500	0	0	0	NR	NR	0
FINANCIAL ASSURANCE		0.500	0	0	0	NR	NR	0
COAL ASH		1.000	0	0	0	0	NR	0
EDR PROPRIETARY RECORDS								
EDR Proprietary Records								
Manufactured Gas Plants		1.500	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1
ESE
1/8-1/4
0.217 mi.
1148 ft.

SAGINAW DISPOSAL SITE
80460 DELIGHT VALLEY SCH RD
COTTAGE GROVE, OR 97424

FINDS **1006852439**
N/A

Relative:
Equal

Actual:
584 ft.

FINDS:

Registry ID: 110014144666

Environmental Interest/Information System
OR-DEQ (Oregon - Department Of Environmental Quality) is a regulatory agency whose job is to protect the quality of Oregon's Environment. DEQ uses a combination of technical assistance, inspections and permitting to help public and private facilities and citizens understand and comply with state and federal environmental regulations.

2
WSW
1/4-1/2
0.412 mi.
2177 ft.

GREEN RIVER LUMBER
80616 DAVIDSON RD
CRESWELL, OR 97426

LUST **S104024512**
N/A

Relative:
Equal

Actual:
584 ft.

LUST:
Region: Western Region
Facility ID: 20-99-7058
Cleanup Received Date: 09/13/1999
Cleanup Start Date: 09/13/1999
Cleanup Complete Date: 11/30/1999

A3
WNW
1/4-1/2
0.457 mi.
2412 ft.

COTTAGE GROVE-EUGENE SPORTSMAN'S CLUB
81078 NORTH PACIFIC HIGHWAY
CRESWELL, OR 97426

ECSI **S110764031**
N/A

Site 1 of 2 in cluster A

Relative:
Higher

Actual:
589 ft.

OR ECSI:

State ID Number:	5427	Brown ID:	0
Study Area:	False	Region ID:	3
Legislatve ID:	0	Investigation ID:	208
FACA ID:	115343	Further Action:	258
Lat/Long (dms):	43 51 50.40 / -123 2 4.20	County Code:	20.00
Score Value:	Not reported	Cerclis ID:	Not reported
Township Coord.:	20.00	Township Zone:	S
Range Coord:	3.00	Range Zone:	W
Section Coord:	3	Qtr Section:	Not reported
Tax Lots:	Not reported	Size:	Not reported
NPL:	False	Orphan:	False
Updated By:	GWISTAR	Update Date:	03/25/2011
Alias Name:	Not reported		

OR ECSI HAZARDOUS RELEASE:
Substance ID.: Not reported
Haz Release ID: Not reported
Qty Released: Not reported
Date Released: Not reported
Update Date: Not reported

COTTAGE GROVE-EUGENE SPORTSMAN'S CLUB (Continued) **S110764031**

Update By: Not reported
Substance Code: Not reported
Substance Name: Not reported
Substance Abbrev.: Not reported
Substance Category ID: Not reported
Substance Category: Not reported
Category Level: Not reported
Created By: Not reported
Created Date: Not reported
Substance Category ID: Not reported
Substance Category: Not reported
Category Level: Not reported
Created By: Not reported
Created Date: Not reported
Substance Alias ID: Not reported
Sub Alias Name: Not reported
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

OR ECSI NARR:
NARR ID: 5752502
NARR Code: Contamination
Created By: SSADOFS
Created Date: 10/13/2010
Updated By: SSADOFS
Updated Date: 10/13/2010
NARR Comments:The Club claims that they have been periodically recovering shot and bullets from the shooting range, but it is likely that significant quantities of lead and/or arsenic are present on areas of the site that have not been subject to recovery or have leached between recovery events. There is no record of confirmation sampling to determine if recovery is successful.

NARR ID: 5752504
NARR Code: Hazardous Substance/Waste Types
Created By: SSADOFS
Created Date: 10/13/2010
Updated By: SSADOFS
Updated Date: 10/13/2010
NARR Comments:Lead shot, possibly also bullets.

COTTAGE GROVE-EUGENE SPORTSMAN'S CLUB (Continued) **S110764031**

NARR ID: 5752505
NARR Code: Manner of Release
Created By: SSADOFS
Created Date: 10/13/2010
Updated By: SSADOFS
Updated Date: 10/13/2010
NARR Comments:Shooting range

NARR ID: 5752506
NARR Code: Substances of Concern
Created By: SSADOFS
Created Date: 10/13/2010
Updated By: SSADOFS
Updated Date: 10/13/2010
NARR Comments:Lead and Arsenic

NARR ID: 5752503
NARR Code: Site History
Created By: SSADOFS
Created Date: 10/13/2010
Updated By: SSADOFS
Updated Date: 10/13/2010
NARR Comments:The Cottage-Grove Eugene Sportsmen's Club has been operating at this site since the 1960's.

OR ECSI SITE CONTROL:
Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported
Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:
Permit Agency: Not reported
Permit Number: Not reported
Permit Type: Not reported
Comments: Not reported

OR ECSI Administrative Action:

Admin ID:	738046	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	10/13/2010	Complete Date:	10/13/2010
Substance Code:	Not reported	Rank Value:	Not reported
Employee Id:	2843	Cleanup Flag:	False
Created By:	SSADOFS	Created Date:	10/13/2010
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	738047	Action ID:	9508
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	10/13/2010	Complete Date:	Not reported

COTTAGE GROVE-EUGENE SPORTSMAN'S CLUB (Continued) **S110764031**

Substance Code: SAS
Employee Id: 2843
Created By: SSADOFS
Action Code: RSSC
Action Flag: True
Action: Site Screening recommended (EV)
Further Action: Medium
Comments: Not reported

Rank Value: Not reported
Cleanup Flag: False
Created Date: 10/13/2010
Category: Remedial Action
Action Code Flag: False

OR ECSI OPERATIONS:
Operation Id: Not reported
Operation Status: Not reported
Common Name: Not reported
Yrs of Operation: Not reported
Comments: Not reported
Updated Date: Not reported
Operations SIC Id: Not reported
SIC Code: Not reported
Created By: Not reported
Created Date: Not reported

A4 **WNW** **1/4-1/2** **0.457 mi.** **2412 ft.**	**COTTAGE GROVE-EUGENE SPORTSMANS CLUB** **81078 N PACIFIC HWY** **CRESWELL, OR 97426** **Site 2 of 2 in cluster A**	**RCRA-NonGen**	**1014400724** **ORSTATE08483**

Relative:
Higher

Actual:
589 ft.

RCRA-NonGen:
Date form received by agency: 05/04/2010
Facility name: COTTAGE GROVE-EUGENE SPORTSMANS CLUB
Facility address: 81078 N PACIFIC HWY
CRESWELL, OR 97426-9337
EPA ID: ORSTATE08483
Contact: Not reported
Contact address: Not reported
Not reported
Contact country: Not reported
Contact telephone: Not reported
Contact email: Not reported
EPA Region: 10
Land type: Other land type
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No

COTTAGE GROVE-EUGENE SPORTSMANS CLUB (Continued) **1014400724**

Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 12/07/2010
Evaluation: COMPLIANCE ASSISTANCE VISIT
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 06/22/2010
Evaluation: COMPLIANCE ASSISTANCE VISIT
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/06/2010
Evaluation: COMPLIANCE ASSISTANCE VISIT
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

5
West
1/2-1
0.504 mi.
2663 ft.

Relative:
Higher

Actual:
592 ft.

J D RINALDI FABRICATORS INC
80996 N PACIFIC HWY # 99
CRESWELL, OR 97426

RCRA-CESQG
FINDS
AST
HSIS

1001203345
ORQ000006841

RCRA-CESQG:
Date form received by agency: 12/31/2003
Facility name: J D RINALDI FABRICATORS INC
Facility address: 80996 N PACIFIC HWY # 99
CRESWELL, OR 97426-9337
EPA ID: ORQ000006841
Mailing address: PO BOX 208
CRESWELL, OR 97426
Contact: DUANE PRATER
Contact address: PO BOX 208
CRESWELL, OR 97426
Contact country: US
Contact telephone: 541 686-1331
Contact email: Not reported
EPA Region: 10
Land type: Private
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of

J D RINALDI FABRICATORS INC (Continued) **1001203345**

any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name:	J D RINALDI FABRICATORS INC
Owner/operator address:	PO BOX 208 CRESWELL, OR 97426
Owner/operator country:	US
Owner/operator telephone:	(541) 686-1331
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	07/28/1997
Owner/Op end date:	Not reported
Owner/operator name:	J.D. RINALDI FABRICATORS, INC.
Owner/operator address:	P.O. BOX 208 CRESWELL, OR 97426
Owner/operator country:	US
Owner/operator telephone:	(541)686-1331
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	10/01/1974
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Historical Generators:

Date form received by agency:	01/10/2003
Facility name:	J D RINALDI FABRICATORS INC
Classification:	Conditionally Exempt Small Quantity Generator
Date form received by agency:	02/25/2002
Facility name:	J D RINALDI FABRICATORS INC
Classification:	Conditionally Exempt Small Quantity Generator
Date form received by agency:	01/22/2001
Facility name:	J D RINALDI FABRICATORS INC
Classification:	Small Quantity Generator
Date form received by agency:	01/14/2000

J D RINALDI FABRICATORS INC (Continued) **1001203345**

Facility name: J D RINALDI FABRICATORS INC
Classification: Small Quantity Generator

Date form received by agency: 01/27/1999
Facility name: J D RINALDI FABRICATORS INC
Classification: Small Quantity Generator

Date form received by agency: 05/18/1998
Facility name: J D RINALDI FABRICATORS INC
Classification: Small Quantity Generator

Date form received by agency: 07/28/1997
Facility name: J D RINALDI FABRICATORS INC
Classification: Small Quantity Generator

Hazardous Waste Summary:
Waste code: NA
Waste name: NA

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 07/10/2003
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

FINDS:

Registry ID: 110006115765

Environmental Interest/Information System

OR-DEQ (Oregon - Department Of Environmental Quality) is a regulatory agency whose job is to protect the quality of Oregon's Environment. DEQ uses a combination of technical assistance, inspections and permitting to help public and private facilities and citizens understand and comply with state and federal environmental regulations.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

AST:
Facility Id: 002431
Hazardous Substance: GASOLINE
Reporting Quantities: 200-499
Quantity Units: GALLONS
Physical State: LIQUID
Storage 1: ABOVEGROUND TANK

J D RINALDI FABRICATORS INC (Continued) **1001203345**

Facility Id:	002431
Hazardous Substance:	TOLUENE
Reporting Quantities:	200-499
Quantity Units:	GALLONS
Physical State:	LIQUID
Storage 1:	ABOVEGROUND TANK
Storage 2:	STEEL DRUM

HSIS:

Facility Id:	002431
Physical State Of The Substance:	2
Physical State:	LIQUID
Average Amount Possessed During The Year Code:	10
Maximum Amount Possessed During The Year Code:	10
Chemical Trade Name:	GASOLINE
Applicable Unit Of Measure Code:	2
Description Of The Unit Of Measure:	GALLONS
Type Code:	A
Description:	ABOVEGROUND TANK
Type Code:	Not reported
Temperature Description:	Not reported
Pressure of Code:	1
Pressure Description:	NORMAL PRESSURE
Pressure of Code:	Not reported
Pressure Description:	Not reported
Temperature Description:	4
Temperature of The Hazardous Substance Code:	N
Temperature Description:	Not reported
Temperature of The Hazardous Substance Code:	Not reported
Days Hazardous Substance On Site During Year:	365
Is The Substance Protected A Trade Secret:	False
Description Of The Max Qnty Code:	200-499
Description Of The Avg Qnty Code:	200-499
Most Hazardous Ingridient:	PETROLEUM DISTILLATES
United Nations/north America 4 Digit Class Number:	1203
Hazard Rank:	2
Chemical Abstract Service Identifier Number:	8006619
Is Substance Pure Or Mixture:	Mixture
Chemical Is Extremely Hazardous Substance (EHS):	Not reported
First Hazardous Class Code For Chemical:	3.0
Second Hazardous Class Code For Chemical:	6.3
Third Hazardous Class Code For Chemical:	6.4
Hazard Class 1 Of The Chemical:	Flammable and Combustible Liquid
Hazard Class 2 Of The Chemical:	Acute Health Hazard
Hazard Class 3 Of The Chemical:	Chronic Health Hazard
Chemical Is A Toxic 313 Chemical:	No
EPA Pesticide Registration Number:	Not reported
Department Or Division Of Company:	Not reported
Facility Has Written Emergency Plan:	Yes
Does The Chemical Contain A 112r Chemical:	No
Contains 112R:	No
Contains EHS:	No
Fertilizer:	No
Pesticide:	No
Contains 313:	Yes
NAICS Code 1:	332312
NAICS Desc 1:	FABRICATED STRUCTURAL MTL MFG

J D RINALDI FABRICATORS INC (Continued) **1001203345**

NAICS Code 2: 000000
NAICS Desc 2: Not reported
Company Name: J D RINALDI FABRICATORS
Manager Name: JOHN RINALDI JR
Business Phone: 5416861331
Mailing Address: PO BOX 208
Mailing City,St,Zip: CRESWELL, OR 97426
No. of Employees: 25
Day Phone: 5416861331
Placard: No
Fire Dept Code: 0543
Sprinkler System: Yes
Emergency Contact: DUANE PRATER
Emergency Procedure: ENTRY MACHINE SHOP & LUNCH RM
Business Type: STEEL FABRICATOR

Facility Id: 002431
Physical State Of The Substance: 2
Physical State: LIQUID
Average Amount Possessed During The Year Code: 10
Maximum Amount Possessed During The Year Code: 10
Chemical Trade Name: TOLUENE
Applicable Unit Of Measure Code: 2
Description Of The Unit Of Measure: GALLONS
Type Code: A
Description: ABOVEGROUND TANK
Type Code: D
Temperature Description: STEEL DRUM
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Pressure of Code: 1
Pressure Description: NORMAL PRESSURE
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Temperature Description: 4
Temperature of The Hazardous Substance Code: N
Days Hazardous Substance On Site During Year: 365
Is The Substance Protected A Trade Secret: False
Description Of The Max Qnty Code: 200-499
Description Of The Avg Qnty Code: 200-499
Most Hazardous Ingridient: TOLUENE
United Nations/north America 4 Digit Class Number: 1294
Hazard Rank: 2
Chemical Abstract Service Identifier Number: 108883
Is Substance Pure Or Mixture: Pure
Chemical Is Extremely Hazardous Substance (EHS): Not reported
First Hazardous Class Code For Chemical: 3.0
Second Hazardous Class Code For Chemical: 6.3
Third Hazardous Class Code For Chemical: 6.4
Hazard Class 1 Of The Chemical: Flammable and Combustible Liquid
Hazard Class 2 Of The Chemical: Acute Health Hazard
Hazard Class 3 Of The Chemical: Chronic Health Hazard
Chemical Is A Toxic 313 Chemical: Yes
EPA Pesticide Registration Number: Not reported
Department Or Division Of Company: Not reported
Facility Has Written Emergency Plan: Yes
Does The Chemical Contain A 112r Chemical: No

J D RINALDI FABRICATORS INC (Continued) **1001203345**

Contains 112R:	No
Contains EHS:	No
Fertilizer:	Not reported
Pesticide:	Not reported
Contains 313:	No
NAICS Code 1:	332312
NAICS Desc 1:	FABRICATED STRUCTURAL MTL MFG
NAICS Code 2:	000000
NAICS Desc 2:	Not reported
Company Name:	J D RINALDI FABRICATORS
Manager Name:	JOHN RINALDI JR
Business Phone:	5416861331
Mailing Address:	PO BOX 208
Mailing City,St,Zip:	CRESWELL, OR 97426
No. of Employees:	25
Day Phone:	5416861331
Placard:	No
Fire Dept Code:	0543
Sprinkler System:	Yes
Emergency Contact:	DUANE PRATER
Emergency Procedure:	ENTRY MACHINE SHOP & LUNCH RM
Business Type:	STEEL FABRICATOR

6
WSW
1/2-1
0.554 mi.
2923 ft.

GREEN RIVER LUMBER
80616 DAVISSON RD
CRESWELL, OR 97426

UST **U000435793**
N/A

Relative:
Higher

Actual:
585 ft.

UST:

Facility ID:	3028
Facility Telephone:	(503) 942-0542
Permittee Name:	JERRY ARNEY, VP
Number of Permitted Tanks:	Not reported
Active Tanks:	Not reported
Decommissioned Tanks:	1
Number of Tanks:	1

Count: 27 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
COTTAGE GROVE	S105527273		I 5 EXIT 173 S	97424	OR HAZMAT
COTTAGE GROVE	S108390796		I 5 SB & MP	97424	OR HAZMAT
COTTAGE GROVE	S108390801		I 5 SBMP	97424	OR HAZMAT
COTTAGE GROVE	S108390782		I 5 MP	97424	OR HAZMAT
COTTAGE GROVE	S108390798		I 5 SBMP 170	97424	OR HAZMAT
COTTAGE GROVE	1007693566	ODOT - GETTINGS CREEK REST AREA	I 5 NORTHBOUNDMILEPOST 1782	97424	FINDS, NPDES
COTTAGE GROVE	S105523991		1320 HWY 99 N	97424	OR HAZMAT
COTTAGE GROVE	S109052457	RIVER WALK SUBDIVISION	HWY 99 S & HARRISON AVE	97424	NPDES
COTTAGE GROVE	S104791370	PLAZA CLEANERS	1441 HWY 99 N	97424	DRYCLEANERS
COTTAGE GROVE	S108572030	WEYERHAEUSER-COTTAGE GROV	HWY 99S	97424	LUST
COTTAGE GROVE	S110948072	KENNER INC	80179 DELIGHT VLY	97424	MANIFEST
COTTAGE GROVE	S104055297	KIMWOOD CORP	77684 S HWY 99	97424	HSIS
COTTAGE GROVE	S108169730	COTTAGE GROVE INDUSTRIAL PARK	S HWY 99	97424	ECSI
COTTAGE GROVE	U000435755	LANE COUNTY	LANE SEARS DELIGHT VLY	97424	UST
COTTAGE GROVE	S102076518	COTTAGE GROVE ROAD MAINT.	LANE SEARS DELIGHT VLY	97424	LUST
COTTAGE GROVE	S104189491	MOSBY CREEK MILL SITE	LAYNG RD	97424	LUST
COTTAGE GROVE	S108663550	WEYERHAEUSER COMPANY-COTTAGE GROVE	77629 S PACIFIC HWY	97424	NPDES
COTTAGE GROVE	1012210110	USDA FS UMPQUA NF: CHAMPION MINE	T23S R1E SEC13	97424	CERCLIS
COTTAGE GROVE	U000435738	COTTAGE GROVE TRANSFER STATION	SEARS RD	97424	UST
COTTAGE GROVE	1008377459	UPPER ROW RIVER WATERSHED	T21S,T22S,T23S,R1W,R1E,R2E	97424	CERCLIS
CRESWELL	S105523999		I 5 M & P 182	97426	OR HAZMAT
CRESWELL	1011863673	A&G AUTO RECYCLING, INC.	80760 HIGHWAY 99 N	97426	RCRA-NonGen
CRESWELL	S110048214	A & G AUTO RECYCLING	80760 HWY 99 N	97426	NPDES
CRESWELL	U000435795	LONE PINE MARKET	82442 HWY 99N	97426	LUST, UST
CRESWELL	1004771214	AUTO CARE NORTHWEST	5 WEST F ST BAYS 3 & 4	97426	RCRA-CESQG, FINDS
LANE COUNTY	S109577609		MCKENZIE HWY 126E MP 49		OR HAZMAT
WALKER MOUNTAIN	1000252060	PGT WALKER MT MICROWAVE SITE	SEC 24 T26S R8E WM	97426	RCRA-NonGen, FINDS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 05/16/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPAa??s Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010
Date Data Arrived at EDR: 01/11/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/15/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/09/2011
Date Data Arrived at EDR: 03/15/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 91

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 05/16/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List
A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/16/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/25/2011	Telephone: 703-603-0695
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 81	Next Scheduled EDR Contact: 09/26/2011
	Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls
A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/16/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/25/2011	Telephone: 703-603-0695
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 81	Next Scheduled EDR Contact: 09/26/2011
	Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 04/05/2011	Source: National Response Center, United States Coast Guard
Date Data Arrived at EDR: 04/05/2011	Telephone: 202-267-2180
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 07/05/2011
Number of Days to Update: 70	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Annually

State- and tribal - equivalent NPL

ECSI: Environmental Cleanup Site Information System
Sites that are or may be contaminated and may require cleanup.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/03/2011	Telephone: 503-229-6629
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/03/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

CRL: Confirmed Release List and Inventory
All facilities with a confirmed release.

Date of Government Version: 05/24/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 05/25/2011	Telephone: 503-229-6170
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 05/25/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 09/05/2011
	Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Facilities List

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 06/13/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/15/2011	Telephone: 503-229-6299
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 15	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Semi-Annually

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 04/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 05/25/2011	Telephone: 503-229-5790
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 05/25/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 09/05/2011
	Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/31/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 02/01/2011	Telephone: 415-972-3372
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 48	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 03/03/2011	Source: EPA Region 4
Date Data Arrived at EDR: 03/18/2011	Telephone: 404-562-8677
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 45	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 05/17/2011	Source: EPA Region 10
Date Data Arrived at EDR: 05/19/2011	Telephone: 206-553-2857
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 26	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 03/07/2011	Source: EPA Region 1
Date Data Arrived at EDR: 05/20/2011	Telephone: 617-918-1313
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/03/2011
Number of Days to Update: 25	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 11/04/2009
Date Data Arrived at EDR: 05/04/2010
Date Made Active in Reports: 07/07/2010
Number of Days to Update: 64

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/04/2010
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/16/2011
Date Data Arrived at EDR: 05/17/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 28

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 04/01/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/29/2011
Number of Days to Update: 35

Source: Department of Environmental Quality
Telephone: 503-229-5815
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Quarterly

AST: Aboveground Storage Tanks
Aboveground storage tank locations reported to the Office of State Fire Marshal.

Date of Government Version: 12/01/2010
Date Data Arrived at EDR: 01/25/2011
Date Made Active in Reports: 02/24/2011
Number of Days to Update: 30

Source: Office of State Fire Marshal
Telephone: 503-378-3473
Last EDR Contact: 05/13/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Semi-Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 03/03/2011
Date Data Arrived at EDR: 03/18/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 45

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 05/18/2011
Date Data Arrived at EDR: 05/26/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 19

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 05/16/2011
Date Data Arrived at EDR: 05/17/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 28

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 05/17/2011
Date Data Arrived at EDR: 05/19/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 26

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 05/04/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 41

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/03/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 01/01/2011
Date Data Arrived at EDR: 02/23/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 68

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/01/2011	Source: EPA Region 7
Date Data Arrived at EDR: 06/01/2011	Telephone: 913-551-7003
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 02/03/2011
Number of Days to Update: 13	Next Scheduled EDR Contact: 05/16/2011
	Data Release Frequency: Varies

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010	Source: FEMA
Date Data Arrived at EDR: 02/16/2010	Telephone: 202-646-5797
Date Made Active in Reports: 04/12/2010	Last EDR Contact: 04/18/2011
Number of Days to Update: 55	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Recorded at ESCI Sites

Engineering controls are physical measures selected or approved by the Director for the purpose of preventing or minimizing exposure to hazardous substances. Engineering controls may include, but are not limited to, fencing, capping, horizontal or vertical barriers, hydraulic controls, and alternative water supplies.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/03/2011	Telephone: 503-229-5193
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/03/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Quarterly

INST CONTROL: Institutional Controls Recorded at ESCI Sites

An institutional control is a legal or administrative tool or action taken to reduce the potential for exposure to hazardous substances. Institutional controls may include, but are not limited to, use restrictions, environmental monitoring requirements, and site access and security measures.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/03/2011	Telephone: 503-229-5193
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/03/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

VCS: Voluntary Cleanup Program Sites

Responsible parties have entered into an agreement with DEQ to voluntarily address contamination associated with their property.

Date of Government Version: 04/22/2011	Source: DEQ
Date Data Arrived at EDR: 04/27/2011	Telephone: 503-229-5256
Date Made Active in Reports: 05/16/2011	Last EDR Contact: 04/11/2011
Number of Days to Update: 19	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 02/25/2011	Source: EPA, Region 1
Date Data Arrived at EDR: 04/05/2011	Telephone: 617-918-1102
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 07/05/2011
Number of Days to Update: 70	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Projects

Brownfields investigations and/or cleanups that have been conducted in Oregon.

Date of Government Version: 05/24/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 503-229-6801
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Semi-Annually

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 03/29/2011
Date Data Arrived at EDR: 03/29/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: No Update Planned

HIST LF: Old Closed SW Disposal Sites
A list of solid waste disposal sites that have been closed for a long while.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 07/08/2003
Date Made Active in Reports: 07/18/2003
Number of Days to Update: 10

Source: Department of Environmental Quality
Telephone: 503-229-5409
Last EDR Contact: 07/08/2003
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 05/09/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/02/2011
Date Data Arrived at EDR: 03/17/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 46

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 06/07/2011
Next Scheduled EDR Contact: 09/19/2011
Data Release Frequency: Quarterly

AOC MU: East Multnomah County Area
Approximate extent of TSA VOC plume February , 2002

Date of Government Version: N/A
Date Data Arrived at EDR: 10/07/2002
Date Made Active in Reports: 10/22/2002
Number of Days to Update: 15

Source: City of Portland Environmental Services
Telephone: 503-823-5310
Last EDR Contact: 03/13/2007
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

AOC COL: Columbia Slough
Columbia Slough waterway boundaries.

Date of Government Version: 08/10/2005
Date Data Arrived at EDR: 05/17/2006
Date Made Active in Reports: 06/16/2006
Number of Days to Update: 30

Source: City of Portland Environmental Services
Telephone: 503-823-5310
Last EDR Contact: 03/13/2007
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CDL 2: Clandestine Drug Lab Site Listing
A listing of clandestine drug lab site locations included in the Incident database.

Date of Government Version: 02/02/2011	Source: Oregon State Police
Date Data Arrived at EDR: 05/04/2011	Telephone: 503-373-1540
Date Made Active in Reports: 06/22/2011	Last EDR Contact: 05/04/2011
Number of Days to Update: 49	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

CDL: Uninhabitable Drug Lab Properties

The properties listed on these county pages have been declared by a law enforcement agency to be unfit for use due to meth lab and/or storage activities. The properties are considered uninhabitable until cleaned up by a state certified decontamination contractor and a certificate of fitness is issued by the Oregon Health Division.

Date of Government Version: 04/27/2011	Source: Department of Consumer & Business Services
Date Data Arrived at EDR: 05/27/2011	Telephone: 503-378-4133
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 11/24/2011
Number of Days to Update: 34	Next Scheduled EDR Contact: 09/05/2011
	Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007	Source: Drug Enforcement Administration
Date Data Arrived at EDR: 11/19/2008	Telephone: 202-307-1000
Date Made Active in Reports: 03/30/2009	Last EDR Contact: 03/23/2009
Number of Days to Update: 131	Next Scheduled EDR Contact: 06/22/2009
	Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/01/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 02/04/2011	Telephone: 202-564-6023
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 87	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005	Source: Department of the Navy
Date Data Arrived at EDR: 12/11/2006	Telephone: 843-820-7326
Date Made Active in Reports: 01/11/2007	Last EDR Contact: 06/21/2011
Number of Days to Update: 31	Next Scheduled EDR Contact: 09/05/2011
	Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2010	Source: U.S. Department of Transportation
Date Data Arrived at EDR: 01/05/2011	Telephone: 202-366-4555
Date Made Active in Reports: 02/25/2011	Last EDR Contact: 07/05/2011
Number of Days to Update: 51	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Annually

SPILLS: Spill Data
Oil and hazardous material spills reported to the Environmental Response Program.

Date of Government Version: 04/12/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 04/14/2011	Telephone: 503-229-5815
Date Made Active in Reports: 05/16/2011	Last EDR Contact: 04/11/2011
Number of Days to Update: 32	Next Scheduled EDR Contact: 07/04/2011
	Data Release Frequency: Semi-Annually

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/05/2011	Telephone: (206) 553-1200
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 07/07/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Varies

DOT OPS: Incident and Accident Data
Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/12/2011	Source: Department of Transporation, Office of Pipeline Safety
Date Data Arrived at EDR: 02/11/2011	Telephone: 202-366-4595
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/11/2011
Number of Days to Update: 80	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Varies

DOD: Department of Defense Sites
This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005	Source: USGS
Date Data Arrived at EDR: 11/10/2006	Telephone: 888-275-8747
Date Made Active in Reports: 01/11/2007	Last EDR Contact: 04/21/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites
The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009	Source: U.S. Army Corps of Engineers
Date Data Arrived at EDR: 08/12/2010	Telephone: 202-528-4285
Date Made Active in Reports: 12/02/2010	Last EDR Contact: 06/14/2011
Number of Days to Update: 112	Next Scheduled EDR Contact: 09/26/2011
	Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 70

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/16/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 5

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 06/15/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/21/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 99

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 06/02/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/08/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 06/08/2011
Next Scheduled EDR Contact: 09/19/2011
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/17/2010
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 94

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/30/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/07/2011
Date Data Arrived at EDR: 01/21/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 59

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/22/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/18/2010
Date Data Arrived at EDR: 04/06/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 51

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010
Date Data Arrived at EDR: 04/16/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 41

Source: EPA
Telephone: (206) 553-1200
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995	Source: EPA
Date Data Arrived at EDR: 07/03/1995	Telephone: 202-564-4104
Date Made Active in Reports: 08/07/1995	Last EDR Contact: 06/02/2008
Number of Days to Update: 35	Next Scheduled EDR Contact: 09/01/2008
	Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2009	Source: EPA/NTIS
Date Data Arrived at EDR: 03/01/2011	Telephone: 800-424-9346
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/27/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Biennially

UIC: Underground Injection Control Program Database

DEQ's Underground Injection Control Program is authorized by the Environmental Protection Agency (EPA) to regulate all underground injection in Oregon to protect groundwater resources.

Date of Government Version: 03/03/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 03/04/2011	Telephone: 503-229-5945
Date Made Active in Reports: 03/29/2011	Last EDR Contact: 07/05/2011
Number of Days to Update: 25	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Varies

OR MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009	Source: Department of Environmental Quality
Date Data Arrived at EDR: 09/08/2010	Telephone: N/A
Date Made Active in Reports: 10/15/2010	Last EDR Contact: 05/16/2011
Number of Days to Update: 37	Next Scheduled EDR Contact: 08/29/2011
	Data Release Frequency: Annually

HAZMAT: Hazmat/Incidents

Hazardous material incidents reported to the State Fire Marshal by emergency responders. The hazardous material may or may not have been released.

Date of Government Version: 02/02/2011	Source: State Fire Marshal's Office
Date Data Arrived at EDR: 05/04/2011	Telephone: 503-373-1540
Date Made Active in Reports: 06/22/2011	Last EDR Contact: 05/04/2011
Number of Days to Update: 49	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Semi-Annually

DRYCLEANERS: Drycleaning Facilities

A listing of registered drycleaning facilities in Oregon.

Date of Government Version: 02/07/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 02/09/2011	Telephone: 503-229-6783
Date Made Active in Reports: 02/23/2011	Last EDR Contact: 06/06/2011
Number of Days to Update: 14	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Varies

NPDES: Wastewater Permits Database

A listing of permitted wastewater facilities.

Date of Government Version: 05/10/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 05/12/2011	Telephone: 503-229-5657
Date Made Active in Reports: 06/22/2011	Last EDR Contact: 06/27/2011
Number of Days to Update: 41	Next Scheduled EDR Contact: 08/29/2011
	Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: Oregon Title V Facility Listing
A listing of Title V facility source and emissions information.

Date of Government Version: 12/31/2007	Source: Department of Environmental Quality
Date Data Arrived at EDR: 12/28/2009	Telephone: 503-229-6459
Date Made Active in Reports: 01/19/2010	Last EDR Contact: 06/20/2011
Number of Days to Update: 22	Next Scheduled EDR Contact: 09/19/2011
	Data Release Frequency: Varies

HSIS: Hazardous Substance Information Survey
Companies in Oregon submitting the Hazardous Substance Information Survey and either reporting or not reporting hazardous substances.

Date of Government Version: 12/01/2010	Source: State Fire Marshal's Office
Date Data Arrived at EDR: 01/25/2011	Telephone: 503-373-1540
Date Made Active in Reports: 02/24/2011	Last EDR Contact: 05/13/2011
Number of Days to Update: 30	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Semi-Annually

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005	Source: USGS
Date Data Arrived at EDR: 12/08/2006	Telephone: 202-208-3710
Date Made Active in Reports: 01/11/2007	Last EDR Contact: 04/21/2011
Number of Days to Update: 34	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/09/2011	Telephone: 615-532-8599
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 06/06/2011
Number of Days to Update: 54	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Varies

FINANCIAL ASSURANCE 1: Financial Assurance Information Listing
Financial assurance information for hazardous waste facilities.

Date of Government Version: 03/29/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 03/31/2011	Telephone: 541-633-2011
Date Made Active in Reports: 05/06/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites Listing
A listing of coal ash disposal sites.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/02/2011	Telephone: 541-298-7255
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 05/31/2011
Number of Days to Update: 28	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Varies

FINANCIAL ASSURANCE 2: Financial Assurance Information Listing

Financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 06/13/2011
Date Data Arrived at EDR: 06/15/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 15

Source: Department of Environmental Quality
Telephone: 503-229-5521
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

COAL ASH DOE: Steam-Electric Plan Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 04/19/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008
Date Data Arrived at EDR: 02/18/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 100

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 05/05/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: N/A

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2010	Source: Department of Environmental Conservation
Date Data Arrived at EDR: 05/12/2011	Telephone: 518-402-8651
Date Made Active in Reports: 05/24/2011	Last EDR Contact: 05/12/2011
Number of Days to Update: 12	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Annually

WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009	Source: Department of Natural Resources
Date Data Arrived at EDR: 07/06/2010	Telephone: N/A
Date Made Active in Reports: 07/26/2010	Last EDR Contact: 06/20/2011
Number of Days to Update: 20	Next Scheduled EDR Contact: 10/03/2011
	Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Private Schools
  Source: National Center for Education Statistics
  Telephone: 202-502-7300
  The National Center for Education Statistics' primary database on private school locations in the United States.
Daycare Centers: Child Care Listings
  Source: Employment Department
  Telephone: 503-947-1420

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory Data
  Source: Oregon Geospatial Enterprise Office
  Telephone: 503-378-2166

Scanned Digital USGS 7.5' Topographic Map (DRG)
  Source: United States Geologic Survey
  A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

GEOCHECK®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

SITE C3B
DELIGHT VALLEY SCHOOL RD
CRESWELL, OR 97426

TARGET PROPERTY COORDINATES

Latitude (North):	43.85450 - 43° 51' 16.2"
Longitude (West):	123.0294 - 123° 1' 45.9"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	497637.1
UTM Y (Meters):	4855497.0
Elevation:	584 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	43123-G1 COTTAGE GROVE, OR
Most Recent Revision:	1984

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

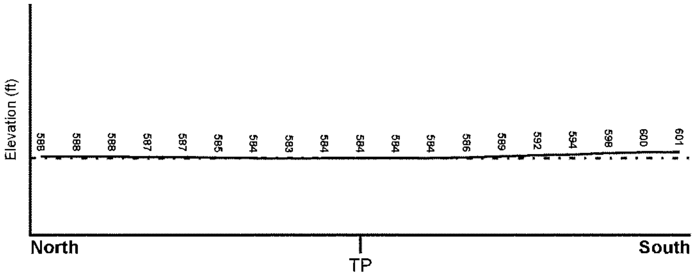
TOPOGRAPHIC INFORMATION

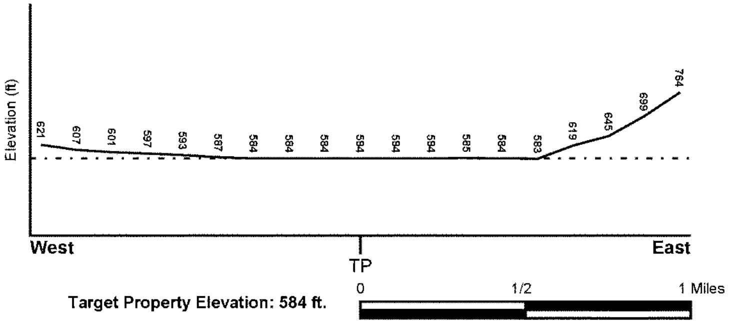
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General NNW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 584 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
LANE, OR	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 41039C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
COTTAGE GROVE SE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

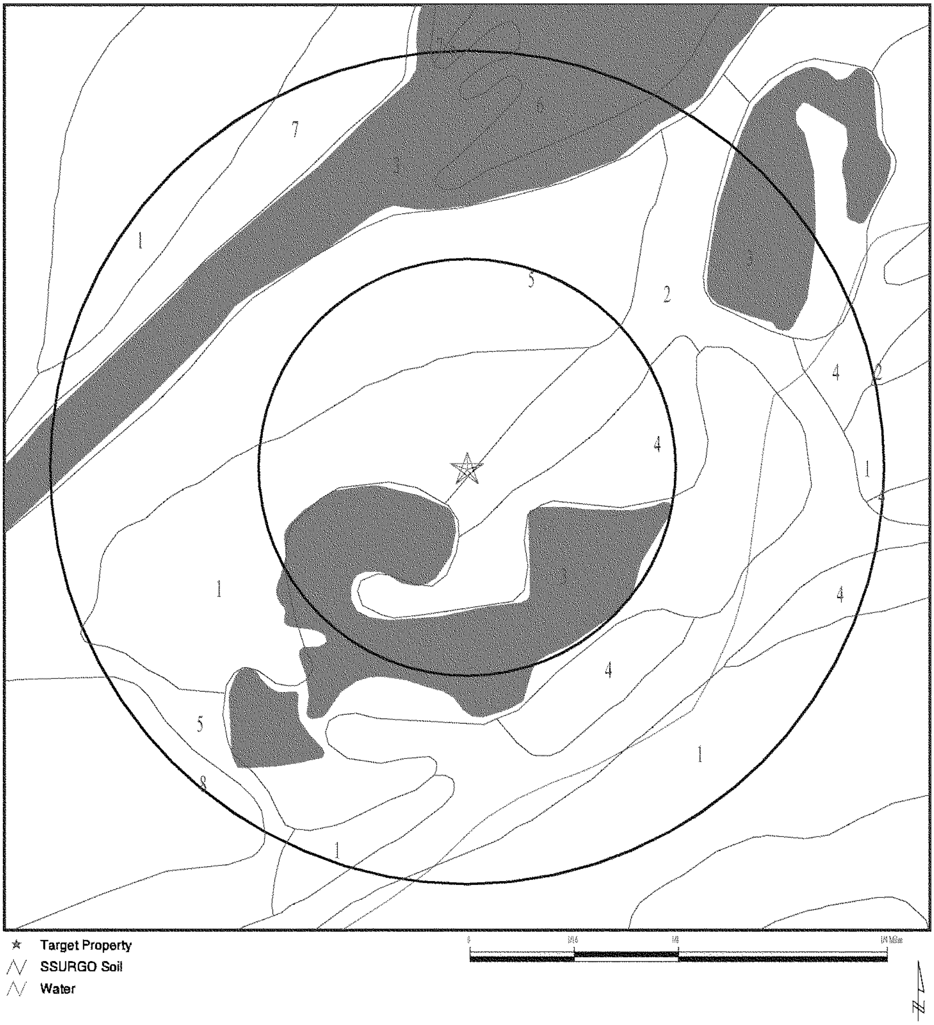
GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT		**GEOLOGIC AGE IDENTIFICATION**	
Era:	Cenozoic	Category:	Volcanic Rocks
System:	Tertiary		
Series:	Miocene volcanic rocks		
Code:	Tmv *(decoded above as Era, System & Series)*		

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3118160.18s



SITE NAME:	Site C3B	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Delight Valley School Rd Creswell OR 97426	CONTACT:	Merri Martz
		INQUIRY #:	3118160.18s
LAT/LONG:	43.8545 / 123.0294	DATE:	July 08, 2011 10:29 am

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name:	Chehalis
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	12 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 5.6
2	12 inches	55 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 5.6
3	55 inches	70 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 5.6

Soil Map ID: 2

Soil Component Name:	McBee
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	Moderately well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 76 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	24 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	24 inches	40 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	40 inches	61 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 6.1

Soil Map ID: 3

Soil Component Name:	Water
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	

Hydric Status: Unknown

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

Soil Map ID: 4

Soil Component Name: Cloquato

Soil Surface Texture: silt loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	14 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	14 inches	50 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	50 inches	59 inches	stratified sand to silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1

Soil Map ID: 5

Soil Component Name:	Camas
Soil Surface Texture:	gravelly sandy loam
Hydrologic Group:	Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.
Soil Drainage Class:	Excessively drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			**Classification**		**Saturated hydraulic conductivity micro m/sec**	
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**		**Soil Reaction (pH)**
1	0 inches	14 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 7.3 Min: 5.6
2	14 inches	59 inches	very gravelly sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 7.3 Min: 5.6

Soil Map ID: 6

Soil Component Name:	Riverwash
Soil Surface Texture:	stratified gravel to sand
Hydrologic Group:	Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
Soil Drainage Class:	Poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 31 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
1	0 inches	59 inches	stratified gravel to sand	Not reported	Not reported	Max: Min:	Max: Min:

Soil Map ID: 7

Soil Component Name: Newberg

Soil Surface Texture: loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
1	0 inches	14 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	14 inches	64 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6

Soil Map ID: 8

Soil Component Name:	Pits
Soil Surface Texture:	loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

No Layer Information available.

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

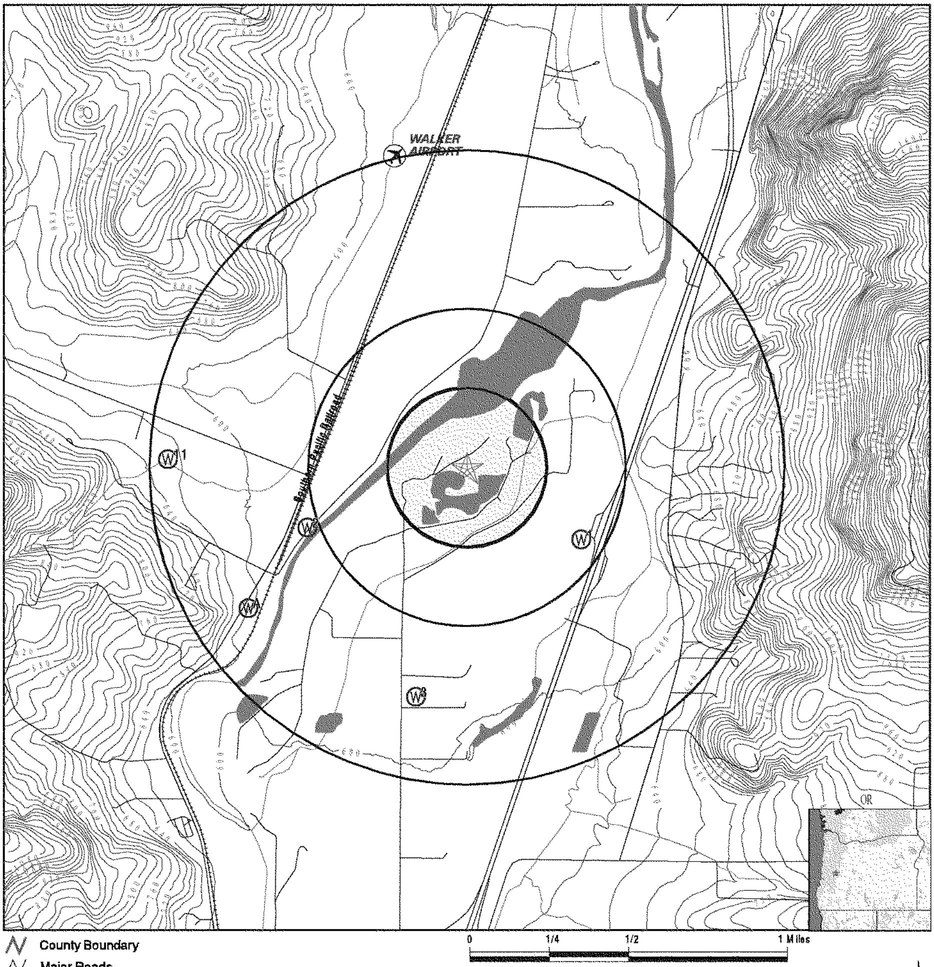
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	ORW400000001524	1/4 - 1/2 Mile ESE
2	ORI400000002536	1/2 - 1 Mile WSW
3	ORI400000002523	1/2 - 1 Mile SSW
A4	ORI400000002530	1/2 - 1 Mile WSW
A5	ORI400000002529	1/2 - 1 Mile WSW
A6	ORI400000002525	1/2 - 1 Mile SW
A7	ORI400000002526	1/2 - 1 Mile SW
A8	ORI400000002527	1/2 - 1 Mile WSW
A9	ORI400000002528	1/2 - 1 Mile WSW
A10	ORI400000002531	1/2 - 1 Mile WSW
11	ORI400000002539	1/2 - 1 Mile West

PHYSICAL SETTING SOURCE MAP - 3118160.18s



- County Boundary
- Major Roads
- Contour Lines
- Airports
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons

- Groundwater Flow Direction
- (GI) Indeterminate Groundwater Flow at Location
- (GV) Groundwater Flow Varies at Location

SITE NAME:	Site C3B	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Delight Valley School Rd Creswell OR 97426	CONTACT:	Merri Martz
		INQUIRY #:	3118160.18s
LAT/LONG:	43.8545 / 123.0294	DATE:	July 08, 2011 10:29 am

Map ID Direction Distance Elevation	Database	EDR ID Number
1 **ESE** **1/4 - 1/2 Mile** **Higher**	**OR WELLS**	**ORW400000001524**

Logid:	LANE 22027	Lstupdate:	Not Reported
Establby:	MARC NORTON	Xysource:	GPS
Horizerr:	10	Sourceorg:	OWRD
Sourceowrd:	GWATER		
Welltag:	0		
Sownum:	476	Obswell:	C
Recwell:	N	Obsflagall:	SC
Lsdelev:	587	Site id:	ORW400000001524

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2 **WSW** **1/2 - 1 Mile** **Higher**	**OR WELLS**	**ORI400000002536**

Well inspe:	41599		
Physical l:	Not Reported	Inspection:	03/20/2006
Startcard :	Not Reported	Wl county :	LANE
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	-1	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	ARNEY, JERRY		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0

Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	1208		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	10		
Qtr40:	NE	Qtr160:	NW
Latitude d:	43.85175		
Longitude :	123.03947		
Gps horizo:	Not Reported		
Year const:	2006		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	U	Previous i:	0
Inspected1:	JWJ	Wm region:	NW
Well tag a:	BANDED TO CASING		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	W
Casing cap:	SS	Pictures t:	-1
Street of :	80678 DAVIDSON RD, CRESWELL		
Street of1:	20678 DAVIDSON RD, CRESWELL		
Last updt :	05/03/2006	Last updt1:	jefferjw
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.85175		
Newlong:	-123.03947		
Site id:	ORI400000002536		

3
SSW
1/2 - 1 Mile
Higher

OR WELLS **ORI400000002523**

Well inspe:	41033		
Physical l:	Not Reported	Inspection:	02/03/2006
Startcard :	Not Reported	Wl county :	LANE
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	ZELLER, CARL		
Street:	Not Reported	City:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	1904		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	10		
Qtr40:	Not Reported	Qtr160:	Not Reported
Latitude d:	43.84402		
Longitude :	123.03262		
Gps horizo:	Not Reported		
Year const:	2005		
Date const:	Not Reported	Date con 1:	Not Reported

Deficienci:	U	Previous i:	0
Inspected1:	JWJ	Wm region:	NW
Well tag a:	BANDED TO CASING		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	W
Casing cap:	SS	Pictures t:	0
Street of :	80353 DELIGHT VALLEY SCHOOL RD		
Street of1:	80353 DELIGHT VALLEY SCHOOL RD		
Last updt :	03/22/2006	Last updt1:	jefferjw
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.84402		
Newlong:	-123.03262		
Site id:	ORI400000002523		

A4
WSW
1/2 - 1 Mile
Higher

OR WELLS **ORI400000002530**

Well inspe:	34456		
Physical l:	Not Reported	Inspection:	01/14/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	WEYERHAUSER; 80551 N. PACIFIC HWY, WALKER, OR		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	FLUSH; 2" CASING		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0

Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	800		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	10		
Qtr40:	NE	Qtr160:	NE
Latitude d:	43.84818		
Longitude :	123.043		
Gps horizo:	Not Reported		
Year const:	2002		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	N	Previous i:	0
Inspected1:	DIP	Wm region:	NW
Well tag a:	Not Reported		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	Not Reported
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	pedersdi
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.84818		
Newlong:	-123.043		
Site id:	ORI400000002530		

A5
WSW
1/2 - 1 Mile
Higher

OR WELLS **ORI400000002529**

Well inspe:	29523		
Physical l:	Not Reported	Inspection:	01/14/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	WEYERHAUSER; 80551 N. PACIFIC HWY, WALKER, OR		
Street:	Not Reported	City:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	OVERDRILLED WITH 6-1/4" HOLLOW STEM AUGER AND FILLED WITH BENTONITE		
Work new:	0	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	-1	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	800		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	10		
Qtr40:	NE	Qtr160:	NE
Latitude d:	43.84818		
Longitude :	123.043		
Gps horizo:	Not Reported		
Year const:	2002		
Date const:	Not Reported	Date con 1:	Not Reported

Deficienci:	N	Previous i:	0
Inspected1:	DIP	Wm region:	NW
Well tag a:	Not Reported		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	Not Reported
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	pedersdi
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.84818		
Newlong:	-123.043		
Site id:	ORI400000002529		

A6
SW
1/2 - 1 Mile
Higher

OR WELLS **ORI400000002525**

Well inspe:	29520		
Physical l:	Not Reported	Inspection:	01/14/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	WEYERHAUSER; 80551 N. PACIFIC HWY, WALKER, OR		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	FLUSH; 2" CASING		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	800		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	10		
Qtr40:	NE	Qtr160:	NE
Latitude d:	43.8479		
Longitude :	123.04276		
Gps horizo:	Not Reported		
Year const:	2002		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	N	Previous i:	0
Inspected1:	DIP	Wm region:	NW
Well tag a:	Not Reported		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	Not Reported
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	pedersdi
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.8479		
Newlong:	-123.04276		
Site id:	ORI400000002525		

A7
SW
1/2 - 1 Mile
Higher

OR WELLS **ORI400000002526**

Well inspe:	29522		
Physical l:	Not Reported	Inspection:	01/14/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	WEYERHAUSER; 80551 N. PACIFIC HWY, WALKER, OR		
Street:	Not Reported	City:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	OLD SC 152144; OVERDRILLED WITH 6-1/4" HOLLOW STEM AUGER AND FILLED WITH BENTONI		
Work new:	0	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	-1	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	800		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	10		
Qtr40:	NE	Qtr160:	NE
Latitude d:	43.8479		
Longitude :	123.04276		
Gps horizo:	Not Reported		
Year const:	2002		
Date const:	Not Reported	Date con 1:	Not Reported

Deficienci:	N	Previous i:	0
Inspected1:	DIP	Wm region:	NW
Well tag a:	Not Reported		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	Not Reported
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	pedersdi
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.8479		
Newlong:	-123.04276		
Site id:	ORI400000002526		

A8
WSW
1/2 - 1 Mile
Higher

OR WELLS ORI400000002527

Well inspe:	29519		
Physical l:	Not Reported	Inspection:	01/14/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	WEYERHAUSER; 80551 N. PACIFIC HWY, WALKER, OR		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	FLUSH; 2" CASING		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0

Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	800		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	10		
Qtr40:	NE	Qtr160:	NE
Latitude d:	43.84805		
Longitude :	123.04336		
Gps horizo:	Not Reported		
Year const:	2002		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	N	Previous i:	0
Inspected1:	DIP	Wm region:	NW
Well tag a:	Not Reported		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	Not Reported
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	pedersdi
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.84805		
Newlong:	-123.04336		
Site id:	ORI400000002527		

A9
WSW
1/2 - 1 Mile
Higher

OR WELLS **ORI400000002528**

Well inspe:	34455		
Physical l:	Not Reported	Inspection:	01/14/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	WEYERHAUSER; 80551 N. PACIFIC HWY, WALKER, OR		
Street:	Not Reported	City:	Not Reported

State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	OLD SC 152143; OVERDRILLED AND FILLED WITH 3/4" BENTONITE CHIPS		
Work new:	0	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	-1	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	800		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	10		
Qtr40:	NE	Qtr160:	NE
Latitude d:	43.84805		
Longitude :	123.04336		
Gps horizo:	Not Reported		
Year const:	2002		
Date const:	Not Reported	Date con 1:	Not Reported

Deficienci:	N	Previous i:	0
Inspected1:	DIP	Wm region:	NW
Well tag a:	Not Reported		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	Not Reported
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	pedersdi
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.84805		
Newlong:	-123.04336		
Site id:	ORI400000002528		

A10
WSW
1/2 - 1 Mile
Higher

OR WELLS **ORI400000002531**

Well inspe:	44805		
Physical l:	Not Reported	Inspection:	07/18/2008
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	HILLYARD, JIM		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	801		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	10		
Qtr40:	NE	Qtr160:	NW
Latitude d:	43.8482		
Longitude :	-123.04409		
Gps horizo:	Not Reported		
Year const:	2008		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	U	Previous i:	0
Inspected1:	JWJ	Wm region:	NW
Well tag a:	BANDED TO CASING		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	SS	Pictures t:	0
Street of :	Not Reported		
Street of1:	80539 HWY 99, CRESWELL		
Last updt :	08/01/2008	Last updt1:	jefferjw
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.8482		
Newlong:	-123.04409		
Site id:	ORI400000002531		

11
West
1/2 - 1 Mile
Higher

OR WELLS **ORI400000002539**

Well inspe:	34560		
Physical l:	Not Reported	Inspection:	02/25/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	COOPER, LELAND; 32844 LYNX HOLLOW RD, CRESWELL		
Street:	Not Reported	City:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	LINER IN WELL AT 1.65 FT BL TOC		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	3200		
Township:	20		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	3		
Qtr40:	NE	Qtr160:	SE
Latitude d:	43.85487		
Longitude :	123.04826		
Gps horizo:	Not Reported		
Year const:	2003		
Date const:	Not Reported	Date con 1:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Deficienci:	N	Previous i:	0
Inspected1:	KRB	Wm region:	NW
Well tag a:	BANDED		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	byrdkr
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	43.85487		
Newlong:	-123.04826		
Site id:	ORI400000002539		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: OR Radon

Radon Test Results

Zipcode	Num Tests	Maximum	Minimum	Average	# > 4 pCi/L
97426	3	1.9	0.3	0.9	0

Federal EPA Radon Zone for LANE County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for LANE COUNTY, OR

Number of sites tested: 19

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area	0.850 pCi/L	100%	0%	0%
Basement	1.360 pCi/L	88%	12%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory Data
Source: Oregon Geospatial Enterprise Office
Telephone: 503-378-2166

HYDROGEOLOGIC INFORMATION

AQUIFLOW^R Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Data
Source: Department of Water Resources
Telephone: 503-986-0843

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Locations
Source: Department of Geology and Mineral Industries
Telephone: 971-673-1540
A listing of oil and gas well locations in the state.

RADON

State Database: OR Radon
Source: Oregon Health Services
Telephone: 503-731-4272
Radon Levels in Orgeon

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

TNC Middle Fork Confluence Site
Buford Park/Frank Parrish Road
Eugene, OR 97405

Inquiry Number: 3118160.2s
July 07, 2011

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

BUFORD PARK/FRANK PARRISH ROAD
EUGENE, OR 97405

COORDINATES

Latitude (North):	44.023400 - 44° 1' 24.2"
Longitude (West):	122.997600 - 122° 59' 51.4"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	500192.3
UTM Y (Meters):	4874255.5
Elevation:	464 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	44122-A8 SPRINGFIELD, OR
Most Recent Revision:	1986
West Map:	44123-A1 EUGENE EAST, OR
Most Recent Revision:	1986

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	2006, 2005
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL........................... National Priority List

EXECUTIVE SUMMARY

Proposed NPL	Proposed National Priority List Sites
NPL LIENS	Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL	National Priority List Deletions

Federal CERCLIS list

CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY	Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP	CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS	Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF	RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG	RCRA - Large Quantity Generators
RCRA-SQG	RCRA - Small Quantity Generators
RCRA-CESQG	RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS	Engineering Controls Sites List
US INST CONTROL	Sites with Institutional Controls

Federal ERNS list

ERNS	Emergency Response Notification System

State- and tribal - equivalent CERCLIS

OR CRL	Confirmed Release List and Inventory

State and tribal landfill and/or solid waste disposal site lists

SWF/LF	Solid Waste Facilities List

State and tribal leaking storage tank lists

INDIAN LUST	Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

UST	Underground Storage Tank Database
AST	Aboveground Storage Tanks

EXECUTIVE SUMMARY

INDIAN UST	Underground Storage Tanks on Indian Land
FEMA UST	Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

ENG CONTROLS	Engineering Controls Recorded at ESCI Sites
INST CONTROL	Institutional Controls Recorded at ESCI Sites

State and tribal voluntary cleanup sites

VCP	Voluntary Cleanup Program Sites
INDIAN VCP	Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS	Brownfields Projects

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS	A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
HIST LF	Old Closed SW Disposal Sites
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL	Clandestine Drug Labs
AOCONCERN	Columbia Slough
CDL	Uninhabitable Drug Lab Properties
US HIST CDL	National Clandestine Laboratory Register

Local Land Records

LIENS 2	CERCLA Lien Information
LUCIS	Land Use Control Information System

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	Spill Database

Other Ascertainable Records

RCRA-NonGen	RCRA - Non Generators
DOT OPS	Incident and Accident Data
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees

ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
FINDS	Facility Index System/Facility Registry System
RAATS	RCRA Administrative Action Tracking System
UIC	Underground Injection Control Program Database
MANIFEST	Manifest Information
OR HAZMAT	Hazmat/Incidents
DRYCLEANERS	Drycleaning Facilities
NPDES	Wastewater Permits Database
AIRS	Oregon Title V Facility Listing
HSIS	Hazardous Substance Information Survey
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER	PCB Transformer Registration Database
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
COAL ASH DOE	Steam-Electric Plan Operation Data
FINANCIAL ASSURANCE	Financial Assurance Information Listing
COAL ASH	Coal Ash Disposal Sites Listing

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

STANDARD ENVIRONMENTAL RECORDS

State- and tribal - equivalent NPL

ECSI: The Environmental Cleanup Site Information System records information about sites in Oregon that may be of environmental interest. The data come from the Department of Environmental Quality.

A review of the ECSI list, as provided by EDR, and dated 06/01/2011 has revealed that there are 7 ECSI sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TRACERS TRUCK REPAIR INC.	*701 S 28TH ST*	*NNE 1 - 2 (1.314 mi.)*	*3*	*7*
MURPHY CO. - SPRINGFIELD	*291 S 18TH ST*	*N 1 - 2 (1.375 mi.)*	*4*	*11*
BPA - ALVEY SUBSTATION	*86000 FRANKLIN BLVD.*	*WSW 1 - 2 (1.382 mi.)*	*5*	*24*
JUNKYARD JOHN'S	*246 S 16TH ST.*	*N 1 - 2 (1.420 mi.)*	*6*	*34*
PRIDE OF OREGON - MCVAY	*86714 MCVAY HWY*	*WSW 1 - 2 (1.443 mi.)*	*7*	*41*
DOW CORNING - SPRINGFIELD PLAN	*1801 S "A" ST.*	*N 1 - 2 (1.467 mi.)*	*8*	*45*
EL-JAY FACTORY #2	*86470 FRANKLIN BLVD.*	*W 1 - 2 (1.482 mi.)*	*9*	*63*

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environmental Quality's LUST Database List.

A review of the LUST list, as provided by EDR, and dated 04/01/2011 has revealed that there are 2 LUST sites within approximately 1 mile of the target property.

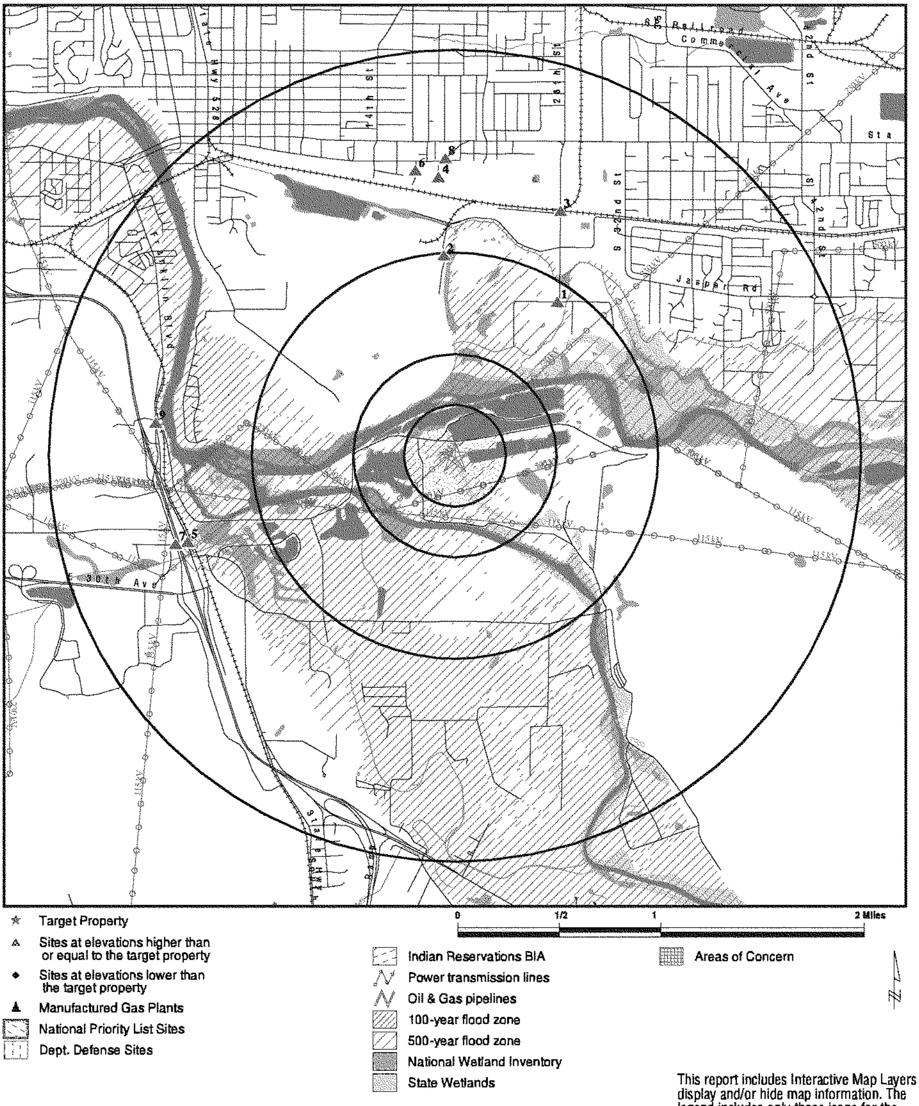
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
28TH & SOUTH M PROPERTY	*2795 S M ST*	*NNE 1/2 - 1 (0.911 mi.)*	*1*	*7*
SPRINGFIELD QUARRY ROCK PRODUC Cleanup Complete: 07/31/1997	*800 S 18TH ST*	*N 1/2 - 1 (0.988 mi.)*	*2*	*7*

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 37 records.

Site Name	Database(s)
TUGMAN PARK LANDFILL	ECSI, OR CRL, INST CONTROL, VCP
LANE COUNTY - BLOOMBERG RD. LANDFI	ECSI
ODOT - GLASS BAR STOCKPILE	ECSI, VCP
IZAAK WALTON LEAGUE SHOOTING RANGE	ECSI, VCP
DUGDALE ENTERPRISES, LLC	ECSI, VCP
SPRINGFIELD AIRPORT (ABANDONED)	ECSI, BROWNFIELDS
WOOD STAVE LINE - SPRINGFIELD	FINDS, ECSI, VCP
STATON COMPANIES INC	AST, HSIS
BLOOMBERG PARK LEAF COMPOSTING FAC	SWF/LF
WASTE ALTERNATIVES	SWF/LF
FUTURE LOGGING CO.	LUST
JAMES RIVER TAG FUELING SITE	LUST
30TH STREET SITE	LUST
STATON COMPANIES	RCRA-NonGen
D. L. SEARS TRUCKING	RCRA-NonGen
GOSHEN AUTO RECYCLERS	RCRA-NonGen
ODOT GLASS BAR STOCKPILE SITE	RCRA-NonGen, FINDS
OIL RE-REFINING COMPANY	RCRA-NonGen
WEYERHAEUSER NR CO SOUTH VALLEY	RCRA-CESQG, FINDS
WESTERN COATING, INC.	FINDS, NPDES
JAMES RIVER TAG FUELING SITE	FINDS
BLACKTAIL PROPERTIES, LLC COMMERCI	FINDS
MARSHALL S STORAGE SITE	FINDS
30TH STREET SITE	FINDS
MCKENZIE HWY 126E MP 49	OR HAZMAT
2ND ST	OR HAZMAT
58 I 5 NEAR HWY	OR HAZMAT
MCKENZIE HWY	OR HAZMAT
MCKENZIE HWY	OR HAZMAT
WEYERHAEUSER NR COMPANY	HSIS
ZIP-O-LOG MILLS INC	HSIS
CONE LUMBER COMPANY	NPDES
REMOTE AUTO DISMANTLING	NPDES
GOSHEN AUTO RECYCLERS	NPDES
MOUNTAIN GATE PHASE 4	NPDES
BLACKTAIL PROPERTIES, LLC COMMERCI	NPDES
MIDDLE FORK WILLAMETTE RIVER LOOP	NPDES

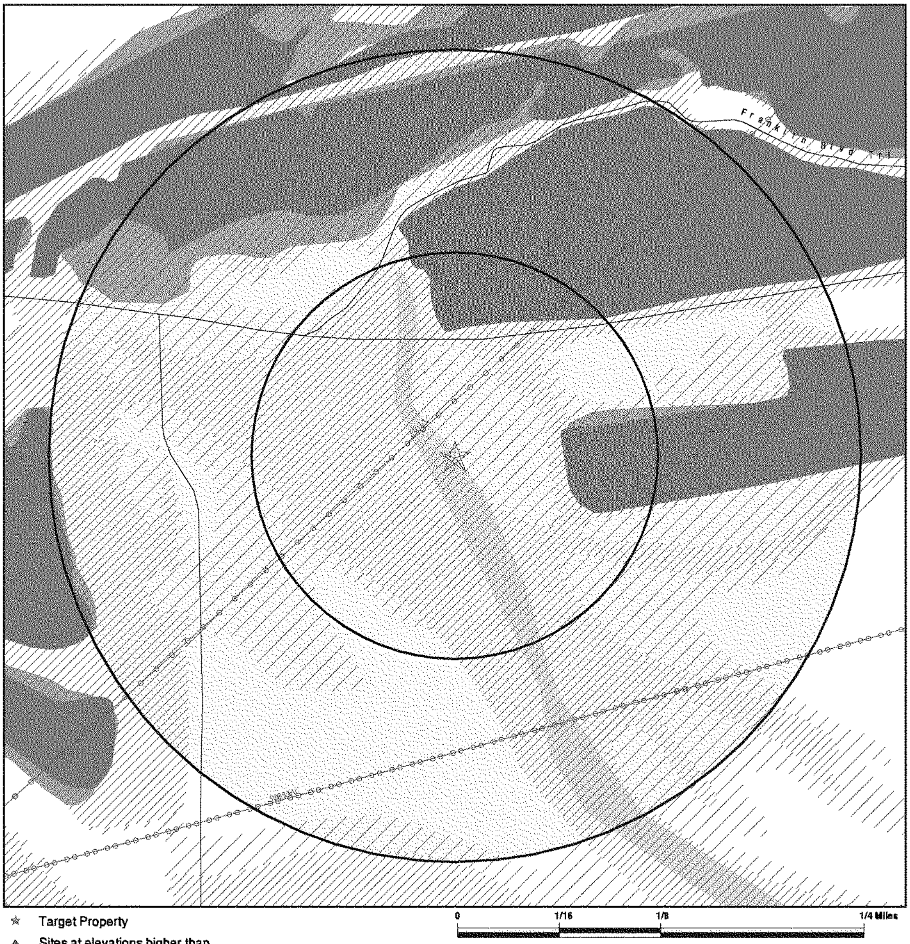
OVERVIEW MAP - 3118160.2s



This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: TNC Middle Fork Confluence Site ADDRESS: Buford Park/Frank Parrish Road Eugene OR 97405 LAT/LONG: 44.0234 / 122.9976	CLIENT: Tetra Tech EM, Inc. CONTACT: Merri Martz INQUIRY #: 3118160.2s DATE: July 07, 2011 7:14 pm

DETAIL MAP - 3118160.2s



- ☆ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Manufactured Gas Plants
- ▲ Sensitive Receptors
- ▨ National Priority List Sites
- ▨ Dept. Defense Sites
- ▨ Indian Reservations BIA
- ∿ Power transmission lines
- ∿ Oil & Gas pipelines
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- ▨ National Wetland Inventory
- ▨ State Wetlands
- ▨ Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	TNC Middle Fork Confluence Site	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Buford Park/Frank Parrish Road Eugene OR 97405	CONTACT:	Merri Martz
		INQUIRY #:	3118160.2s
LAT/LONG:	44.0234 / 122.9976	DATE:	July 07, 2011 7:15 pm

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.500	0	0	0	0	0	0
Proposed NPL		1.500	0	0	0	0	0	0
NPL LIENS		0.500	0	0	0	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.500	0	0	0	0	0	0
Federal CERCLIS list								
CERCLIS		1.000	0	0	0	0	NR	0
FEDERAL FACILITY		1.500	0	0	0	0	0	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		1.000	0	0	0	0	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS		1.500	0	0	0	0	0	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		1.000	0	0	0	0	NR	0
Federal RCRA generators list								
RCRA-LQG		0.750	0	0	0	0	NR	0
RCRA-SQG		0.750	0	0	0	0	NR	0
RCRA-CESQG		0.750	0	0	0	0	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		1.000	0	0	0	0	NR	0
US INST CONTROL		1.000	0	0	0	0	NR	0
Federal ERNS list								
ERNS		0.500	0	0	0	NR	NR	0
State- and tribal - equivalent NPL								
ECSI		1.500	0	0	0	0	7	7
State- and tribal - equivalent CERCLIS								
OR CRL		1.000	0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		1.000	0	0	0	0	NR	0
State and tribal leaking storage tank lists								
LUST		1.000	0	0	0	2	NR	2
INDIAN LUST		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
State and tribal registered storage tank lists								
UST		0.750	0	0	0	0	NR	0
AST		0.750	0	0	0	0	NR	0
INDIAN UST		0.750	0	0	0	0	NR	0
FEMA UST		0.750	0	0	0	0	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS		1.000	0	0	0	0	NR	0
INST CONTROL		1.000	0	0	0	0	NR	0
State and tribal voluntary cleanup sites								
VCP		1.000	0	0	0	0	NR	0
INDIAN VCP		1.000	0	0	0	0	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		1.000	0	0	0	0	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		1.000	0	0	0	0	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9		1.000	0	0	0	0	NR	0
ODI		1.000	0	0	0	0	NR	0
HIST LF		1.000	0	0	0	0	NR	0
INDIAN ODI		1.000	0	0	0	0	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		0.500	0	0	0	NR	NR	0
AOCONCERN		1.500	0	0	0	0	0	0
CDL		0.500	0	0	0	NR	NR	0
US HIST CDL		0.500	0	0	0	NR	NR	0
Local Land Records								
LIENS 2		0.500	0	0	0	NR	NR	0
LUCIS		1.000	0	0	0	0	NR	0
Records of Emergency Release Reports								
HMIRS		0.500	0	0	0	NR	NR	0
SPILLS		0.500	0	0	0	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.750	0	0	0	0	NR	0
DOT OPS		0.500	0	0	0	NR	NR	0
DOD		1.500	0	0	0	0	0	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FUDS		1.500	0	0	0	0	0	0
CONSENT		1.500	0	0	0	0	0	0
ROD		1.500	0	0	0	0	0	0
UMTRA		1.000	0	0	0	0	NR	0
MINES		0.750	0	0	0	0	NR	0
TRIS		0.500	0	0	0	NR	NR	0
TSCA		0.500	0	0	0	NR	NR	0
FTTS		0.500	0	0	0	NR	NR	0
HIST FTTS		0.500	0	0	0	NR	NR	0
SSTS		0.500	0	0	0	NR	NR	0
ICIS		0.500	0	0	0	NR	NR	0
PADS		0.500	0	0	0	NR	NR	0
MLTS		0.500	0	0	0	NR	NR	0
RADINFO		0.500	0	0	0	NR	NR	0
FINDS		0.500	0	0	0	NR	NR	0
RAATS		0.500	0	0	0	NR	NR	0
UIC		TP	NR	NR	NR	NR	NR	0
MANIFEST		0.750	0	0	0	0	NR	0
OR HAZMAT		0.500	0	0	0	NR	NR	0
DRYCLEANERS		0.750	0	0	0	0	NR	0
NPDES		0.500	0	0	0	NR	NR	0
AIRS		0.500	0	0	0	NR	NR	0
HSIS		0.500	0	0	0	NR	NR	0
INDIAN RESERV		1.500	0	0	0	0	0	0
SCRD DRYCLEANERS		1.000	0	0	0	0	NR	0
PCB TRANSFORMER		0.500	0	0	0	NR	NR	0
COAL ASH EPA		1.000	0	0	0	0	NR	0
COAL ASH DOE		0.500	0	0	0	NR	NR	0
FINANCIAL ASSURANCE		0.500	0	0	0	NR	NR	0
COAL ASH		1.000	0	0	0	0	NR	0
EDR PROPRIETARY RECORDS								
EDR Proprietary Records								
Manufactured Gas Plants		1.500	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
1 **NNE** **1/2-1** **0.911 mi.** **4808 ft.**	**28TH & SOUTH M PROPERTY** **2795 S M ST** **SPRINGFIELD, OR 97477**	**LUST** **UST**	**U004175462** **N/A**

Relative:
Higher

Actual:
470 ft.

LUST:
Region: Western Region
Facility ID: 20-10-1168
Cleanup Received Date: 11/22/2010
Cleanup Start Date: 11/19/2010
Cleanup Complete Date: Not reported

UST:
Facility ID: 12395
Facility Telephone: (541) 726-2395
Permittee Name: MICHAEL WARREN
Number of Permitted Tanks: Not reported
Active Tanks: Not reported
Decommissioned Tanks: 1
Number of Tanks: 1

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
2 **North** **1/2-1** **0.988 mi.** **5219 ft.**	**SPRINGFIELD QUARRY ROCK PRODUCTS** **800 S 18TH ST** **SPRINGFIELD, OR 97477**	**LUST** **UST**	**U004016008** **N/A**

Relative:
Higher

Actual:
473 ft.

LUST:
Region: Western Region
Facility ID: 20-97-7036
Cleanup Received Date: 06/12/1997
Cleanup Start Date: 06/16/1997
Cleanup Complete Date: 07/31/1997

UST:
Facility ID: 2750
Facility Telephone: (503)747-1213
Permittee Name: GREG WEISS, SECRETARY/TREASURER
Number of Permitted Tanks: Not reported
Active Tanks: Not reported
Decommissioned Tanks: 5
Number of Tanks: 5

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
3 **NNE** **> 1** **1.314 mi.** **6939 ft.**	**TRACERS TRUCK REPAIR INC.** **701 S 28TH ST** **SPRINGFIELD, OR 97477**	**ECSI** **LUST**	**S101210447** **N/A**

Relative:
Higher

Actual:
478 ft.

OR ECSI:
State ID Number: 975
Study Area: False
Legislatve ID: 0
FACA ID: 4944
Lat/Long (dms): 44 2 28.00 / -122 59 12.00
Score Value: Not reported
Brown ID: 0
Region ID: 3
Investigation ID: 208
Further Action: 260
County Code: 20.00
Cerclis ID: 003984308

TRACERS TRUCK REPAIR INC. (Continued) **S101210447**

Township Coord.:	18.00	Township Zone:	S
Range Coord:	2.00	Range Zone:	W
Section Coord:	6	Qtr Section:	Not reported
Tax Lots:	Not reported	Size:	Not reported
NPL:	False	Orphan:	False
Updated By:	GWISTAR	Update Date:	06/12/2007
Alias Name:	Not reported		

OR ECSI HAZARDOUS RELEASE:

Substance ID.:	Not reported
Haz Release ID:	Not reported
Qty Released:	Not reported
Date Released:	Not reported
Update Date:	Not reported
Update By:	Not reported
Substance Code:	Not reported
Substance Name:	Not reported
Substance Abbrev.:	Not reported
Substance Category ID:	Not reported
Substance Category:	Not reported
Category Level:	Not reported
Created By:	Not reported
Created Date:	Not reported
Substance Category ID:	Not reported
Substance Category:	Not reported
Category Level:	Not reported
Created By:	Not reported
Created Date:	Not reported
Substance Alias ID:	Not reported
Sub Alias Name:	Not reported
Comment ID:	Not reported
Release Code:	Not reported
Release Comments:	Not reported
Sampling Result ID:	Not reported
Feature Id:	Not reported
Hazard Release Id:	Not reported
Medium:	Not reported
Substance Abbrev.:	Not reported
Unit Code:	Not reported
Observation:	Not reported
Owner Operator:	Not reported
Lab Data:	Not reported
Sample Depth:	Not reported
Start Date:	Not reported
End Date:	Not reported
Min Concentration:	Not reported
Max Concentration:	Not reported
Sample Comment:	Not reported
Last Update By:	Not reported
Update Date:	Not reported

OR ECSI NARR:

NARR ID:	5727471
NARR Code:	Contamination
Created By:	Not reported
Created Date:	12/17/2002
Updated By:	Not reported
Updated Date:	12/17/2002

TRACERS TRUCK REPAIR INC. (Continued) **S101210447**

NARR Comments:From PA: Site ponds (up to 6) are monitored on a biannual basis by Widing contractor company. Data indicates so far that there appears to be no significant threat to public health. Pond water (and sludges) have passed the USEPA EP Toxicity text for hazardous waste.

NARR ID: 5727519
NARR Code: Data Sources
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:EPA CERCLA Preliminary Assessment

NARR ID: 5727520
NARR Code: Hazardous Substance/Waste Types
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Phenols/heavy metals.

NARR ID: 5727521
NARR Code: Pathways Other Hazards
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:DEQ file memo (10/7/82) suggests that sludge-contaminated soil under former wastewater treatment ponds may be contaminated with low levels of EPA-TOX heavy metals and phenols from the sludge deposited there. Ponds have been bulldozed to close excavated basins.

OR ECSI SITE CONTROL:
Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported
Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:
Permit Agency: Not reported
Permit Number: Not reported
Permit Type: Not reported
Comments: Not reported

OR ECSI Administrative Action:

Admin ID:	718032	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	05/05/1988	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	26	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False

TRACERS TRUCK REPAIR INC. (Continued) **S101210447**

Action: Site added to database
Further Action: Not reported
Comments: Not reported

Admin ID:	721532	Action ID:	9457
Agency:	Environmantal Protection Agency	Region:	Not reported
Start Date:	08/03/1984	Complete Date:	09/17/1984
Substance Code:	Not reported	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PA1	Category:	EPA Led Action
Action Flag:	True	Action Code Flag:	False
Action:	EPA Basic Preliminary Assessment		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	721533	Action ID:	9512
Agency:	Environmantal Protection Agency	Region:	Not reported
Start Date:	09/12/1988	Complete Date:	09/12/1988
Substance Code:	Not reported	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	SI1	Category:	EPA Led Action
Action Flag:	True	Action Code Flag:	False
Action:	EPA Screening Site Inspection 1		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	722104	Action ID:	9508
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	02/11/1994	Complete Date:	02/11/1994
Substance Code:	SAS	Rank Value:	0
Employee Id:	293	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RSSC	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Site Screening recommended (EV)		
Further Action:	Low		
Comments:	Not reported		

Admin ID:	715616	Action ID:	9514
Agency:	Environmantal Protection Agency	Region:	Not reported
Start Date:	12/04/1994	Complete Date:	12/05/1994
Substance Code:	Not reported	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	SP1	Category:	EPA Led Action
Action Flag:	True	Action Code Flag:	False
Action:	EPA Site Inspection Prioritization		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	715617	Action ID:	9444
Agency:	Environmantal Protection Agency	Region:	Not reported
Start Date:	12/05/1994	Complete Date:	12/05/1994
Substance Code:	Not reported	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False

TRACERS TRUCK REPAIR INC. (Continued) **S101210447**

Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NFRAP	Category:	EPA Led Action
Action Flag:	True	Action Code Flag:	False
Action:	No Further Remedial Action Planned under Federal program		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	716077	Action ID:	9421
Agency:	Environmantal Protection Agency	Region:	Not reported
Start Date:	01/01/1979	Complete Date:	Not reported
Substance Code:	Not reported	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	DS1	Category:	EPA Led Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to CERCLIS		
Further Action:	Not reported		
Comments:	Not reported		

OR ECSI OPERATIONS:

Operation Id:	132274
Operation Status:	Inactive
Common Name:	Widing Transportation Inc. - Lane County
Yrs of Operation:	Not reported
Comments:	Tank truck washing operation (phenolic and urea resins).
Updated Date:	03/23/1995
Operations SIC Id:	194877
SIC Code:	4789
Created By:	Not reported
Created Date:	12/17/2002

LUST:

Region:	Western Region
Facility ID:	20-94-7011
Cleanup Received Date:	08/26/1994
Cleanup Start Date:	09/06/1994
Cleanup Complete Date:	**11/04/1995**

4	**MURPHY CO. - SPRINGFIELD**	**FINDS**	**1006857090**
North	**291 S 18TH ST**	**ECSI**	**N/A**
> 1	**SPRINGFIELD, OR 97477**		
1.375 mi.			
7259 ft.			

Relative:
Higher

Actual:
474 ft.

FINDS:

Registry ID: 110014195110

Environmental Interest/Information System
OR-DEQ (Oregon - Department Of Environmental Quality) is a regulatory agency whose job is to protect the quality of Oregon's Environment. DEQ uses a combination of technical assistance, inspections and permitting to help public and private facilities and citizens understand and comply with state and federal environmental regulations.

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

OR ECSI:

State ID Number: 1062
Study Area: False
Legislatve ID: 832
FACA ID: 9185
Lat/Long (dms): 44 2 35.00 / -122 59 54.00
Score Value: Not reported
Township Coord.: 17.00
Range Coord: 3.00
Section Coord: 36
Tax Lots: 504
NPL: False
Updated By: GWISTAR
Alias Name: Not reported

Brown ID: 0
Region ID: 3
Investigation ID: 206
Further Action: 0
County Code: 20.00
Cerclis ID: Not reported
Township Zone: S
Range Zone: W
Qtr Section: Not reported
Size: 4.52 acres
Orphan: False
Update Date: 08/16/2007

OR ECSI HAZARDOUS RELEASE:

Substance ID.: 121608
Haz Release ID: 383738
Qty Released: unknown
Date Released: unknown
Update Date: 12/02/1993
Update By: Not reported
Substance Code: 71-43-2
Substance Name: BENZENE
Substance Abbrev.: Not reported
Substance Category ID: 8502
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8502
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319178
Sub Alias Name: BENZOL
Substance Alias ID: 319179
Sub Alias Name: COAL NAPTHA
Substance Alias ID: 319180
Sub Alias Name: CYCLOHEXATRIENE
Substance Alias ID: 319181
Sub Alias Name: PHENE
Substance Alias ID: 319182
Sub Alias Name: PYROBENZOL
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

Substance ID.: 120883
Haz Release ID: 383739
Qty Released: unknown
Date Released: unknown
Update Date: 12/02/1993
Update By: Not reported
Substance Code: 108-88-3
Substance Name: TOLUENE
Substance Abbrev.: Not reported
Substance Category ID: 8520
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8520
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 316466
Sub Alias Name: BENZENE,METHYL-
Substance Alias ID: 316467
Sub Alias Name: METHACIDE
Substance Alias ID: 316468
Sub Alias Name: METHYLBENZENE
Substance Alias ID: 316469
Sub Alias Name: METHYLBENZOL
Substance Alias ID: 316470
Sub Alias Name: PHENYLMETHANE
Substance Alias ID: 316471
Sub Alias Name: TOLUOL
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

Substance ID.: 120781
Haz Release ID: 383740
Qty Released: unknown
Date Released: unknown
Update Date: 12/02/1993
Update By: Not reported
Substance Code: 100-41-4
Substance Name: ETHYLBENZENE
Substance Abbrev.: Not reported
Substance Category ID: 8515
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8515
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 316146
Sub Alias Name: ETHYLBENZOL
Substance Alias ID: 316147
Sub Alias Name: PHENYLETHANE
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

Substance ID.: 121051
Haz Release ID: 383741
Qty Released: unknown
Date Released: uknown
Update Date: 12/02/1993
Update By: Not reported
Substance Code: 1330-20-7
Substance Name: XYLENEs
Substance Abbrev.: Not reported

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

Substance Category ID: 8526
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8526
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 317017
Sub Alias Name: DIMETHYLBENZENEs
Substance Alias ID: 317018
Sub Alias Name: XYLOLs
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

Substance ID.: 121610
Haz Release ID: 383742
Qty Released: unknown
Date Released: unknown
Update Date: 12/02/1993
Update By: Not reported
Substance Code: 71-55-6
Substance Name: TRICHLOROETHANE,1,1,1-
Substance Abbrev.: Not reported
Substance Category ID: 8521
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8552
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8521
Substance Category: Volatiles
Category Level: Not reported

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8552
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319183
Sub Alias Name: BALTANA
Substance Alias ID: 319184
Sub Alias Name: CHLOROTHENE
Substance Alias ID: 319185
Sub Alias Name: METHYLCHLOROFORM
Substance Alias ID: 318151
Sub Alias Name: TCA,1,1,1-
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

Substance ID.: 121011
Haz Release ID: 383743
Qty Released: unknown
Date Released: unknown
Update Date: 12/02/1993
Update By: Not reported
Substance Code: 127-18-4
Substance Name: TETRACHLOROETHYLENE
Substance Abbrev.: Not reported
Substance Category ID: 8519
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8551
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8519
Substance Category: Volatiles

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8551
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 316912
Sub Alias Name: ETHENE,TETRACHLORO-
Substance Alias ID: 316913
Sub Alias Name: ETHYLENE TETRACHLORIDE
Substance Alias ID: 316914
Sub Alias Name: PERCHLOROETHYLENE
Substance Alias ID: 316915
Sub Alias Name: PERCLENE
Substance Alias ID: 316916
Sub Alias Name: TETRACHLOROETHENE
Substance Alias ID: 316917
Sub Alias Name: TETRACHLOROETHENE,1,1,2,2-
Substance Alias ID: 316918
Sub Alias Name: TETRACHLOROETHYLENE,1,1,2,2-
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

Substance ID.: 121639
Haz Release ID: 383744
Qty Released: unknown
Date Released: unknown
Update Date: 12/02/1993
Update By: Not reported
Substance Code: 7439-92-1
Substance Name: LEAD
Substance Abbrev.: Not reported
Substance Category ID: 8466
Substance Category: Inorganics
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

Substance Category ID: 8466
Substance Category: Inorganics
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319256
Sub Alias Name: PB
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

Substance ID.: 121668
Haz Release ID: 383745
Qty Released: unknown
Date Released: unknown
Update Date: 12/02/1993
Update By: Not reported
Substance Code: 7440-43-9
Substance Name: CADMIUM
Substance Abbrev.: Not reported
Substance Category ID: 8460
Substance Category: Inorganics
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8460
Substance Category: Inorganics
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319291
Sub Alias Name: CD
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

Substance ID.: 121671
Haz Release ID: 383746
Qty Released: unknown
Date Released: unknown
Update Date: 12/02/1993
Update By: Not reported
Substance Code: 7440-47-3
Substance Name: CHROMIUM
Substance Abbrev.: Not reported
Substance Category ID: 8462
Substance Category: Inorganics
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8462
Substance Category: Inorganics
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319294
Sub Alias Name: CHROMIUM, TOTAL
Substance Alias ID: 318145
Sub Alias Name: CHROMIUM, INORGANIC
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

Substance ID.: 122008
Haz Release ID: 383510
Qty Released: unknown
Date Released: unknown
Update Date: 12/02/1993
Update By: Not reported
Substance Code: ECD266
Substance Name: TOTAL HYDROCARBONS (AS DIESEL)
Substance Abbrev.: Not reported
Substance Category ID: 8539
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8539
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: Not reported
Sub Alias Name: Not reported
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: 345837
Feature Id: Not reported
Hazard Release Id: 383510
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: 04/28/1992
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Up to 510 ppm
Last Update By: CONV
Update Date: 09/13/1994

OR ECSI NARR:
NARR ID: 5731255
NARR Code: Contamination
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:A surface water ditch located on the Murphy Co. property was sampled during an investigation of Dow Corning. Analysis indicated elevated levels of TCA. A sump located near Dow Corning's property serves as an oil/water separator and receives runoff from steam-cleaning operations at the Murphy Co. maintenance shop. (2/12/93 LSK) Corning remediated the contaminated soil associated with this area. Spent drums and waste-oil barrels are stored on uncontained dirt and gravel. In 1992, Murphy Co decommissioned two 1,000-gallon gasoline tanks and one 10,000-gallon diesel underground storage tank.

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

Approximately 400 cubic yards of contaminated soil were removed from the UST excavation. The soil was contaminated with total petroleum hydrocarbons. One area contained low levels of TCA. Additional sampling and soil removal occurred from an east west ditch located south of the maintenance shed. The ditch contained low levels of TCA near the Dow Corning property line. It does not appear that Murphy Co. is a significant source of TCA and TCE contamination to the local groundwater. Soils in the ditch were removed and added to contaminated soil pile. Performed geophysical survey in response to allegations of buried drums, but none were found - only buried metal cables. Contaminated soil pile being bioremediated on-site. Awaiting confirmation samples before closing XPA phase.

NARR ID: 5731256
NARR Code: Data Sources
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: Dow Corning Corp. Site Assessment 9/28/90; State Basic PA 6/91; Site Characterization Report 1/92

NARR ID: 5731257
NARR Code: Hazardous Substance/Waste Types
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: The main waste types associated with this facility are diesel, gasoline, oil & grease, and possibly solvents.

NARR ID: 5731258
NARR Code: Manner of Release
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: Past business practices.

NARR ID: 5731259
NARR Code: Remedial Action
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: (2/12/93 LSK) Petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylenes, 1,1,1-TCA, perchloroethene, lead, cadmium, and chromium were detected in soil and/or groundwater at the site. Dow Corning remediated contaminated soil from a former sump located near its own property boundary. About 400 cubic yards of contaminated soil were removed during the decommissioning of two 1,000-gallon and one 10,000-gallon UST. An additional 2 cubic yards of contaminated soil were removed from the east-west ditch located south of the maintenance shed. Confirmation sampling indicates that residual TPH contamination remains in the ditch area (510 ppm). It is unlikely that Murphy Co. is a potential source of TCA and TCE contamination in the local groundwater. DEQ's UST Program is investigating UST

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

releases/remediation (see LUST log #20-91-4286).

OR ECSI SITE CONTROL:

Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported
Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:

Permit Agency: DEQ
Permit Number: 1062
Permit Type: Industrial
Comments: Closed 1976.

OR ECSI Administrative Action:

Admin ID:	717005	Action ID:	9425
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	01/28/1991	Complete Date:	01/28/1991
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	EV	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	SITE EVALUATION		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	717006	Action ID:	9496
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	01/28/1991	Complete Date:	01/28/1991
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RPA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	State Basic Preliminary Assessment recommended (PA)		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	723605	Action ID:	9456
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	01/29/1991	Complete Date:	06/26/1991
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	BASIC PRELIMINARY ASSESSEMENT		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	723683	Action ID:	9510
Agency:	Dept Of Environmental Quality	Region:	Headquarters

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

Start Date: 06/26/1991 Complete Date: 06/26/1991
Substance Code: SAS Rank Value: 0
Employee Id: 466 Cleanup Flag: False
Created By: Not reported Created Date: 12/17/2002
Action Code: RXPA Category: Remedial Action
Action Flag: True Action Code Flag: False
Action: State Expanded Preliminary Assessment recommended (XPA)
Further Action: Not reported
Comments: Not reported

Admin ID: 723685 Action ID: 9520
Agency: Dept Of Environmental Quality Region: Headquarters
Start Date: 03/17/1992 Complete Date: 07/19/1992
Substance Code: SAS Rank Value: 0
Employee Id: 547 Cleanup Flag: False
Created By: Not reported Created Date: 12/17/2002
Action Code: XPA Category: Remedial Action
Action Flag: True Action Code Flag: False
Action: EXPANDED PRELIMINARY ASSESSMENT
Further Action: Not reported
Comments: Not reported

Admin ID: 729880 Action ID: 9443
Agency: Dept Of Environmental Quality Region: Western Region
Start Date: 06/28/1994 Complete Date: 06/28/1994
Substance Code: SAS Rank Value: Not reported
Employee Id: 725 Cleanup Flag: False
Created By: MENGLIS Created Date: 02/15/2005
Action Code: NFA Category: Remedial Action
Action Flag: True Action Code Flag: False
Action: NO FURTHER STATE ACTION REQUIRED
Further Action: 0
Comments: Not reported

Admin ID: 716255 Action ID: 9424
Agency: Dept Of Environmental Quality Region: Headquarters
Start Date: 01/17/1991 Complete Date: Not reported
Substance Code: SAS Rank Value: 0
Employee Id: 26 Cleanup Flag: False
Created By: Not reported Created Date: 12/17/2002
Action Code: ENTRY Category: Administrative Action
Action Flag: True Action Code Flag: False
Action: Site added to database
Further Action: Not reported
Comments: Not reported

Admin ID: 715741 Action ID: 9477
Agency: Dept Of Environmental Quality Region: Western Region
Start Date: 07/19/1992 Complete Date: Not reported
Substance Code: LUS Rank Value: 0
Employee Id: Not reported Cleanup Flag: False
Created By: Not reported Created Date: 12/17/2002
Action Code: REFL Category: Remedial Action
Action Flag: True Action Code Flag: False
Action: Refer to LUST Program
Further Action: Not reported
Comments: (LUST log #20-91-4286)

MURPHY CO. - SPRINGFIELD (Continued) **1006857090**

OR ECSI OPERATIONS:
Operation Id: 132373
Operation Status: Inactive
Common Name: Murphy Co. - Springfield
Yrs of Operation: 1968-1992
Comments: truck maintenance shop
Updated Date: 03/23/1995
Operations SIC Id: 194832
SIC Code: 7538
Created By: Not reported
Created Date: 12/17/2002

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
5 **WSW** **> 1** **1.382 mi.** **7296 ft.**	**BPA - ALVEY SUBSTATION** **86000 FRANKLIN BLVD.** **EUGENE, OR 97405**	**ECSI** **OR CRL**	**S104889566** **N/A**

Relative:
Higher

Actual:
473 ft.

OR ECSI:
State ID Number: 623
Study Area: False
Legislatve ID: 0
FACA ID: 1356
Lat/Long (dms): 44 0 1.10 / -123 1 1.60
Score Value: Not reported
Township Coord.: 18.00
Range Coord: 3.00
Section Coord: 14
Tax Lots: Not reported
NPL: False
Updated By: GWISTAR
Alias Name: Alvey Site
Alias Name: US DOE BPA - Alvey Substation

Brown ID: 0
Region ID: 3
Investigation ID: 207
Further Action: 258
County Code: 20.00
Cerclis ID: 8891406334
Township Zone: S
Range Zone: W
Qtr Section: Not reported
Size: 21 acres
Orphan: False
Update Date: 07/05/2007

OR ECSI HAZARDOUS RELEASE:
Substance ID.: 121639
Haz Release ID: 381911
Qty Released: Not reported
Date Released: Not reported
Update Date: 03/16/1999
Update By: Not reported
Substance Code: 7439-92-1
Substance Name: LEAD
Substance Abbrev.: Not reported
Substance Category ID: 8466
Substance Category: Inorganics
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8466
Substance Category: Inorganics
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319256
Sub Alias Name: PB
Comment ID: Not reported
Release Code: Not reported

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

Substance ID.: 121610
Haz Release ID: 385238
Qty Released: unknown
Date Released: mid 1987 or before
Update Date: 10/21/1988
Update By: Not reported
Substance Code: 71-55-6
Substance Name: TRICHLOROETHANE,1,1,1-
Substance Abbrev.: Not reported
Substance Category ID: 8521
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8552
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8521
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8552
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319183
Sub Alias Name: BALTANA
Substance Alias ID: 319184
Sub Alias Name: CHLOROTHENE
Substance Alias ID: 319185
Sub Alias Name: METHYLCHLOROFORM
Substance Alias ID: 318151
Sub Alias Name: TCA,1,1,1-
Comment ID: 304266

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Release Code: Data Sources
Release Comments: BPA sample test results
Sampling Result ID: 346860
Feature Id: Not reported
Hazard Release Id: 385238
Medium: 700
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 2,500 ppm
Last Update By: CONV
Update Date: 09/13/1994

Substance ID.: 121989
Haz Release ID: 385239
Qty Released: unknown
Date Released: Not reported
Update Date: 10/21/1988
Update By: Not reported
Substance Code: ECD200
Substance Name: OIL OR FUEL RELATED COMPOUNDS
Substance Abbrev.: Not reported
Substance Category ID: 8532
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8532
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: Not reported
Sub Alias Name: Not reported
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: 346454
Feature Id: Not reported
Hazard Release Id: 385239
Medium: 698
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Max Concentration: Not reported
Sample Comment: 108 ppm
Last Update By: CONV
Update Date: 09/13/1994
Sampling Result ID: 346455
Feature Id: Not reported
Hazard Release Id: 385239
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 7,800 ppm
Last Update By: CONV
Update Date: 09/13/1994

Substance ID.: 120919
Haz Release ID: 385240
Qty Released: Unknown
Date Released: Not reported
Update Date: 10/21/1988
Update By: Not reported
Substance Code: 11104-28-2
Substance Name: PCB 1221
Substance Abbrev.: Not reported
Substance Category ID: 8543
Substance Category: PCB Substances for the OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8543
Substance Category: PCB Substances for the OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 316591
Sub Alias Name: AROCHLOR 1221
Substance Alias ID: 316592
Sub Alias Name: AROCLOR 1221
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: 346456
Feature Id: Not reported
Hazard Release Id: 385240
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Sample Depth:	Not reported
Start Date:	Not reported
End Date:	Not reported
Min Concentration:	Not reported
Max Concentration:	Not reported
Sample Comment:	1015 ppm
Last Update By:	CONV
Update Date:	09/13/1994

Substance ID.:	121701
Haz Release ID:	385241
Qty Released:	unknown
Date Released:	Not reported
Update Date:	10/21/1988
Update By:	Not reported
Substance Code:	75-35-4
Substance Name:	DICHLOROETHYLENE,1,1-
Substance Abbrev.:	Not reported
Substance Category ID:	8512
Substance Category:	Volatiles
Category Level:	Not reported
Created By:	Not reported
Created Date:	12/17/2002
Substance Category ID:	8553
Substance Category:	Solvents of interest to Milwaukie Area GW study
Category Level:	Not reported
Created By:	Not reported
Created Date:	12/17/2002
Substance Category ID:	8512
Substance Category:	Volatiles
Category Level:	Not reported
Created By:	Not reported
Created Date:	12/17/2002
Substance Category ID:	8553
Substance Category:	Solvents of interest to Milwaukie Area GW study
Category Level:	Not reported
Created By:	Not reported
Created Date:	12/17/2002
Substance Alias ID:	319364
Sub Alias Name:	DICHLOROETHENE,1,1-
Substance Alias ID:	319365
Sub Alias Name:	DICHLOROETHYLENE,asym-
Substance Alias ID:	319366
Sub Alias Name:	ETHENE,1,1-DICHLORO-
Substance Alias ID:	319367
Sub Alias Name:	VINYLIDENE CHLORIDE
Comment ID:	Not reported
Release Code:	Not reported
Release Comments:	Not reported
Sampling Result ID:	346457
Feature Id:	Not reported
Hazard Release Id:	385241
Medium:	698
Substance Abbrev.:	Not reported
Unit Code:	Not reported
Observation:	False
Owner Operator:	False

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Lab Data: True
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 4 ppb
Last Update By: CONV
Update Date: 09/13/1994

OR ECSI NARR:
NARR ID: 5726864
NARR Code: Contamination
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Removal of three tanks in 1987. The tanks contained waste oil, diesel, and regular gas. The waste oil showed the presence of 1,1,1-trichloroethane as determined from sampling by the BPA. In 1987 BPA sampled soil in the area that was beneath the removed tanks. Sample results indicated presence of oil and grease and PCBs. No samples were taken of the soil for solvent analysis. Also, on 2/24/86, 125 gallons of insulating oil escaped from an oil storage containment facility at the BPA Alvey Substation. BPA estimated the oil contained PCBs at 2 to 5.1 ppm. Another UST (3,000 gal. leaded gasoline) was removed in October 1992. BTEX at levels below screening levels were detected under the concrete dispenser slab (soils). Groundwater had BTEX contamination below screening levels. PCB contamination has been detected at various locations on-site.

NARR ID: 5726865
NARR Code: Data Sources
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:1) EPA PA prepared by the BPA (2/20/90), including BPA's sampling results from 1987 tank removals; 2) EPA SI prepared for BPA by Riedel Environmental Services (6/22/90); 3) EPA correspondence; 4) Lab results

NARR ID: 5726866
NARR Code: Hazardous Substance/Waste Types
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:waste oil, diesel, regular gasoline, solvents, PCBs

NARR ID: 5726867
NARR Code: Site Location
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:At the intersection of Hwy 99 & I-5.

BPA - ALVEY SUBSTATION (Continued) **S104889566**

NARR ID: 5726868
NARR Code: Manner of Release
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: Releases associated with USTs (waste oil, gasoline, diesel fuel). PCBs in soils at various site locations including UST locations. Feb 1986 mineral oil spill.

NARR ID: 5726869
NARR Code: Media Contamination
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: Sample results of material in the waste oil tank indicated TCA present at 2,500 ppm. Soil and groundwater have been impacted. There is also a potential for migration to surface water via the site's drainage/dry well system.

NARR ID: 5726870
NARR Code: Pathways Other Hazards
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: PCBs, petroleum contamination in soils. VOCs and elevated arsenic and lead detected in groundwater.

NARR ID: 5726871
NARR Code: Remedial Action
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: BPA conducted cleanup actions for the 2/24/86 spill. (4/9/90 Al Goodman/EPA) EPA Region 10 has completed review of the PA/SI report for the Alvey Substation. The site does not score high enough to be proposed for the NPL. Therefore, no further federal action is recommended. EPA's decision does not relieve the facility from complying with Oregon regulations. The DEQ should be contacted to find out what activities may be required to comply with state cleanup standards. PAE completed 3/99. Medium priority for XPA. (4/11/01 GMW/SAS) BPA has characterized PCB contamination and plans to conduct a self-implementing removal action to clean up PCB-contaminated soil to 25 ppm or below. The 3/22/01 cover letter and report to EPA Region 10, entitled 30-Day Notification Report for Self Implementing On-Site Cleanup and Disposal of Polychlorinated Bipphenyl (PCB) Remediation Waste - Part 2 of 2, Site-Specific Facility Information, documents BPA's cleanup plans. BPA expects to complete this work by December 2001.

NARR ID: 5726872
NARR Code: Health Threats
Created By: Not reported
Created Date: 12/17/2002

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: Potential direct contact among on-site workers. Site is fenced. Public water lines serve area residences, lowering potential for groundwater impacts. There is the potential for impacts to surface water via facility's drywell/drainage system. VOCs have been detected on-site, although data is limited.

OR ECSI SITE CONTROL:
Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported
Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:
Permit Agency: Not reported
Permit Number: Not reported
Permit Type: Not reported
Comments: Not reported

OR ECSI Administrative Action:

Admin ID:	720293	Action ID:	9457
Agency:	Environmantal Protection Agency	Region:	Not reported
Start Date:	02/20/1990	Complete Date:	04/09/1991
Substance Code:	Not reported	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PA1	Category:	EPA Led Action
Action Flag:	True	Action Code Flag:	False
Action:	EPA Basic Preliminary Assessment		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	720431	Action ID:	9508
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	02/11/1994	Complete Date:	02/11/1994
Substance Code:	SAS	Rank Value:	0
Employee Id:	293	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RSSC	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Site Screening recommended (EV)		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	700252	Action ID:	9445
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	11/30/1988	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NOTIF	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Action:	Responsible party notified re 11/88 Inventory listing		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	707556	Action ID:	9465
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	03/15/1999	Complete Date:	04/23/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	730	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PRC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Facility proposed for Confirmed Release List		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	707557	Action ID:	9438
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	10/29/1999	Complete Date:	10/29/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	730	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	LSC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Facility placed on Confirmed Release List		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	706920	Action ID:	9510
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	04/26/1999	Complete Date:	04/26/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	2043	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RXPA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	State Expanded Preliminary Assessment recommended (XPA)		
Further Action:	Medium		
Comments:	Not reported		

Admin ID:	706921	Action ID:	9498
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	04/26/1999	Complete Date:	04/26/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	2043	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RPLC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Proposal for Confirmed Release List recommended		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	718431	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Not reported
Start Date:	10/21/1988	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	26	Cleanup Flag:	False

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Created By:	Not reported	Created Date:	12/17/2002
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	723497	Action ID:	9444
Agency:	Environmantal Protection Agency	Region:	Not reported
Start Date:	04/09/1991	Complete Date:	04/09/1991
Substance Code:	Not reported	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NFRAP	Category:	EPA Led Action
Action Flag:	True	Action Code Flag:	False
Action:	No Further Remedial Action Planned under Federal program		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	709031	Action ID:	9459
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	12/04/1998	Complete Date:	04/26/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	2043	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PAE	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	PRELIMINARY ASSESSMENT EQUIVALENT		
Further Action:	Not reported		
Comments:	State screening.		

Admin ID:	708785	Action ID:	9425
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	12/04/1998	Complete Date:	04/26/1999
Substance Code:	SAS	Rank Value:	0
Employee Id:	2043	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	EV	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	SITE EVALUATION		
Further Action:	Not reported		
Comments:	State screening		

Admin ID:	716075	Action ID:	9421
Agency:	Environmantal Protection Agency	Region:	Not reported
Start Date:	11/16/1988	Complete Date:	Not reported
Substance Code:	Not reported	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	DS1	Category:	EPA Led Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to CERCLIS		
Further Action:	Not reported		
Comments:	Not reported		

OR ECSI OPERATIONS:

Operation Id:	131932
Operation Status:	Active

BPA - ALVEY SUBSTATION (Continued) **S104889566**

Common Name: BPA Alvey Substation
Yrs of Operation: unknown
Comments: electrical substation
Updated Date: 03/22/1995
Operations SIC Id: 195111
SIC Code: 4911
Created By: Not reported
Created Date: 12/17/2002

CRL:
Facility ID: 623
Location ID: 1356
Status Code: LIS
Facility Status: State Expanded Preliminary Assessment recommended (XPA)
Lat/Long: 44.0003 / -123.0171

6
North
> 1
1.420 mi.
7499 ft.

JUNKYARD JOHN'S
246 S 16TH ST.
SPRINGFIELD, OR 97477

ECSI
OR CRL
VCP

S103842787
N/A

Relative:
Higher

Actual:
470 ft.

OR ECSI:

State ID Number:	1880	Brown ID:	0
Study Area:	False	Region ID:	3
Legislatve ID:	0	Investigation ID:	207
FACA ID:	40421	Further Action:	260
Lat/Long (dms):	44 2 37.00 / -123 0 3.00	County Code:	20.00
Score Value:	Not reported	Cerclis ID:	Not reported
Township Coord.:	17.00	Township Zone:	S
Range Coord:	3.00	Range Zone:	W
Section Coord:	36	Qtr Section:	Not reported
Tax Lots:	Not reported	Size:	1 acre
NPL:	False	Orphan:	False
Updated By:	GWISTAR	Update Date:	02/25/2009
Alias Name:	K&S Auto Recyclers		

OR ECSI HAZARDOUS RELEASE:
Substance ID.: 122012
Haz Release ID: 379949
Qty Released: Not reported
Date Released: Not reported
Update Date: 08/10/2001
Update By: Not reported
Substance Code: ECD275
Substance Name: TOTAL PETROLEUM HYDROCARBONS (TPH)
Substance Abbrev.: Not reported
Substance Category ID: 8540
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8540
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: Not reported

JUNKYARD JOHN'S (Continued) **S103842787**

Sub Alias Name: Not reported
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: 338691
Feature Id: Not reported
Hazard Release Id: 379949
Medium: 703
Substance Abbrev.: Not reported
Unit Code: 110
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: 08/13/2001
End Date: 08/13/2001
Min Concentration: 263.00
Max Concentration: .00
Sample Comment: 263 mg/Kg TPH - oil
Last Update By: mme
Update Date: 10/08/2001
Sampling Result ID: 338692
Feature Id: Not reported
Hazard Release Id: 379949
Medium: 703
Substance Abbrev.: Not reported
Unit Code: 110
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: 08/13/2001
End Date: 08/13/2001
Min Concentration: 211.00
Max Concentration: .00
Sample Comment: 211 mg/Kg TPH - Diesel
Last Update By: mme
Update Date: 10/08/2001

Substance ID.: 122002
Haz Release ID: 379951
Qty Released: Not reported
Date Released: Not reported
Update Date: 08/10/2001
Update By: Not reported
Substance Code: ECD243
Substance Name: POLYAROMATIC HYDROCARBONS (PAH)
Substance Abbrev.: Not reported
Substance Category ID: Not reported
Substance Category: Not reported
Category Level: Not reported
Created By: Not reported
Created Date: Not reported
Substance Category ID: Not reported
Substance Category: Not reported
Category Level: Not reported
Created By: Not reported

JUNKYARD JOHN'S (Continued) **S103842787**

Created Date: Not reported
Substance Alias ID: 318143
Sub Alias Name: PAH
Substance Alias ID: 318148
Sub Alias Name: POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
Substance Alias ID: 318149
Sub Alias Name: POLYNUCLEAR AROMATIC HYDROCARBINS (PNA)
Substance Alias ID: 318150
Sub Alias Name: PNA
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: 338693
Feature Id: Not reported
Hazard Release Id: 379951
Medium: 703
Substance Abbrev.: Not reported
Unit Code: 110
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: 08/13/2001
End Date: 08/13/2001
Min Concentration: .01
Max Concentration: 5.03
Sample Comment: 0.0176 - 5.03 mg/Kg
Last Update By: mme
Update Date: 10/08/2001

Substance ID.: 121994
Haz Release ID: 380499
Qty Released: unk
Date Released: unk
Update Date: 09/07/1996
Update By: Not reported
Substance Code: ECD222
Substance Name: PETROLEUM
Substance Abbrev.: Not reported
Substance Category ID: 8533
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8533
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: Not reported
Sub Alias Name: Not reported
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: 342191
Feature Id: Not reported
Hazard Release Id: 380499

JUNKYARD JOHN'S (Continued) **S103842787**

Medium:	703
Substance Abbrev.:	Not reported
Unit Code:	Not reported
Observation:	True
Owner Operator:	False
Lab Data:	False
Sample Depth:	Not reported
Start Date:	Not reported
End Date:	Not reported
Min Concentration:	Not reported
Max Concentration:	Not reported
Sample Comment:	No sample data, visual confirmation of heavy staining
Last Update By:	kna
Update Date:	07/09/1996

OR ECSI NARR:

NARR ID:	5735988
NARR Code:	Contamination
Created By:	Not reported
Created Date:	12/17/2002
Updated By:	Not reported
Updated Date:	12/17/2002
NARR Comments:	(7/10/96 KNA) This site came to the attention of DEQ when a complainant alleged that petroleum products were migrating via storm water runoff onto an adjacent property. A site visit revealed extensive stained soils on the adjacent property, along with a trash pile and two tire piles.

NARR ID:	5735989
NARR Code:	Hazardous Substance/Waste Types
Created By:	Not reported
Created Date:	12/17/2002
Updated By:	Not reported
Updated Date:	12/17/2002
NARR Comments:	Petroleum products, including oil and possibly gasoline

NARR ID:	5735990
NARR Code:	Manner of Release
Created By:	Not reported
Created Date:	12/17/2002
Updated By:	Not reported
Updated Date:	12/17/2002
NARR Comments:	Past practices

NARR ID:	5735991
NARR Code:	Pathways Other Hazards
Created By:	Not reported
Created Date:	12/17/2002
Updated By:	Not reported
Updated Date:	12/17/2002
NARR Comments:	Potential human exposure to contaminants at the site exist through direct contact with soils. Possible receptors include industrial workers and construction workers. Potential routes of exposure include skin contact, inhalation and incidental ingestion. Static groundwater levels in the vicinity range from 2-13 feet. The regional movement of groundwater is west-northwest, generally towards the confluence of the Willamette and McKenzie Rivers.

JUNKYARD JOHN'S (Continued) **S103842787**

NARR ID: 5735992
NARR Code: Remedial Action
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:(7/10/96 KNA) PA recommended, low priority. (10/5/01 M2C/VCP) Soil samples were collected June 25, 2001 from four test pits, and analyzed for TPH. Additional samples were collected August 13, 2001 to evaluate the northeast area where TPH was detected; they were analyzed for TPH, VOCs, PAHs, and metals (Cd, Cr, Pb). TPH, PAHs, and metals were detected in soil, but at levels below EPA's Preliminary Remediation Goals. A Partial No Further Action was issued for soil contamination. Groundwater and sediments in the drainage ditch were not evaluated during this investigation.

NARR ID: 5735993
NARR Code: Health Threats
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Soils have been impacted.

OR ECSI SITE CONTROL:
Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported
Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:
Permit Agency: Not reported
Permit Number: Not reported
Permit Type: Not reported
Comments: Not reported

OR ECSI Administrative Action:

Admin ID:	700434	Action ID:	9437
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	07/08/1996	Complete Date:	07/09/1996
Substance Code:	VCS	Rank Value:	0
Employee Id:	179	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	LRC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Listing Review completed		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	725646	Action ID:	9435
Agency:	Dept Of Environmental Quality	Region:	0
Start Date:	09/25/2001	Complete Date:	Not reported
Substance Code:	ICP	Rank Value:	Not reported

JUNKYARD JOHN'S (Continued) **S103842787**

Employee Id:	2197	Cleanup Flag:	False
Created By:	MENGLIS	Created Date:	03/24/2003
Action Code:	ICP	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Independent Cleanup Program		
Further Action:	0		
Comments:	Not reported		

Admin ID:	702474	Action ID:	9456
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	09/25/2001	Complete Date:	09/28/2001
Substance Code:	VCP	Rank Value:	0
Employee Id:	2197	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	BASIC PRELIMINARY ASSESSEMENT		
Further Action:	Not reported		
Comments:	File review summary		

Admin ID:	702477	Action ID:	9463
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	10/09/2001	Complete Date:	10/09/2001
Substance Code:	VCP	Rank Value:	0
Employee Id:	2197	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PNFA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Partial No Further Action		
Further Action:	0		
Comments:	PNFA for soil only.		

Admin ID:	711148	Action ID:	9496
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	07/10/1996	Complete Date:	07/10/1996
Substance Code:	VCS	Rank Value:	0
Employee Id:	179	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RPA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	State Basic Preliminary Assessment recommended (PA)		
Further Action:	Low		
Comments:	Not reported		

Admin ID:	711149	Action ID:	9498
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	07/09/1996	Complete Date:	07/09/1996
Substance Code:	VCS	Rank Value:	0
Employee Id:	179	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RPLC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Proposal for Confirmed Release List recommended		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	711776	Action ID:	9438

JUNKYARD JOHN'S (Continued) **S103842787**

Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	03/18/1997	Complete Date:	03/18/1997
Substance Code:	SAS	Rank Value:	0
Employee Id:	730	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	LSC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Facility placed on Confirmed Release List		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	711379	Action ID:	9465
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	01/03/1997	Complete Date:	01/03/1997
Substance Code:	VCS	Rank Value:	0
Employee Id:	179	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PRC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Facility proposed for Confirmed Release List		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	712811	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	07/08/1996	Complete Date:	Not reported
Substance Code:	VCS	Rank Value:	0
Employee Id:	179	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	712812	Action ID:	9425
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	07/08/1996	Complete Date:	07/09/1996
Substance Code:	VCS	Rank Value:	0
Employee Id:	179	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	EV	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	SITE EVALUATION		
Further Action:	Not reported		
Comments:	state		

OR ECSI OPERATIONS:

Operation Id:	133169
Operation Status:	Unknown
Common Name:	Junkyard John's
Yrs of Operation:	Not reported
Comments:	Not reported
Updated Date:	10/08/2001
Operations SIC Id:	Not reported
SIC Code:	Not reported
Created By:	Not reported
Created Date:	Not reported

JUNKYARD JOHN'S (Continued) **S103842787**

CRL:
Facility ID: 1880
Location ID: 40421
Status Code: LIS
Facility Status: Partial No Further Action
Lat/Long: 44.0436 / -123.0008

VCS:
ECS Site ID: 1880
CRL: LIS
Facility Size: 1 acre
Action: Partial No Further Action
Start Date: 2001-10-09
End Date: 2001-10-09
Project Manager Name: Mary Camarata
Program: VCP

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7 **WSW** **> 1** **1.443 mi.** **7619 ft.**	**PRIDE OF OREGON - MCVAY** **86714 MCVAY HWY** **EUGENE, OR 97405**	**ECSI** **LUST** **VCP** **BROWNFIELDS**	**S105247164** **N/A**

Relative:
Higher

Actual:
486 ft.

OR ECSI:
State ID Number: 4444
Study Area: False
Legislatve ID: 0
FACA ID: 89276
Lat/Long (dms): 44 1 5.90 / -123 1 33.60
Score Value: Not reported
Township Coord.: 18.00
Range Coord: 3.00
Section Coord: 11
Tax Lots: Not reported
NPL: False
Updated By: BTHOMS
Alias Name: SeQuential Biofuels
Alias Name: Franko Station #15 (Former)

Brown ID: Brownfield Site - DEQ Funding Assistance
Region ID: 3
Investigation ID: 208
Further Action: 0
County Code: 20.00
Cerclis ID: Not reported
Township Zone: S
Range Zone: W
Qtr Section: Not reported
Size: 0.7 acre
Orphan: False
Update Date: 12/18/2006

OR ECSI HAZARDOUS RELEASE:
Substance ID.: Not reported
Haz Release ID: Not reported
Qty Released: Not reported
Date Released: Not reported
Update Date: Not reported
Update By: Not reported
Substance Code: Not reported
Substance Name: Not reported
Substance Abbrev.: Not reported
Substance Category ID: Not reported
Substance Category: Not reported
Category Level: Not reported
Created By: Not reported
Created Date: Not reported
Substance Category ID: Not reported
Substance Category: Not reported
Category Level: Not reported

PRIDE OF OREGON - MCVAY (Continued) **S105247164**

Created By: Not reported
Created Date: Not reported
Substance Alias ID: Not reported
Sub Alias Name: Not reported
Comment ID: Not reported
Release Code: Not reported
Release Comments: Not reported
Sampling Result ID: Not reported
Feature Id: Not reported
Hazard Release Id: Not reported
Medium: Not reported
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: Not reported
Owner Operator: Not reported
Lab Data: Not reported
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: Not reported
Update Date: Not reported

OR ECSI NARR:
NARR ID: 5747006
NARR Code: General Site Description
Created By: GWISTAR
Created Date: 08/11/2005
Updated By: GWISTAR
Updated Date: 08/11/2005
NARR Comments: A residential area of single-family homes is located directly west of the site. The former service station building, canopy, and dispenser islands currently occupy the site. No business has operated at the site since 2003.

NARR ID: 5746827
NARR Code: Hazardous Substance/Waste Types
Created By: MENGLIS
Created Date: 07/12/2005
Updated By: MENGLIS
Updated Date: 07/12/2005
NARR Comments: In January 2005, more than 400 tires and 15 drums of investigation derived waste were removed from the site.

NARR ID: 5746818
NARR Code: Site Location
Created By: MENGLIS
Created Date: 07/12/2005
Updated By: GWISTAR
Updated Date: 08/11/2005
NARR Comments: This site is located along a commercial corridor adjacent to Interstate 5 in southeast Eugene.

NARR ID: 5746826
NARR Code: Site Ownership
Created By: MENGLIS

PRIDE OF OREGON - MCVAY (Continued) **S105247164**

Created Date: 07/12/2005
Updated By: MENGLIS
Updated Date: 07/12/2005
NARR Comments:Lane County obtained the site in September 2004 through tax foreclosure.

NARR ID: 5746822
NARR Code: Remedial Action
Created By: MENGLIS
Created Date: 07/12/2005
Updated By: BTHOMS
Updated Date: 12/18/2006
NARR Comments:(7/12/05) A Site-Specific Assessment (SSA) at the McVay Highway Project Site, also known as the former Franko Station #15, located at 86714 McVay Highway in Eugene, Oregon was completed on June 17, 2005. Information and data gathered during the assessment will be used in cleaning up and redeveloping the site. Site redevelopment as a biofueling facility is expected to begin in August 2005 simultaneously with cleanup under an EPA Brownfield Cleanup Grant that was awarded during May 2005.

(12/06 BET) EPA Brownfield grant awarded in 2005, soil removal and additional soil and groundwater assesment conducted in 2005 and early 2006. One extraction is currently pumping groundwater and treating on site. Site was redeveloped as retail biofuel station. Soil cleanup completed, groundwater cleanup continuing.

NARR ID: 5746828
NARR Code: Site History
Created By: MENGLIS
Created Date: 07/12/2005
Updated By: GWISTAR
Updated Date: 10/23/2006
NARR Comments:The former Franko facility at 86741 McVay Highway in Eugene sold gasoline from 1976 until it closed in 1991, when Mid Oil Company and Franko Oil Company filed Chapter 7 bankruptcy. The property was turned over to the bankruptcy estate.

In 1991, petroleum contamination was observed along McVay highway (east of the site) during utility trenching. The contamination had also migrated off site to a residential well west of the facility.
In 1996, Lucky Sites LLC purchased the property out of bankruptcy, removed the five underground storage tanks and excavated contaminated soil. Further assessment, including installation of groundwater monitoring wells, identified the pump-islands as the primary source of petroleum contamination at the site.

The site continued to fall into disrepair after several years of n eglect. Lane County acquired the property through tax foreclosure in 2004. In January 2005, the county removed over 400 tires, 15 drums of investigation wastes, hundreds of needles and other debris from the property.

At about the same time, Lane County entered into negotiations with DEQ and SeQuential Biofuels to reuse the site. This included a Prospective Purchaser Agreement between DEQ and the county. Lane County also applied for a Brownfields Cleanup Grant from EPA to

PRIDE OF OREGON - MCVAY (Continued) **S105247164**

facilitate cleanup and redevelopment, and EPA awarded the grant in the Spring of 2005.

OR ECSI SITE CONTROL:
Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported
Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:
Permit Agency: Not reported
Permit Number: Not reported
Permit Type: Not reported
Comments: Not reported

OR ECSI Administrative Action:
Admin ID: 730623 Action ID: 9424
Agency: Dept Of Environmental Quality Region: Not reported
Start Date: 07/12/2005 Complete Date: 07/12/2005
Substance Code: Not reported Rank Value: Not reported
Employee Id: 2202 Cleanup Flag: False
Created By: MENGLIS Created Date: 07/12/2005
Action Code: ENTRY Category: Administrative Action
Action Flag: True Action Code Flag: False
Action: Site added to database
Further Action: Not reported
Comments: Not reported

Admin ID: 730624 Action ID: 9518
Agency: Dept Of Environmental Quality Region: Western Region
Start Date: 05/10/2005 Complete Date: 06/17/2005
Substance Code: Not reported Rank Value: Not reported
Employee Id: 2033 Cleanup Flag: False
Created By: MENGLIS Created Date: 07/12/2005
Action Code: TBA Category: Remedial Action
Action Flag: True Action Code Flag: False
Action: TARGETED BROWNFIELD ASSESSMENT
Further Action: 0
Comments: Not reported

Admin ID: 731052 Action ID: 9464
Agency: Dept Of Environmental Quality Region: Western Region
Start Date: 03/11/2005 Complete Date: 07/19/2005
Substance Code: CPD Rank Value: Not reported
Employee Id: 2097 Cleanup Flag: False
Created By: GWISTAR Created Date: 09/22/2005
Action Code: PPA Category: Remedial Action
Action Flag: True Action Code Flag: False
Action: Prospective Purchaser Agreement
Further Action: 0
Comments: PPA #05-03: SeQuential Retail Station #1 LLC.

Admin ID: 731227 Action ID: 9491

PRIDE OF OREGON - MCVAY (Continued) **S105247164**

Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	10/01/2005	Complete Date:	Not reported
Substance Code:	VCS	Rank Value:	Not reported
Employee Id:	2033	Cleanup Flag:	False
Created By:	GWISTAR	Created Date:	10/26/2005
Action Code:	RM	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	REMOVAL		
Further Action:	0		
Comments:	Funded by EPA brownfield grant.		

OR ECSI OPERATIONS:

Operation Id:	Not reported
Operation Status:	Not reported
Common Name:	Not reported
Yrs of Operation:	Not reported
Comments:	Not reported
Updated Date:	Not reported
Operations SIC Id:	Not reported
SIC Code:	Not reported
Created By:	Not reported
Created Date:	Not reported

LUST:

Region:	Western Region
Facility ID:	20-89-4181
Cleanup Received Date:	12/27/1989
Cleanup Start Date:	04/17/1991
Cleanup Complete Date:	**04/17/1991**

VCS:

ECS Site ID:	4444
CRL:	SUS
Facility Size:	0.7 acre
Action:	REMOVAL
Start Date:	2005-10-01
End Date:	Not reported
Project Manager Name:	Bryn Thoms
Program:	VCS

OR BROWNFIELDS:

Lat/Long: 44.018300000000004 / -123.026

8
North
> 1
1.467 mi.
7743 ft.

DOW CORNING - SPRINGFIELD PLANT
1801 S "A" ST.
SPRINGFIELD, OR 97477

ECSI **S110638471**
ENG CONTROLS **N/A**
VCP

Relative:
Higher

Actual:
471 ft.

OR ECSI:

State ID Number:	694	Brown ID:	0
Study Area:	False	Region ID:	3
Legislatve ID:	831	Investigation ID:	206
FACA ID:	4928	Further Action:	0
Lat/Long (dms):	44 2 38.80 / -122 59 55.30	County Code:	20.00
Score Value:	Not reported	Cerclis ID:	Not reported
Township Coord.:	17.00	Township Zone:	S

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Range Coord:	3.00	Range Zone:	W
Section Coord:	36	Qtr Section:	Not reported
Tax Lots:	401,300	Size:	13.9 acres
NPL:	False	Orphan:	False
Updated By:	Not reported	Update Date:	Not reported
Alias Name:	National Metallurgical		
Alias Name:	Globe Metallurgical, Inc.		

OR ECSI HAZARDOUS RELEASE:

Substance ID.: 121011
Haz Release ID: 383992
Qty Released: unknown
Date Released: uknown
Update Date: 09/20/1988
Update By: Not reported
Substance Code: 127-18-4
Substance Name: TETRACHLOROETHYLENE
Substance Abbrev.: Not reported
Substance Category ID: 8519
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8551
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8519
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8551
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 316912
Sub Alias Name: ETHENE,TETRACHLORO-
Substance Alias ID: 316913
Sub Alias Name: ETHYLENE TETRACHLORIDE
Substance Alias ID: 316914
Sub Alias Name: PERCHLOROETHYLENE
Substance Alias ID: 316915
Sub Alias Name: PERCLENE
Substance Alias ID: 316916
Sub Alias Name: TETRACHLOROETHENE
Substance Alias ID: 316917
Sub Alias Name: TETRACHLOROETHENE,1,1,2,2-
Substance Alias ID: 316918
Sub Alias Name: TETRACHLOROETHYLENE,1,1,2,2-
Comment ID: 304412
Release Code: Data Sources
Release Comments: Russ Fetrow Eng. report (9/28/90)
Sampling Result ID: 344309
Feature Id: Not reported
Hazard Release Id: 383992

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Medium: 698
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 18 ppb
Last Update By: CONV
Update Date: 09/13/1994
Sampling Result ID: 344310
Feature Id: Not reported
Hazard Release Id: 383992
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 57 ppm
Last Update By: CONV
Update Date: 09/13/1994

Substance ID.: 121701
Haz Release ID: 385317
Qty Released: unknown
Date Released: unknown
Update Date: 09/20/1988
Update By: Not reported
Substance Code: 75-35-4
Substance Name: DICHLOROETHYLENE,1,1-
Substance Abbrev.: Not reported
Substance Category ID: 8512
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8553
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8512
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8553

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319364
Sub Alias Name: DICHLOROETHENE,1,1-
Substance Alias ID: 319365
Sub Alias Name: DICHLOROETHYLENE,asym-
Substance Alias ID: 319366
Sub Alias Name: ETHENE,1,1-DICHLORO-
Substance Alias ID: 319367
Sub Alias Name: VINYLIDENE CHLORIDE
Comment ID: 304415
Release Code: Data Sources
Release Comments: Russ Fetrow Eng. report (9/28/90)
Sampling Result ID: 346542
Feature Id: Not reported
Hazard Release Id: 385317
Medium: 698
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 190 ppb
Last Update By: CONV
Update Date: 09/13/1994

Substance ID.: 120919
Haz Release ID: 385355
Qty Released: unknown
Date Released: 1984 - PCB leak
Update Date: 09/20/1988
Update By: Not reported
Substance Code: 11104-28-2
Substance Name: PCB 1221
Substance Abbrev.: Not reported
Substance Category ID: 8543
Substance Category: PCB Substances for the OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8543
Substance Category: PCB Substances for the OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 316591
Sub Alias Name: AROCHLOR 1221
Substance Alias ID: 316592
Sub Alias Name: AROCLOR 1221
Comment ID: 304411

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Release Code: Data Sources
Release Comments: Russ Fetrow Eng. report (9/28/90)
Sampling Result ID: 346539
Feature Id: Not reported
Hazard Release Id: 385355
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 2 ppm
Last Update By: CONV
Update Date: 09/13/1994

Substance ID.: 121988
Haz Release ID: 385356
Qty Released: unknown
Date Released: unknown
Update Date: 09/20/1988
Update By: Not reported
Substance Code: ECD198
Substance Name: OIL - LUBRICATING
Substance Abbrev.: Not reported
Substance Category ID: 8531
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8531
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: Not reported
Sub Alias Name: Not reported
Comment ID: 304417
Release Code: Data Sources
Release Comments: Russ Fetrow Engineering GW investigation (11/88); RF Eng. report (9/28/90)
Sampling Result ID: 344314
Feature Id: Not reported
Hazard Release Id: 385356
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 31,000 ppm
Last Update By: CONV
Update Date: 09/13/1994
Sampling Result ID: 346870
Feature Id: Not reported
Hazard Release Id: 385356
Medium: 698
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 0.9 ppm
Last Update By: CONV
Update Date: 09/13/1994

Substance ID.: 121700
Haz Release ID: 385357
Qty Released: unknown
Date Released: unknown
Update Date: 09/20/1988
Update By: Not reported
Substance Code: 75-34-3
Substance Name: DICHLOROETHANE,1,1-
Substance Abbrev.: Not reported
Substance Category ID: 8548
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8548
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319361
Sub Alias Name: ETHANE,1,1-DICHLORO-
Substance Alias ID: 319362
Sub Alias Name: ETHYLIDENE CHLORIDE
Substance Alias ID: 319363
Sub Alias Name: ETHYLIDENE DICHLORIDE
Comment ID: 304414
Release Code: Data Sources
Release Comments: Russ Fetrow Eng. report (9/28/90)
Sampling Result ID: 344312
Feature Id: Not reported
Hazard Release Id: 385357
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 1.2 ppm
Last Update By: CONV
Update Date: 09/13/1994
Sampling Result ID: 346541
Feature Id: Not reported
Hazard Release Id: 385357
Medium: 698
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 105 ppb
Last Update By: CONV
Update Date: 09/13/1994

Substance ID.: 121781
Haz Release ID: 385358
Qty Released: unknown
Date Released: unknown
Update Date: 09/20/1988
Update By: Not reported
Substance Code: 79-01-6
Substance Name: TRICHLOROETHYLENE
Substance Abbrev.: Not reported
Substance Category ID: 8523
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8545
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8523
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8545
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Created Date:	12/17/2002
Substance Alias ID:	317517
Sub Alias Name:	ETHINYL TRICHLORIDE
Substance Alias ID:	317518
Sub Alias Name:	ETHYLENE TRICHLORIDE
Substance Alias ID:	317519
Sub Alias Name:	TCE
Substance Alias ID:	317520
Sub Alias Name:	TRI-CLENE
Substance Alias ID:	317521
Sub Alias Name:	TRICHLOROETHENE
Comment ID:	304416
Release Code:	Data Sources
Release Comments:	Russ Fetrow Eng. report (9/28/90)
Sampling Result ID:	344313
Feature Id:	Not reported
Hazard Release Id:	385358
Medium:	703
Substance Abbrev.:	Not reported
Unit Code:	Not reported
Observation:	False
Owner Operator:	False
Lab Data:	True
Sample Depth:	Not reported
Start Date:	Not reported
End Date:	Not reported
Min Concentration:	Not reported
Max Concentration:	Not reported
Sample Comment:	2.1 ppm
Last Update By:	CONV
Update Date:	09/13/1994
Sampling Result ID:	345305
Feature Id:	Not reported
Hazard Release Id:	385358
Medium:	698
Substance Abbrev.:	Not reported
Unit Code:	Not reported
Observation:	False
Owner Operator:	False
Lab Data:	True
Sample Depth:	Not reported
Start Date:	Not reported
End Date:	Not reported
Min Concentration:	Not reported
Max Concentration:	Not reported
Sample Comment:	19 ppb
Last Update By:	CONV
Update Date:	09/13/1994

Substance ID.:	121610
Haz Release ID:	385359
Qty Released:	unknown
Date Released:	1953 to present
Update Date:	09/20/1988
Update By:	Not reported
Substance Code:	71-55-6
Substance Name:	TRICHLOROETHANE,1,1,1-

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Substance Abbrev.: Not reported
Substance Category ID: 8521
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8552
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8521
Substance Category: Volatiles
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8552
Substance Category: Solvents of interest to Milwaukie Area GW study
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: 319183
Sub Alias Name: BALTANA
Substance Alias ID: 319184
Sub Alias Name: CHLOROTHENE
Substance Alias ID: 319185
Sub Alias Name: METHYLCHLOROFORM
Substance Alias ID: 318151
Sub Alias Name: TCA,1,1,1-
Comment ID: 304413
Release Code: Data Sources
Release Comments: Russ Fetrow Eng. report (9/28/90)
Sampling Result ID: 344311
Feature Id: Not reported
Hazard Release Id: 385359
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: True
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: 120 ppm
Last Update By: CONV
Update Date: 09/13/1994
Sampling Result ID: 346540
Feature Id: Not reported
Hazard Release Id: 385359
Medium: 698
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Lab Data:	True
Sample Depth:	Not reported
Start Date:	Not reported
End Date:	Not reported
Min Concentration:	Not reported
Max Concentration:	Not reported
Sample Comment:	5,200 ppb
Last Update By:	CONV
Update Date:	09/13/1994

OR ECSI NARR:

NARR ID: 5745555
NARR Code: Site Contacts
Created By: NGRAMLI
Created Date: 09/28/2004
Updated By: NGRAMLI
Updated Date: 01/04/2005
NARR Comments:Dan
Fischl Invoices Springfield Aster, LLC One Penn Plaza, Suite 2514
New York, NY
10119 Phone # (212)-798-8100 Ted Heilman (owner) (P) 212-798-8126 (F) 212-798-8180 PR Contact John C. Leighton Corporate Asset Advisors
551 NW 77th Street, Suite 201 Boca Raton, FL 33487 (P) 561-997-2720
(F) 561-997-2391 (C) 954-494-3318 jleighton@caai.com www.caai.com

NARR ID: 5727084
NARR Code: Contamination
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:(1/17/1996 JAK/SRS) Site investigations at the Dow Corning facility from 1988 through 1992 showed volatile organics in soil and groundwater at the site. Groundwater samples collected from one of the wells exceeded drinking water standards for TCA, TCE, and DCE. Dow entered into a letter agreement with DEQ in April 1989. Investigations conducted from August through October 1989 included soil and groundwater sampling and a soil gas survey. Corrective measures included excavation of contaminated soils from three source areas at the site in November 1989. Dow agreed to conduct quarterly groundwater monitoring. Results of groundwater sampling in September 1990 indicated an increase in contaminant levels from June 1990. DEQ notified Dow that additional investigation would be necessary under a Consent Order. The Consent Order was signed on 2/25/92, with a final work plan approved by DEQ on 6/17/92.

NARR ID: 5727085
NARR Code: Data Sources
Created By: Not reported
Created Date: 12/17/2002
Updated By: NGRAMLI
Updated Date: 01/04/2005
NARR Comments:ICP project manager
files 1) Environmental Summary Report, Former Globe Metallurgical Facility, ERM, February 2004; 2) Statistical Analysis of GW at 1801

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Aster Street, Dow Corning, Cascade Pacific Engineering, January 1996; 3) Final Remediation Action Report, Former Globe Metallurgical Facility, Springfield, OR, ERM, November 18, 2004; 4) Draft - Final Remediation Action Report, Former Globe Metallurgical Facility, Springfield, OR, ERM, December 2004; 5) Results of Interim Measures Conducted at Dow Corning Plant Springfield, OR, prepared by Russ Fetrow Engineering Inc., January 1990; 6) DEQ Consent Order No. ECSR-WVR-91-10, February 1992; 7) Dow Corning Corporation v Springfield Plant DEQ No. ECSR-WVR-91-10 Results of Soil Sampling Conducted August 1992, prepared by Cascade Pacific, October 16, 1992; 8) Record of Decision, Selected Remedial Action, Dow Corning Corporation, Springfield Oregon, prepared by DEQ, September 1993; 9) DEQ Consent Order No. ECSR-WVR-91-10 Addendum, January 1994; 10) DEQ, UPPR Eugene Yard: Irrigation with Groundwater Containing VOCs Fact Sheet, dated June 4, 2001 11) Solvent Stabilizers White Paper, Thomas Mohr, Santa Clara Water District, June 14, 2001.

NARR ID: 5727086
NARR Code: Hazardous Substance/Waste Types
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:PCBs, oil, trichloroethene, 1,1,1-trichloroethane, perchloroethene, methylene chloride, 1,1-dichloroethene, 1,1-dichloroethane, 1,2-dichloroethane

NARR ID: 5727087
NARR Code: Manner of Release
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:PCB-leaking underground storage tank (UST) and transformer fluid catch tank area; buried drum in maintenance shop historically used to collect waste oil and spent solvents; steam cleaning area and drainage ditch. Time of release unknown (except for PCB leak in 1984). Not reported

NARR ID: 5727088
NARR Code: Site Ownership
Created By: Not reported
Created Date: 12/17/2002
Updated By: NGRAMLI
Updated Date: 02/02/2005
NARR Comments:Globe Metallurgical Inc purchased the facility in June 1993. Springfield-Aster LLC is the current owner of the site.

NARR ID: 5727089
NARR Code: Pathways Other Hazards
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Groundwater is close to the ground surface in the vicinity of the source areas. Results of a door-to-door well use survey indicated only 1 of 93 private wells identified near the Dow facility was used

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

for domestic purposes (and this well is not located directly hydraulically downgradient, but rather side-gradient, so the potential for migration impact is low). A neighboring facility with a maintenance shop, the Murphy Company, may have contributed to the contamination detected in the area groundwater. See ECSI #1062 for more information.

NARR ID: 5727090
NARR Code: Remedial Action
Created By: Not reported
Created Date: 12/17/2002
Updated By: GWISTAR
Updated Date: 03/01/2005
NARR Comments:(1/17/1996 JAK/SRS) DEQ entered into a Consent Order with Dow Corning in February 1992. A Remedial Investigation was conducted from July to September 1992. Results of the investigation showed that low levels of volatile organics remain in groundwater at the site. Based on results of site investigations and source-removal activities conducted at the site, the need for additional remediation at the site is not warranted at this time. Although contaminants are present in groundwater above background levels, there is no current threat to human health or the environment, based on the limited extent of contamination, low concentrations present, and lack of exposure pathways. In September 1993, DEQ issued a Record of Decision (ROD) based on the investigative data collected from 1988 into 1992. The ROD specified the remaining cleanup actions for the contaminated groundwater at the site. In January 1994, the Consent Order was amended to incorporate the final cleanup actions of the ROD. Monitoring was conducted through September 1995 to evaluate changes in groundwater quality and confirm that contaminants are not migrating off-site and are not exceeding drinking water standards. In January 1996, Dow Corning prepared a summary report of the 1993 through 1995 groundwater data. The intent of the report was to evaluate the groundwater data based on the ROD requriements and determine if the site met the requirements for a no further action. In 1996, Dow Corning put the review of this report on hold. In March 2004, Springfield Aster LLC (current owner of former Dow Corning / Globe Metallurgical Site), contacted DEQ to join the ICP program in order to obtain a no further action and certification of completion for Consent Order No. ECSR-WVR-91-10. (9/04 NHG) Dow Corning signed an ICP agreement with the intent to obtain a no further action (NFA) and certification of completion (COC) from DEQ. DEQ reviewed a February 2004 site closure report and determined additional information was required to assess the site for a NFA and COC. On September 24, 2004, DEQ submitted the draft comments on the closure report to the environmental contractor representing the former Globe Metallurgical/Dow Corning site. Due to the time lapse in the cleanup, DEQ also requested a remedy assessment to confirm the appropriateness of the remedy selected in 1993. (12/04 NHG) Between November 2004 and December 2004, DEQ received and reviewed supplemental data requests for the proposed NFA and COC, and concluded that the groundwater monitoring and evaluation requirements of the Consent Order and Record of Decision were satisfactorily met. (1/05 NHG) On January 3, 2005, DEQ began a 30-day public comment period regarding DEQ's proposal to terminate the Consent Order and issue the NFA.
(2/03 NHG) No significant public comments were received. COC and N

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

FA issued on 2/3/05.

NARR ID: 5727092
NARR Code: Containment Units
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Buried drum in machine shop - sump for waste oil.

OR ECSI SITE CONTROL:
Site Control #: 335
Control Number: 24
Begin Date: 09/23/1993
End Date: 01/30/1996
Frequency Of Review: 12
Last Reviewed By: Gramlich, Nancy
Last Reviewed Date: Not reported
Last Update By: NGRAMLI
Last Updated Date: 09/17/2004
Site Comment: In January 1996, Dow Corning submitted a summary of the 1993 through 1995 groundwater data. The intent of the report was to evaluate the groundwater data based on the ROD requriements and determine if the site met the requirements for a no further action. In 1996, Dow Corning put the review of this report on hold.

OR ECSI PERMIT:
Permit Agency: Not reported
Permit Number: Not reported
Permit Type: Not reported
Comments: Not reported

OR ECSI Administrative Action:

Admin ID:	700459	Action ID:	9488
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	02/26/1991	Complete Date:	02/26/1991
Substance Code:	SRS	Rank Value:	0
Employee Id:	361	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RLSC	Category:	Listing Action
Action Flag:	False	Action Code Flag:	False

Action: Listing on Confirmed Release List recommended
Further Action: Not reported
Comments: Not reported

Admin ID:	717652	Action ID:	9494
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	09/13/1993	Complete Date:	09/13/1993
Substance Code:	SRS	Rank Value:	0
Employee Id:	461	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	ROD	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False

Action: RECORD OF DECISION
Further Action: Not reported
Comments: No Feasibility Study performed due to low levels of contamination.

Admin ID:	708341	Action ID:	9491
Agency:	Dept Of Environmental Quality	Region:	Headquarters

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Start Date:	11/01/1989	Complete Date:	11/30/1989
Substance Code:	SRS	Rank Value:	0
Employee Id:	361	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RM	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	REMOVAL		
Further Action:	Not reported		
Comments:	Excavation of contaminated soil from three source areas.		

Admin ID:	708342	Action ID:	9520
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/01/1989	Complete Date:	10/31/1989
Substance Code:	SRS	Rank Value:	0
Employee Id:	361	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	XPA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	EXPANDED PRELIMINARY ASSESSMENT		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	708343	Action ID:	9498
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	07/31/1990	Complete Date:	07/31/1990
Substance Code:	SRS	Rank Value:	0
Employee Id:	361	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RPLC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Proposal for Confirmed Release List recommended		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	708344	Action ID:	9484
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	07/01/1992	Complete Date:	09/30/1992
Substance Code:	SRS	Rank Value:	0
Employee Id:	461	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RI	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	REMEDIAL INVESTIGATION		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	718340	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	09/20/1988	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	1804	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Admin ID:	728078	Action ID:	9519
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	03/11/2004	Complete Date:	Not reported
Substance Code:	ICP	Rank Value:	Not reported
Employee Id:	2393	Cleanup Flag:	False
Created By:	MENGLIS	Created Date:	03/11/2004
Action Code:	VWL	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	VCS Waiting List		
Further Action:	0		
Comments:	ICP Waiting list		

Admin ID:	723953	Action ID:	9445
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	11/30/1988	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	Not reported	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NOTIF	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Responsible party notified re 11/88 Inventory listing		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	724420	Action ID:	9448
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	02/25/1991	Complete Date:	02/25/1991
Substance Code:	SRS	Rank Value:	0
Employee Id:	361	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NRC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Review for final listing		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	724454	Action ID:	9437
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	07/30/1990	Complete Date:	07/30/1990
Substance Code:	SRS	Rank Value:	0
Employee Id:	361	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	LRC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Listing Review completed		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	724520	Action ID:	9442
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	07/30/1991	Complete Date:	02/25/1992
Substance Code:	SRS	Rank Value:	0
Employee Id:	461	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NEG	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	NEGOTIATIONS		

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Further Action: Not reported
Comments: Not reported

Admin ID:	723762	Action ID:	9465
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/31/1990	Complete Date:	08/31/1990
Substance Code:	SRS	Rank Value:	0
Employee Id:	361	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	PRC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Facility proposed for Confirmed Release List		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	723763	Action ID:	9438
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	04/29/1991	Complete Date:	04/29/1991
Substance Code:	SAS	Rank Value:	0
Employee Id:	2319	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	LSC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Facility placed on Confirmed Release List		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	710914	Action ID:	9504
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	12/14/1988	Complete Date:	12/14/1988
Substance Code:	SRS	Rank Value:	0
Employee Id:	361	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RRM	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Removal Action Recommended (RM)		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	729574	Action ID:	9409
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	11/18/2004	Complete Date:	12/23/2004
Substance Code:	ICP	Rank Value:	Not reported
Employee Id:	2389	Cleanup Flag:	True
Created By:	NGRAMLI	Created Date:	01/04/2005
Action Code:	BENE	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Beneficial Water Use Assessment		
Further Action:	0		
Comments:	Not reported		

Admin ID:	729575	Action ID:	9436
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	11/18/2004	Complete Date:	12/23/2004
Substance Code:	ICP	Rank Value:	Not reported
Employee Id:	2389	Cleanup Flag:	True
Created By:	NGRAMLI	Created Date:	01/04/2005

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Action Code:	LANU	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Land-Use Assessment		
Further Action:	0		
Comments:	Not reported		

Admin ID:	729790	Action ID:	9443
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	02/03/2005	Complete Date:	02/03/2005
Substance Code:	ICP	Rank Value:	Not reported
Employee Id:	2389	Cleanup Flag:	False
Created By:	NGRAMLI	Created Date:	02/02/2005
Action Code:	NFA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	NO FURTHER STATE ACTION REQUIRED		
Further Action:	0		
Comments:	Not reported		

Admin ID:	729791	Action ID:	9414
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	02/03/2005	Complete Date:	02/03/2005
Substance Code:	icp	Rank Value:	Not reported
Employee Id:	2389	Cleanup Flag:	False
Created By:	NGRAMLI	Created Date:	02/02/2005
Action Code:	CRTC	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Certification of Completion		
Further Action:	0		
Comments:	Not reported		

Admin ID:	729031	Action ID:	9450
Agency:	Dept Of Environmental Quality	Region:	0
Start Date:	09/17/1993	Complete Date:	09/30/1995
Substance Code:	Not reported	Rank Value:	Not reported
Employee Id:	0	Cleanup Flag:	False
Created By:	NGRAMLI	Created Date:	09/17/2004
Action Code:	OM	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	OPERATION and MAINTENANCE		
Further Action:	0		
Comments:	see controls file.		

Admin ID:	729107	Action ID:	9435
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	09/13/2004	Complete Date:	09/24/2004
Substance Code:	ICP	Rank Value:	Not reported
Employee Id:	2389	Cleanup Flag:	False
Created By:	NGRAMLI	Created Date:	09/24/2004
Action Code:	ICP	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Independent Cleanup Program		
Further Action:	0		
Comments:	Not reported		

Admin ID:	729108	Action ID:	9470
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	09/24/2004	Complete Date:	12/23/2004

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Substance Code:	ICP	Rank Value:	Not reported
Employee Id:	2389	Cleanup Flag:	False
Created By:	NGRAMLI	Created Date:	09/24/2004
Action Code:	RAOTH	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Other remedial or investigative action recommended		
Further Action:	0		
Comments:	Not reported		

Admin ID:	715222	Action ID:	9425
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	12/14/1988	Complete Date:	12/14/1988
Substance Code:	SRS	Rank Value:	0
Employee Id:	361	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	EV	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	SITE EVALUATION		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	715602	Action ID:	9412
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	02/25/1992	Complete Date:	02/25/1992
Substance Code:	SRS	Rank Value:	0
Employee Id:	461	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	CNOR	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Consent Order		
Further Action:	Not reported		
Comments:	Not reported		

OR ECSI OPERATIONS:

Operation Id:	131997
Operation Status:	Active
Common Name:	Dow Corning Corp.
Yrs of Operation:	1953-1993
Comments:	silicon production
Updated Date:	10/26/1998
Operations SIC Id:	195045
SIC Code:	3339
Created By:	Not reported
Created Date:	12/17/2002

OR ENG CONTROL:

Site Control Sequence #:	335
Site Id:	694
Control Sequence #:	24
Begin Date:	09/23/1993
End Date:	01/30/1996
Frequency Of Review:	12
Last Reviewed By:	Gramlich, Nancy
Last Review Date:	Not reported
Last Updated By:	NGRAMLI
Last Updated Date:	09/17/2004
Group Sequence #:	6

DOW CORNING - SPRINGFIELD PLANT (Continued) **S110638471**

Control Code: PMRG
Control Description: Periodic montioring & reporting, groundwater quality
FK Type Code: 2
Group Code: LTC
Group Description: Long-Term Controls
Type Code: E
Type Description: Engineering
Comments: In January 1996, Dow Corning submitted a summary of the 1993 through 1995 groundwater data. The intent of the report was to evaluate the groundwater data based on the ROD requriements and determine if the site met the requirements for a no further action. In 1996, Dow Corning put the review of this report on hold.

VCS:
ECS Site ID: 694
CRL: NFA
Facility Size: 13.9 acres
Action: NO FURTHER STATE ACTION REQUIRED
Start Date: 2005-02-03
End Date: 2005-02-03
Project Manager Name: Nancy Gramlich
Program: ICP

9
West
> 1
1.482 mi.
7823 ft.

EL-JAY FACTORY #2
86470 FRANKLIN BLVD.
EUGENE, OR 97405

ECSI **S103841512**
VCP **N/A**

Relative:
Higher

Actual:
489 ft.

OR ECSI:

State ID Number:	199	Brown ID:	0
Study Area:	False	Region ID:	3
Legislatve ID:	0	Investigation ID:	206
FACA ID:	1370	Further Action:	0
Lat/Long (dms):	44 0 43.60 / -123 1 11.60	County Code:	20.00
Score Value:	Not reported	Cerclis ID:	Not reported
Township Coord.:	18.00	Township Zone:	S
Range Coord:	3.00	Range Zone:	W
Section Coord:	11	Qtr Section:	Not reported
Tax Lots:	3600	Size:	2.3 acres
NPL:	False	Orphan:	False
Updated By:	GWISTAR	Update Date:	02/25/2009
Alias Name:	Mobius, Inc.		
Alias Name:	Johnson Crushers International, Inc.		

OR ECSI HAZARDOUS RELEASE:
Substance ID.: 121989
Haz Release ID: 382919
Qty Released: Unknown
Date Released: Unknown
Update Date: 08/24/1988
Update By: Not reported
Substance Code: ECD200
Substance Name: OIL OR FUEL RELATED COMPOUNDS
Substance Abbrev.: Not reported
Substance Category ID: 8532
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported

EL-JAY FACTORY #2 (Continued) **S103841512**

Created By: Not reported
Created Date: 12/17/2002
Substance Category ID: 8532
Substance Category: Petroleum Related Releases for OSPIRG Report
Category Level: Not reported
Created By: Not reported
Created Date: 12/17/2002
Substance Alias ID: Not reported
Sub Alias Name: Not reported
Comment ID: 303474
Release Code: Data Sources
Release Comments: WVR HW DEQ source file
Sampling Result ID: 337486
Feature Id: Not reported
Hazard Release Id: 382919
Medium: 703
Substance Abbrev.: Not reported
Unit Code: Not reported
Observation: False
Owner Operator: False
Lab Data: False
Sample Depth: Not reported
Start Date: Not reported
End Date: Not reported
Min Concentration: Not reported
Max Concentration: Not reported
Sample Comment: Not reported
Last Update By: CONV
Update Date: 09/13/1994

OR ECSI NARR:
NARR ID: 5729988
NARR Code: Contamination
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: Oil was released into the soil. Other hazardous substances that are used at the facility may have been disposed of or leaked on-site.

NARR ID: 5729989
NARR Code: Data Sources
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments: Environmental Site Assessment, Cascade Pacific Engineering (1/96); Environmental Site Investigation for the Former El-Jay F2 facility, GEM (5/96); Soil Investigation & Remediation System Progress Report, Century West (1/98); Remediation System Final Closure Report, Century West (3/99).

NARR ID: 5729990
NARR Code: Hazardous Substance/Waste Types
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002

EL-JAY FACTORY #2 (Continued) **S103841512**

NARR Comments:oil

NARR ID: 5729991
NARR Code: Manner of Release
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Time of release unknown.

NARR ID: 5729992
NARR Code: Pathways Other Hazards
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Soil contamination

NARR ID: 5729993
NARR Code: Remedial Action
Created By: Not reported
Created Date: 12/17/2002
Updated By: Not reported
Updated Date: 12/17/2002
NARR Comments:Company removed soil from the spill area. (8/27/92 LSK/SAS) Low-priority site. (1/18/00 JGR) Installed remediation system (11 extraction wells/passive injection wells) in 1/97. System remained in operation until 5/98. (3/14/01 GJW) Remediation system decommissioned and removed in 2000. NFA issued 2/01 and project closed.

OR ECSI SITE CONTROL:
Site Control #: Not reported
Control Number: Not reported
Begin Date: Not reported
End Date: Not reported
Frequency Of Review: Not reported
Last Reviewed By: Not reported
Last Reviewed Date: Not reported
Last Update By: Not reported
Last Updated Date: Not reported
Site Comment: Not reported

OR ECSI PERMIT:
Permit Agency: Not reported
Permit Number: Not reported
Permit Type: Not reported
Comments: Not reported

OR ECSI Administrative Action:

Admin ID:	708446	Action ID:	9519
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	10/09/1998	Complete Date:	06/01/1999
Substance Code:	VCP	Rank Value:	3
Employee Id:	1872	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	VWL	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	VCS Waiting List		
Further Action:	Low		

EL-JAY FACTORY #2 (Continued) **S103841512**

Comments: Not reported

Admin ID:	718733	Action ID:	9425
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/27/1992	Complete Date:	08/27/1992
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	EV	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	SITE EVALUATION		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	718734	Action ID:	9437
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/28/1992	Complete Date:	08/28/1992
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	LRC	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Listing Review completed		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	718735	Action ID:	9449
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/29/1992	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NSFL	Category:	Listing Action
Action Flag:	True	Action Code Flag:	False
Action:	Insufficient information to list		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	718736	Action ID:	9496
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/30/1992	Complete Date:	08/30/1992
Substance Code:	SAS	Rank Value:	0
Employee Id:	466	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RPA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	State Basic Preliminary Assessment recommended (PA)		
Further Action:	Low		
Comments:	Not reported		

Admin ID:	707199	Action ID:	9440
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	06/01/1999	Complete Date:	06/01/1999
Substance Code:	VCP	Rank Value:	3
Employee Id:	1929	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	LTAG	Category:	Remedial Action

EL-JAY FACTORY #2 (Continued) **S103841512**

Action Flag:	True	Action Code Flag:	False
Action:	Letter Agreement		
Further Action:	Low		
Comments:	Not reported		

Admin ID:	718257	Action ID:	9424
Agency:	Dept Of Environmental Quality	Region:	Headquarters
Start Date:	08/24/1988	Complete Date:	Not reported
Substance Code:	SAS	Rank Value:	0
Employee Id:	1804	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	ENTRY	Category:	Administrative Action
Action Flag:	True	Action Code Flag:	False
Action:	Site added to database		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	703737	Action ID:	9413
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	03/14/2001	Complete Date:	03/14/2001
Substance Code:	VCP	Rank Value:	0
Employee Id:	2164	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	CO	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	Closeout activities on completed project		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	703668	Action ID:	9443
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	02/05/2001	Complete Date:	02/05/2001
Substance Code:	VCP	Rank Value:	0
Employee Id:	2164	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	NFA	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	NO FURTHER STATE ACTION REQUIRED		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	703375	Action ID:	9425
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	11/01/1999	Complete Date:	11/01/1999
Substance Code:	VCP	Rank Value:	0
Employee Id:	2164	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	EV	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	SITE EVALUATION		
Further Action:	Not reported		
Comments:	Not reported		

Admin ID:	704700	Action ID:	9491
Agency:	Dept Of Environmental Quality	Region:	Western Region
Start Date:	01/10/1997	Complete Date:	05/30/1998
Substance Code:	VCP	Rank Value:	0

EL-JAY FACTORY #2 (Continued) **S103841512**

Employee Id:	1929	Cleanup Flag:	False
Created By:	Not reported	Created Date:	12/17/2002
Action Code:	RM	Category:	Remedial Action
Action Flag:	True	Action Code Flag:	False
Action:	REMOVAL		
Further Action:	Not reported		
Comments:	Not reported		

OR ECSI OPERATIONS:

Operation Id:	131618
Operation Status:	Active
Common Name:	El-Jay Factory #2
Yrs of Operation:	Not reported
Comments:	Manufacturer - large rock processing equipment.
Updated Date:	01/24/2000
Operations SIC Id:	195387
SIC Code:	3532
Created By:	Not reported
Created Date:	12/17/2002

VCS:

ECS Site ID:	199
CRL:	NFA
Facility Size:	2.3 acres
Action:	NO FURTHER STATE ACTION REQUIRED
Start Date:	2001-02-05
End Date:	2001-02-05
Project Manager Name:	Gene Wong
Program:	VCP

Count: 37 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
EUGENE	S105613775	TUGMAN PARK LANDFILL	E 39TH AVENUE NEAR FERRY ST	97405	ECSI, OR CRL, INST CONTROL, VCP
EUGENE	S100499505	FUTURE LOGGING CO.	34531 HWY 58	97478	LUST
EUGENE	1004770383	WEYERHAEUSER NR CO SOUTH VALLEY	85647 HWY 99 S	97405	RCRA-CESQG, FINDS
EUGENE	S108659178	CONE LUMBER COMPANY	85810 HWY 99 S	97405	NPDES
EUGENE	1008404775	STATON COMPANIES	85386 HWY 99 S	97405	RCRA-NonGen
EUGENE	1006853996	WESTERN COATING, INC.	90340 HWY 99N		FINDS, NPDES
EUGENE	S105980659	BLOOMBERG PARK LEAF COMPOSTING FAC	BLOOMBERG RD	97405	SWF/LF
EUGENE	S106236393	LANE COUNTY - BLOOMBERG RD. LANDFI	BLOOMBERG RD	97405	ECSI
EUGENE	S104335347	STATON COMPANIES INC	85386 FRANKLIN BLVD	97405	AST, HSIS
EUGENE	1008404779	D. L. SEARS TRUCKING	86720 FRANKLIN	97405	RCRA-NonGen
EUGENE	S105614159	ODOT - GLASS BAR STOCKPILE	FRANKLIN BLVD	97405	ECSI, VCP
EUGENE	S104337256	WEYERHAEUSER NR COMPANY	85647 S HWY 99	97405	HSIS
EUGENE	1011490948	GOSHEN AUTO RECYCLERS	85741 S HWY 99	97405	RCRA-NonGen
EUGENE	S110292497	ZIP-O-LOG MILLS INC	85810 S HWY 99	97405	HSIS
EUGENE	1006852738	IZAAK WALTON LEAGUE SHOOTING RANGE	IZAAK WALTON RD	97405	ECSI, VCP
EUGENE	1000834779	ODOT GLASS BAR STOCKPILE SITE	NEAR I-5 SOUTH BETWEEN MILEPOS	97405	RCRA-NonGen, FINDS
EUGENE	1014400756	OIL RE-REFINING COMPANY	85951 OLD HIGHWAY 99	97405	RCRA-NonGen
EUGENE	S105225676	WASTE ALTERNATIVES	85507 STATE HIGHWAY 99 S	97405	SWF/LF
EUGENE	S108987584	REMOTE AUTO DISMANTLING	85709 STATE HIGHWAY 99 S	97405	NPDES
EUGENE	S110121603	GOSHEN AUTO RECYCLERS	85741 STATE 99 S	97405	NPDES
LANE COUNTY	S109577609		MCKENZIE HWY 126E MP 49		OR HAZMAT
OREGON CITY	1006854720	JAMES RIVER TAG FUELING SITE	MILEPOST 752, HIGHWAY 99E	97405	FINDS
OREGON CITY	S100499089	JAMES RIVER TAG FUELING SITE	MILEPOST 752, HIGHWAY 99E	97405	LUST
SPRINGFIELD	S108661375	MOUNTAIN GATE PHASE 4	HWY 126 & 58TH	97477	NPDES
SPRINGFIELD	S109052283	BLACKTAIL PROPERTIES, LLC COMMERCI	364 N 28TH ST	97477	NPDES
SPRINGFIELD	1011947162	BLACKTAIL PROPERTIES, LLC COMMERCI	364 N. 28TH STREET	97477	FINDS
SPRINGFIELD	1006868471	MARSHALL S STORAGE SITE	126 N 28TH STREET	97477	FINDS
SPRINGFIELD	S106165194		2ND ST	97477	OR HAZMAT
SPRINGFIELD	S105076321	30TH STREET SITE	30TH STREET IN RIGHT OF WAY	97477	LUST
SPRINGFIELD	1006856997	30TH STREET SITE	30TH STREET (IN RIGHT-OF-WAY)	97477	FINDS
SPRINGFIELD	S108390984	DUGDALE ENTERPRISES, LLC	3570TH & 3574 MARCOLA RD	97477	ECSI, VCP
SPRINGFIELD	S108987022		58 I 5 NEAR HWY	97477	OR HAZMAT
SPRINGFIELD	S110647106	MIDDLE FORK WILLAMETTE RIVER LOOP	CLEARWATER PARK	97478	NPDES
SPRINGFIELD	S106236342	SPRINGFIELD AIRPORT (ABANDONED)	SW COR OF 28TH & OLYMPIC STS	97478	ECSI, BROWNFIELDS
SPRINGFIELD	1006858566	WOOD STAVE LINE - SPRINGFIELD	DOWNTOWN SPRINGFIELD	97477	FINDS, ECSI, VCP
SPRINGFIELD	S105524274		MCKENZIE HWY	97478	OR HAZMAT
SPRINGFIELD	S105524278		MCKENZIE HWY	97478	OR HAZMAT

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/31/2011	Source: EPA
Date Data Arrived at EDR: 04/13/2011	Telephone: N/A
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 04/13/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1 Telephone 617-918-1143	EPA Region 6 Telephone: 214-655-6659
EPA Region 3 Telephone 215-814-5418	EPA Region 7 Telephone: 913-551-7247
EPA Region 4 Telephone 404-562-8033	EPA Region 8 Telephone: 303-312-6774
EPA Region 5 Telephone 312-886-6686	EPA Region 9 Telephone: 415-947-4246
EPA Region 10 Telephone 206-553-8665	

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/31/2011	Source: EPA
Date Data Arrived at EDR: 04/13/2011	Telephone: N/A
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 04/13/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991	Source: EPA
Date Data Arrived at EDR: 02/02/1994	Telephone: 202-564-4267
Date Made Active in Reports: 03/30/1994	Last EDR Contact: 05/16/2011
Number of Days to Update: 56	Next Scheduled EDR Contact: 08/29/2011
	Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/31/2011	Source: EPA
Date Data Arrived at EDR: 04/13/2011	Telephone: N/A
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 04/13/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/25/2011	Source: EPA
Date Data Arrived at EDR: 03/01/2011	Telephone: 703-412-9810
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 06/14/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPAa??s Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/11/2011	Telephone: 703-603-8704
Date Made Active in Reports: 02/16/2011	Last EDR Contact: 04/15/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/25/2011	Source: EPA
Date Data Arrived at EDR: 03/01/2011	Telephone: 703-412-9810
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 06/14/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/09/2011
Date Data Arrived at EDR: 03/15/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 91

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 05/16/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List
A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/16/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/25/2011	Telephone: 703-603-0695
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 81	Next Scheduled EDR Contact: 09/26/2011
	Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls
A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/16/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/25/2011	Telephone: 703-603-0695
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 81	Next Scheduled EDR Contact: 09/26/2011
	Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 04/05/2011	Source: National Response Center, United States Coast Guard
Date Data Arrived at EDR: 04/05/2011	Telephone: 202-267-2180
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 07/05/2011
Number of Days to Update: 70	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Annually

State- and tribal - equivalent NPL

ECSI: Environmental Cleanup Site Information System
Sites that are or may be contaminated and may require cleanup.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/03/2011	Telephone: 503-229-6629
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/03/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

CRL: Confirmed Release List and Inventory
All facilities with a confirmed release.

Date of Government Version: 05/24/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 05/25/2011	Telephone: 503-229-6170
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 05/25/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 09/05/2011
	Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Facilities List

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 06/13/2011
Date Data Arrived at EDR: 06/15/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 15

Source: Department of Environmental Quality
Telephone: 503-229-6299
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Semi-Annually

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 04/01/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 503-229-5790
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/31/2011
Date Data Arrived at EDR: 02/01/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 48

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 03/03/2011
Date Data Arrived at EDR: 03/18/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 45

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 05/17/2011
Date Data Arrived at EDR: 05/19/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 26

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 05/20/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 25

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/03/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/10/2011	Source: EPA Region 6
Date Data Arrived at EDR: 05/11/2011	Telephone: 214-665-6597
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 34	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 11/04/2009	Source: EPA Region 7
Date Data Arrived at EDR: 05/04/2010	Telephone: 913-551-7003
Date Made Active in Reports: 07/07/2010	Last EDR Contact: 05/04/2010
Number of Days to Update: 64	Next Scheduled EDR Contact: 05/16/2011
	Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/16/2011	Source: EPA Region 8
Date Data Arrived at EDR: 05/17/2011	Telephone: 303-312-6271
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 28	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 04/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 05/25/2011	Telephone: 503-229-5815
Date Made Active in Reports: 06/29/2011	Last EDR Contact: 05/25/2011
Number of Days to Update: 35	Next Scheduled EDR Contact: 09/05/2011
	Data Release Frequency: Quarterly

AST: Aboveground Storage Tanks
Aboveground storage tank locations reported to the Office of State Fire Marshal.

Date of Government Version: 12/01/2010	Source: Office of State Fire Marshal
Date Data Arrived at EDR: 01/25/2011	Telephone: 503-378-3473
Date Made Active in Reports: 02/24/2011	Last EDR Contact: 05/13/2011
Number of Days to Update: 30	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Semi-Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 03/03/2011	Source: EPA Region 4
Date Data Arrived at EDR: 03/18/2011	Telephone: 404-562-9424
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 45	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Semi-Annually

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 05/18/2011	Source: EPA Region 9
Date Data Arrived at EDR: 05/26/2011	Telephone: 415-972-3368
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 19	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 05/16/2011	Source: EPA Region 8
Date Data Arrived at EDR: 05/17/2011	Telephone: 303-312-6137
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 28	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 05/17/2011	Source: EPA Region 10
Date Data Arrived at EDR: 05/19/2011	Telephone: 206-553-2857
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 26	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 03/07/2011	Source: EPA, Region 1
Date Data Arrived at EDR: 05/04/2011	Telephone: 617-918-1313
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/03/2011
Number of Days to Update: 41	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 01/01/2011	Source: EPA Region 5
Date Data Arrived at EDR: 02/23/2011	Telephone: 312-886-6136
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 68	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011	Source: EPA Region 6
Date Data Arrived at EDR: 05/11/2011	Telephone: 214-665-7591
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 34	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/01/2011
Date Data Arrived at EDR: 06/01/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 13

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 02/03/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/18/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Recorded at ESCI Sites

Engineering controls are physical measures selected or approved by the Director for the purpose of preventing or minimizing exposure to hazardous substances. Engineering controls may include, but are not limited to, fencing, capping, horizontal or vertical barriers, hydraulic controls, and alternative water supplies.

Date of Government Version: 06/01/2011
Date Data Arrived at EDR: 06/03/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 27

Source: Department of Environmental Quality
Telephone: 503-229-5193
Last EDR Contact: 06/03/2011
Next Scheduled EDR Contact: 08/08/2011
Data Release Frequency: Quarterly

INST CONTROL: Institutional Controls Recorded at ESCI Sites

An institutional control is a legal or administrative tool or action taken to reduce the potential for exposure to hazardous substances. Institutional controls may include, but are not limited to, use restrictions, environmental monitoring requirements, and site access and security measures.

Date of Government Version: 06/01/2011
Date Data Arrived at EDR: 06/03/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 27

Source: Department of Environmental Quality
Telephone: 503-229-5193
Last EDR Contact: 06/03/2011
Next Scheduled EDR Contact: 08/08/2011
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

VCS: Voluntary Cleanup Program Sites

Responsible parties have entered into an agreement with DEQ to voluntarily address contamination associated with their property.

Date of Government Version: 04/22/2011
Date Data Arrived at EDR: 04/27/2011
Date Made Active in Reports: 05/16/2011
Number of Days to Update: 19

Source: DEQ
Telephone: 503-229-5256
Last EDR Contact: 04/11/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 70

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Projects

Brownfields investigations and/or cleanups that have been conducted in Oregon.

Date of Government Version: 05/24/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 503-229-6801
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Semi-Annually

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 03/29/2011
Date Data Arrived at EDR: 03/29/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: No Update Planned

HIST LF: Old Closed SW Disposal Sites
A list of solid waste disposal sites that have been closed for a long while.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 07/08/2003
Date Made Active in Reports: 07/18/2003
Number of Days to Update: 10

Source: Department of Environmental Quality
Telephone: 503-229-5409
Last EDR Contact: 07/08/2003
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 05/09/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/02/2011
Date Data Arrived at EDR: 03/17/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 46

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 06/07/2011
Next Scheduled EDR Contact: 09/19/2011
Data Release Frequency: Quarterly

AOC MU: East Multnomah County Area
Approximate extent of TSA VOC plume February , 2002

Date of Government Version: N/A
Date Data Arrived at EDR: 10/07/2002
Date Made Active in Reports: 10/22/2002
Number of Days to Update: 15

Source: City of Portland Environmental Services
Telephone: 503-823-5310
Last EDR Contact: 03/13/2007
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

AOC COL: Columbia Slough
Columbia Slough waterway boundaries.

Date of Government Version: 08/10/2005
Date Data Arrived at EDR: 05/17/2006
Date Made Active in Reports: 06/16/2006
Number of Days to Update: 30

Source: City of Portland Environmental Services
Telephone: 503-823-5310
Last EDR Contact: 03/13/2007
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CDL 2: Clandestine Drug Lab Site Listing
A listing of clandestine drug lab site locations included in the Incident database.

Date of Government Version: 02/02/2011
Date Data Arrived at EDR: 05/04/2011
Date Made Active in Reports: 06/22/2011
Number of Days to Update: 49

Source: Oregon State Police
Telephone: 503-373-1540
Last EDR Contact: 05/04/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

CDL: Uninhabitable Drug Lab Properties

The properties listed on these county pages have been declared by a law enforcement agency to be unfit for use due to meth lab and/or storage activities. The properties are considered uninhabitable until cleaned up by a state certified decontamination contractor and a certificate of fitness is issued by the Oregon Health Division.

Date of Government Version: 04/27/2011
Date Data Arrived at EDR: 05/27/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 34

Source: Department of Consumer & Business Services
Telephone: 503-378-4133
Last EDR Contact: 11/24/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spant Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 06/21/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/05/2011
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 51

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Annually

SPILLS: Spill Data

Oil and hazardous material spills reported to the Environmental Response Program.

Date of Government Version: 04/12/2011
Date Data Arrived at EDR: 04/14/2011
Date Made Active in Reports: 05/16/2011
Number of Days to Update: 32

Source: Department of Environmental Quality
Telephone: 503-229-5815
Last EDR Contact: 04/11/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Semi-Annually

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/12/2011
Date Data Arrived at EDR: 02/11/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 05/11/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 08/12/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 112

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 70

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/16/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 5

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 06/15/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/21/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 99

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 06/02/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/08/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 06/08/2011
Next Scheduled EDR Contact: 09/19/2011
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/17/2010
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 94

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/30/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/07/2011
Date Data Arrived at EDR: 01/21/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 59

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/22/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/18/2010
Date Data Arrived at EDR: 04/06/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 51

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010
Date Data Arrived at EDR: 04/16/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 41

Source: EPA
Telephone: (206) 553-1200
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Biennially

UIC: Underground Injection Control Program Database

DEQ's Underground Injection Control Program is authorized by the Environmental Protection Agency (EPA) to regulate all underground injection in Oregon to protect groundwater resources.

Date of Government Version: 03/03/2011
Date Data Arrived at EDR: 03/04/2011
Date Made Active in Reports: 03/29/2011
Number of Days to Update: 25

Source: Department of Environmental Quality
Telephone: 503-229-5945
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

OR MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 09/08/2010
Date Made Active in Reports: 10/15/2010
Number of Days to Update: 37

Source: Department of Environmental Quality
Telephone: N/A
Last EDR Contact: 05/16/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: Annually

HAZMAT: Hazmat/Incidents

Hazardous material incidents reported to the State Fire Marshal by emergency responders. The hazardous material may or may not have been released.

Date of Government Version: 02/02/2011
Date Data Arrived at EDR: 05/04/2011
Date Made Active in Reports: 06/22/2011
Number of Days to Update: 49

Source: State Fire Marshal's Office
Telephone: 503-373-1540
Last EDR Contact: 05/04/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

DRYCLEANERS: Drycleaning Facilities

A listing of registered drycleaning facilities in Oregon.

Date of Government Version: 02/07/2011
Date Data Arrived at EDR: 02/09/2011
Date Made Active in Reports: 02/23/2011
Number of Days to Update: 14

Source: Department of Environmental Quality
Telephone: 503-229-6783
Last EDR Contact: 06/06/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Varies

NPDES: Wastewater Permits Database

A listing of permitted wastewater facilities.

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/12/2011
Date Made Active in Reports: 06/22/2011
Number of Days to Update: 41

Source: Department of Environmental Quality
Telephone: 503-229-5657
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: Oregon Title V Facility Listing

A listing of Title V facility source and emissions information.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 12/28/2009
Date Made Active in Reports: 01/19/2010
Number of Days to Update: 22

Source: Department of Environmental Quality
Telephone: 503-229-6459
Last EDR Contact: 06/20/2011
Next Scheduled EDR Contact: 09/19/2011
Data Release Frequency: Varies

HSIS: Hazardous Substance Information Survey

Companies in Oregon submitting the Hazardous Substance Information Survey and either reporting or not reporting hazardous substances.

Date of Government Version: 12/01/2010
Date Data Arrived at EDR: 01/25/2011
Date Made Active in Reports: 02/24/2011
Number of Days to Update: 30

Source: State Fire Marshal's Office
Telephone: 503-373-1540
Last EDR Contact: 05/13/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Semi-Annually

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 06/06/2011
Next Scheduled EDR Contact: 08/08/2011
Data Release Frequency: Varies

FINANCIAL ASSURANCE 1: Financial Assurance Information Listing

Financial assurance information for hazardous waste facilities.

Date of Government Version: 03/29/2011
Date Data Arrived at EDR: 03/31/2011
Date Made Active in Reports: 05/06/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 541-633-2011
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites Listing

A listing of coal ash disposal sites.

Date of Government Version: 06/01/2011
Date Data Arrived at EDR: 06/02/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 28

Source: Department of Environmental Quality
Telephone: 541-298-7255
Last EDR Contact: 05/31/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

FINANCIAL ASSURANCE 2: Financial Assurance Information Listing

Financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 06/13/2011
Date Data Arrived at EDR: 06/15/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 15

Source: Department of Environmental Quality
Telephone: 503-229-5521
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

COAL ASH DOE: Steam-Electric Plan Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 04/19/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008
Date Data Arrived at EDR: 02/18/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 100

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 05/05/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: N/A

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 05/12/2011
Date Made Active in Reports: 05/24/2011
Number of Days to Update: 12

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/12/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 07/06/2010
Date Made Active in Reports: 07/26/2010
Number of Days to Update: 20

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 06/20/2011
Next Scheduled EDR Contact: 10/03/2011
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.
Daycare Centers: Child Care Listings
Source: Employment Department
Telephone: 503-947-1420

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory Data
Source: Oregon Geospatial Enterprise Office
Telephone: 503-378-2166

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

TNC MIDDLE FORK CONFLUENCE SITE
BUFORD PARK/FRANK PARRISH ROAD
EUGENE, OR 97405

TARGET PROPERTY COORDINATES

Latitude (North):	44.02340 - 44° 1' 24.2"
Longitude (West):	122.9976 - 122° 59' 51.3"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	500192.3
UTM Y (Meters):	4874255.5
Elevation:	464 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	44122-A8 SPRINGFIELD, OR
Most Recent Revision:	1986
West Map:	44123-A1 EUGENE EAST, OR
Most Recent Revision:	1986

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

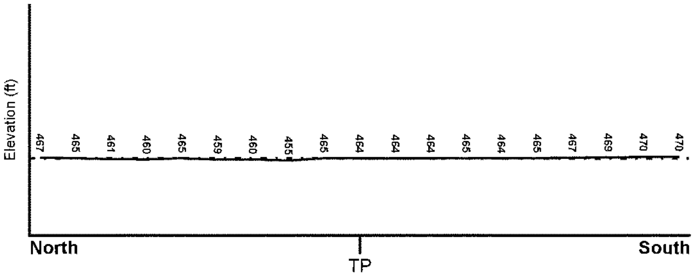
TOPOGRAPHIC INFORMATION

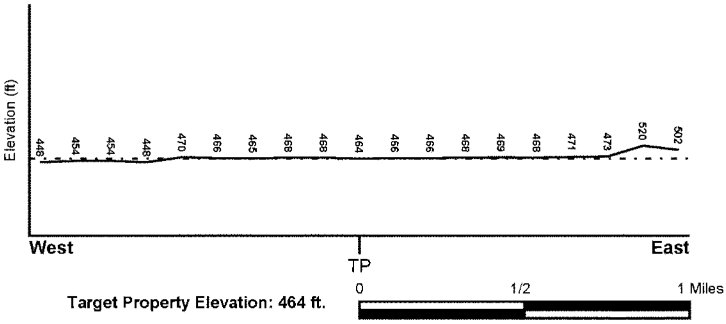
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General NNE

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 464 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
LANE, OR	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 41039C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
SPRINGFIELD	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

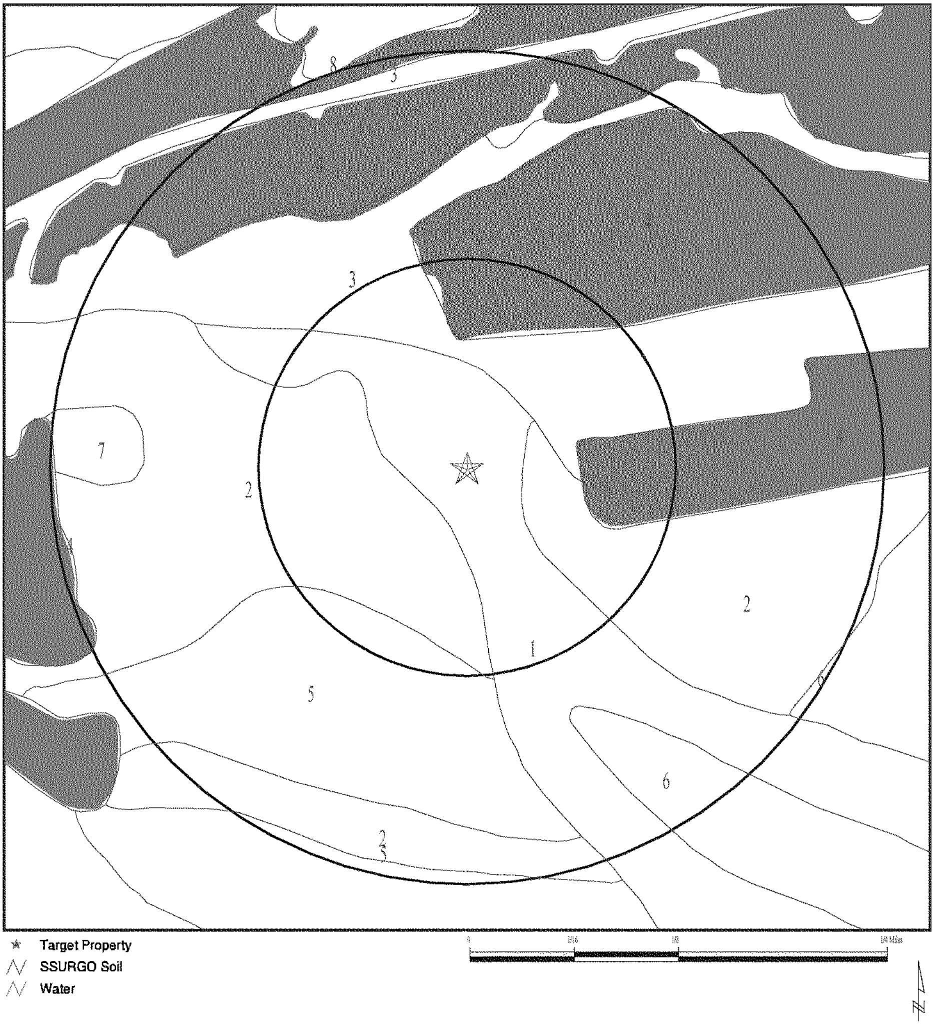
GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT		**GEOLOGIC AGE IDENTIFICATION**	
Era:	Cenozoic	Category:	Stratifed Sequence
System:	Quaternary		
Series:	Quaternary		
Code:	Q *(decoded above as Era, System & Series)*		

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3118160.2s



★ Target Property
/\/ SSURGO Soil
/\/ Water

SITE NAME: TNC Middle Fork Confluence Site
ADDRESS: Buford Park/Frank Parrish Road
Eugene OR 97405
LAT/LONG: 44.0234 / 122.9976

CLIENT: Tetra Tech EM, Inc.
CONTACT: Merri Martz
INQUIRY #: 3118160.2s
DATE: July 07, 2011 7:15 pm

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name:	McBee
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	Moderately well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 76 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**		
1	0 inches	24 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	24 inches	40 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	40 inches	61 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 6.1

Soil Map ID: 2

Soil Component Name:	Newberg
Soil Surface Texture:	fine sandy loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	14 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6
2	14 inches	64 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6

Soil Map ID: 3

Soil Component Name:	Pits
Soil Surface Texture:	fine sandy loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	

Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

No Layer Information available.

Soil Map ID: 4

Soil Component Name:	Water
Soil Surface Texture:	fine sandy loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	
Hydric Status: Unknown	
Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

No Layer Information available.

Soil Map ID: 5

Soil Component Name:	Chehalis
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	12 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 5.6
2	12 inches	55 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 5.6
3	55 inches	70 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 5.6

Soil Map ID: 6

Soil Component Name:	Newberg
Soil Surface Texture:	loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6
2	14 inches	64 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6

Soil Map ID: 7

Soil Component Name:	Cloquato
Soil Surface Texture:	silt loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	14 inches	50 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	50 inches	59 inches	stratified sand to silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1

Soil Map ID: 8

Soil Component Name:	Riverwash
Soil Surface Texture:	stratified gravel to sand
Hydrologic Group:	Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
Soil Drainage Class:	Poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 31 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	59 inches	stratified gravel to sand	Not reported	Not reported	Max: Min:	Max: Min:

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A3	USGS3239904	1/2 - 1 Mile NNE
B5	USGS3239902	1/2 - 1 Mile NE
B6	USGS3239903	1/2 - 1 Mile NE
C9	USGS3239907	1/2 - 1 Mile NNE
D13	USGS3239909	1/2 - 1 Mile North
D14	USGS3239910	1/2 - 1 Mile North
E17	USGS3239905	1/2 - 1 Mile NE
E18	USGS3239906	1/2 - 1 Mile NE
G23	USGS3239908	1/2 - 1 Mile NE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

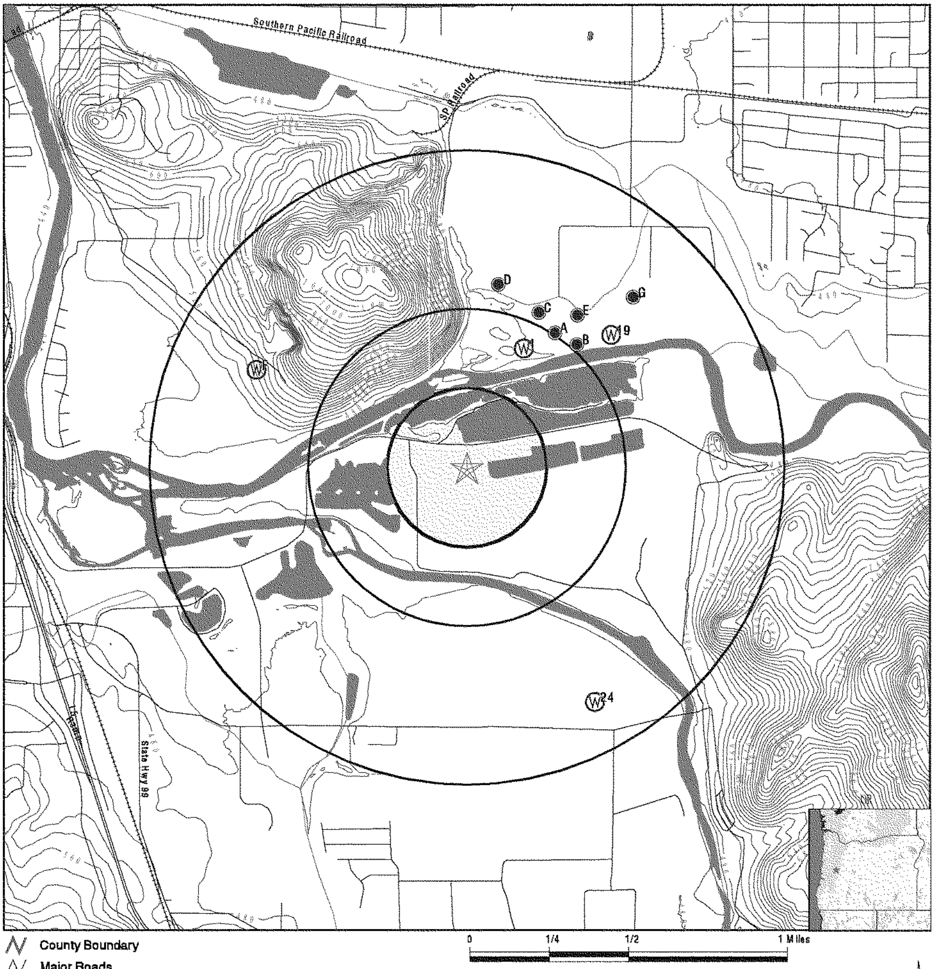
MAP ID	WELL ID	LOCATION FROM TP
1	ORW400000001809	1/4 - 1/2 Mile NNE
A2	ORW400000001813	1/2 - 1 Mile NNE
B4	ORW400000001810	1/2 - 1 Mile NE
B7	ORW400000001811	1/2 - 1 Mile NE
C8	ORW400000001818	1/2 - 1 Mile NNE
C10	ORW400000001819	1/2 - 1 Mile NNE
D11	ORW400000001827	1/2 - 1 Mile North
D12	ORW400000001828	1/2 - 1 Mile North
E15	ORW400000001816	1/2 - 1 Mile NE
E16	ORW400000001817	1/2 - 1 Mile NE
19	ORW400000001812	1/2 - 1 Mile NE
F20	ORI400000003331	1/2 - 1 Mile WNW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
F21	ORI400000003332	1/2 - 1 Mile WNW
G22	ORW400000001824	1/2 - 1 Mile NE
24	ORW400000001759	1/2 - 1 Mile SSE

PHYSICAL SETTING SOURCE MAP - 3118160.2s



County Boundary
Major Roads
Contour Lines
◎ Earthquake epicenter, Richter 5 or greater
Ⓦ Water Wells
Ⓟ Public Water Supply Wells
● Cluster of Multiple Icons

Groundwater Flow Direction
(G I) Indeterminate Groundwater Flow at Location
(G V) Groundwater Flow Varies at Location

SITE NAME:	TNC Middle Fork Confluence Site	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Buford Park/Frank Parrish Road	CONTACT:	Merri Martz
	Eugene OR 97405	INQUIRY #:	3118160.2s
LAT/LONG:	44.0234 / 122.9976	DATE:	July 07, 2011 7:15 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation	Database	EDR ID Number
1 **NNE** **1/4 - 1/2 Mile** **Lower**	**OR WELLS**	**ORW400000001809**

Logid:	LANE 16073	Lstupdate:	11/04/2008
Establby:	EMILY BRAY-NASH	Xysource:	APPLICATION MAP & DOQ
Horizerr:	150	Sourceorg:	OWRD
Sourceowrd:	GWATER		
Welltag:	0		
Sownum:	0	Obswell:	N
Recwell:	9	Obsflagall:	ON
Lsdelev:	0	Site id:	ORW400000001809

A2 **NNE** **1/2 - 1 Mile** **Higher**	**OR WELLS**	**ORW400000001813**

Logid:	LANE 16098	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	458	Site id:	ORW400000001813

A3 **NNE** **1/2 - 1 Mile** **Higher**	**FED USGS**	**USGS3239904**

Agency cd:	USGS	Site no:	440147122592701
Site name:	18S/03W-01DCA		
Latitude:	440147	EDR Site id:	USGS3239904
Longitude:	1225927	Dec lat:	44.0295698
Dec lon:	-122.99202757	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	41
State:	41	County:	039
Country:	US	Land net:	Not Reported
Location map:	SPRINGFIELD	Map scale:	24000
Altitude:	458.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	Not Reported		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle Fork Willamette. Oregon. Area = 1350 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19650402
Date inventoried:	19690805	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	55.00	Hole depth:	55.00
Source of depth data:	driller		
Project number:	4753-33601		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1965-04-02	Ground water data end date:	1965-04-02
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1965-04-02	10.50	

B4
NE
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001810**

Logid:	LANE 16082	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	465	Site id:	ORW400000001810

B5
NE
1/2 - 1 Mile
Higher

FED USGS **USGS3239902**

Agency cd:	USGS	Site no:	440145122592201
Site name:	18S/03W-01DDB1		
Latitude:	440145	EDR Site id:	USGS3239902
Longitude:	1225922	Dec lat:	44.02901426
Dec lon:	-122.99063862	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	41
State:	41	County:	039
Country:	US	Land net:	Not Reported
Location map:	SPRINGFIELD	Map scale:	24000
Altitude:	465.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Mckenzie. Oregon. Area = 1360 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19600500
Date inventoried:	19690805	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	49.00	Hole depth:	49.00
Source of depth data:	driller		
Project number:	4753-33601		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-00	Ground water data end date:	1960-05-00
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05	10.00	

B6
NE
1/2 - 1 Mile
Higher

FED USGS **USGS3239903**

Agency cd:	USGS	Site no:	440145122592202
Site name:	18S/03W-01DDB2		
Latitude:	440145	EDR Site id:	USGS3239903
Longitude:	1225922	Dec lat:	44.02901426
Dec lon:	-122.99063862	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	41
State:	41	County:	039
Country:	US	Land net:	Not Reported
Location map:	SPRINGFIELD	Map scale:	24000
Altitude:	465.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Mckenzie. Oregon. Area = 1360 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19610300
Date inventoried:	19690805	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	50.00	Hole depth:	50.00
Source of depth data:	driller		
Project number:	4753-33601		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1961-03-00	Ground water data end date:	1961-03-00
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1961-03	7.50	

B7
NE
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001811**

Logid:	LANE 16085	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	465	Site id:	ORW400000001811

C8
NNE **OR WELLS** **ORW400000001818**
1/2 - 1 Mile
Lower

Logid:	LANE 2789	Lstupdate:	11/04/2008
Establby:	EMILY BRAY-NASH	Xysource:	APPLICATION MAP & DOQ
Horizerr:	100	Sourceorg:	OWRD
Sourceowrd:	GWATER		
Welltag:	0		
Sownum:	0	Obswell:	N
Recwell:	9	Obsflagall:	ON
Lsdelev:	0	Site id:	ORW400000001818

C9
NNE **FED USGS** **USGS3239907**
1/2 - 1 Mile
Higher

Agency cd:	USGS	Site no:	440150122593001
Site name:	18S/03W-01DBD		
Latitude:	440150	EDR Site id:	USGS3239907
Longitude:	1225930	Dec lat:	44.03040312
Dec lon:	-122.99286094	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	41
State:	41	County:	039
Country:	US	Land net:	Not Reported
Location map:	SPRINGFIELD	Map scale:	24000
Altitude:	458.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Mckenzie. Oregon. Area = 1360 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19580509
Date inventoried:	19690805	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	56.00	Hole depth:	56.00
Source of depth data:	driller		
Project number:	4753-33601		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1958-05-09	Ground water data end date:	1958-05-09
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1958-05-09	11.00	

C10
NNE
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001819**

Logid:	LANE 16096	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	458	Site id:	ORW400000001819

D11
North
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001827**

Logid:	LANE 16099	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	458	Site id:	ORW400000001827

D12
North
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001828**

Logid:	LANE 16101	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	458	Site id:	ORW400000001828

Map ID Direction Distance Elevation	Database	EDR ID Number
D13 **North** **1/2 - 1 Mile** **Higher**	**FED USGS**	**USGS3239909**

Agency cd:	USGS	Site no:	440155122594001
Site name:	18S/03W-01DBC1		
Latitude:	440155	EDR Site id:	USGS3239909
Longitude:	1225940	Dec lat:	44.03179198
Dec lon:	-122.99563884	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	41
State:	41	County:	039
Country:	US	Land net:	Not Reported
Location map:	SPRINGFIELD	Map scale:	24000
Altitude:	458.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Mckenzie. Oregon. Area = 1360 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19650423
Date inventoried:	19690805	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	55.00	Hole depth:	55.00
Source of depth data:	driller		
Project number:	4753-33601		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1965-04-23	Ground water data end date:	1965-04-23
Ground water data count:	1		

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1965-04-23	7.50		1965-04-23	7.50	

D14 **North** **1/2 - 1 Mile** **Higher**	**FED USGS**	**USGS3239910**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Agency cd:	USGS	Site no:	440155122594002
Site name:	18S/03W-01DBC2		
Latitude:	440155	EDR Site id:	USGS3239910
Longitude:	1225940	Dec lat:	44.03179198
Dec lon:	-122.99563884	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	41
State:	41	County:	039
Country:	US	Land net:	Not Reported
Location map:	SPRINGFIELD	Map scale:	24000
Altitude:	458.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Mckenzie. Oregon. Area = 1360 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19650614
Date inventoried:	19690805	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	56.00	Hole depth:	56.00
Source of depth data:	driller		
Project number:	4753-33601		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1965-06-14	Ground water data end date:	1965-06-14
Ground water data count:	1		

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1965-06-14	11.50		1965-06-14	11.50	

E15
NE
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001816**

Logid:	LANE 16100	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	465	Site id:	ORW400000001816

E16
NE
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001817**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Logid:	LANE 16090	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	465	Site id:	ORW400000001817

E17
NE
1/2 - 1 Mile
Higher

FED USGS **USGS3239905**

Agency cd:	USGS	Site no:	440150122592201
Site name:	18S/03W-01DAC1		
Latitude:	440150	EDR Site id:	USGS3239905
Longitude:	1225922	Dec lat:	44.03040314
Dec lon:	-122.99063864	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	41
State:	41	County:	039
Country:	US	Land net:	Not Reported
Location map:	SPRINGFIELD	Map scale:	24000
Altitude:	465.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Mckenzie. Oregon. Area = 1360 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19570611
Date inventoried:	19690805	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	44.00	Hole depth:	44.00
Source of depth data:	driller		
Project number:	4753-33601		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1957-06-11	Ground water data end date:	1957-06-11
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1957-06-11	9.00	

E18
NE
1/2 - 1 Mile
Higher

FED USGS **USGS3239906**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Agency cd:	USGS	Site no:	440150122592202
Site name:	18S/03W-01DAC2		
Latitude:	440150	EDR Site id:	USGS3239906
Longitude:	1225922	Dec lat:	44.03040314
Dec lon:	-122.99063864	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	41
State:	41	County:	039
Country:	US	Land net:	Not Reported
Location map:	SPRINGFIELD	Map scale:	24000
Altitude:	465.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Mckenzie. Oregon. Area = 1360 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19560724
Date inventoried:	19690805	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	44.00	Hole depth:	44.00
Source of depth data:	driller		
Project number:	4753-33601		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1956-07-24	Ground water data end date:	1956-07-24
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1956-07-24	9.00	

19
NE
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001812**

Logid:	LANE 16097	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	465	Site id:	ORW400000001812

F20
WNW
1/2 - 1 Mile
Higher

OR WELLS **ORI400000003331**

Well inspe:	29938		
Physical l:	Not Reported	Inspection:	02/19/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	ALLEN, ALFRED; 1405 S 2ND AVE, SPRINGFIELD		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	NO WELL LOG YET; SEAL SLUMPED 2.90 FT		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	600		
Township:	18		

Township c:	S		
Range:	3		
Range char:	W		
Sctn:	2		
Qtr40:	NE	Qtr160:	SE
Latitude d:	44.02785		
Longitude :	123.01091		
Gps horizo:	Not Reported		
Year const:	2002		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	U	Previous i:	0
Inspected1:	KRB	Wm region:	NW
Well tag a:	BANDED		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	byrdkr
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	44.02785		
Newlong:	-123.01091		
Site id:	ORI400000003331		

F21
WNW
1/2 - 1 Mile
Higher

OR WELLS **ORI400000003332**

Well inspe:	34591		
Physical l:	Not Reported	Inspection:	03/12/2003
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	ALLEN, ALFRED; 1405 S 2ND AVE, SPRINGFIELD		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported

Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	SEAL TOPPED OFF		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	600		
Township:	18		
Township c:	S		
Range:	3		
Range char:	W		
Sctn:	2		
Qtr40:	NE	Qtr160:	SE
Latitude d:	44.02785		
Longitude :	123.01091		
Gps horizo:	Not Reported		
Year const:	2002		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	U	Previous i:	-1
Inspected1:	KRB	Wm region:	NW
Well tag a:	BANDED		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		
Last updt :	01/01/2000	Last updt1:	byrdkr
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	44.02785		
Newlong:	-123.01091		
Site id:	ORI400000003332		

Map ID Direction Distance Elevation	Database	EDR ID Number
G22 **NE** **1/2 - 1 Mile** **Higher**	**OR WELLS**	**ORW400000001824**

Logid:	LANE 16113	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	465	Site id:	ORW400000001824

G23 **NE** **1/2 - 1 Mile** **Higher**	**FED USGS**	**USGS3239908**

Agency cd:	USGS	Site no:	440153122590901
Site name:	18S/03W-01DAD		
Latitude:	440153	EDR Site id:	USGS3239908
Longitude:	1225909	Dec lat:	44.0312365
Dec lon:	-122.98702741	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	41
State:	41	County:	039
Country:	US	Land net:	Not Reported
Location map:	SPRINGFIELD	Map scale:	24000
Altitude:	465.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Mckenzie. Oregon. Area = 1360 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19640428
Date inventoried:	19690805	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	50.00	Hole depth:	50.00
Source of depth data:	driller		
Project number:	4753-33601		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1964-04-28	Ground water data end date:	1964-04-28
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1964-04-28	12.00	

24
SSE
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001759**

Logid:	LANE 16205	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	469	Site id:	ORW400000001759

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: OR Radon

Radon Test Results

Zipcode	Num Tests	Maximum	Minimum	Average	# > 4 pCi/L
97405	31	6.4	0.1	1.6	2

Federal EPA Radon Zone for LANE County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for LANE COUNTY, OR

Number of sites tested: 19

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area	0.850 pCi/L	100%	0%	0%
Basement	1.360 pCi/L	88%	12%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory Data
Source: Oregon Geospatial Enterprise Office
Telephone: 503-378-2166

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Data
Source: Department of Water Resources
Telephone: 503-986-0843

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Locations
Source: Department of Geology and Mineral Industries
Telephone: 971-673-1540
A listing of oil and gas well locations in the state.

RADON

State Database: OR Radon
Source: Oregon Health Services
Telephone: 503-731-4272
Radon Levels in Orgeon

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

Site M2A
Buford Access Rd
Pleasant Hill, OR 97455

Inquiry Number: 3118160.10s
July 08, 2011

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

FORM-BPF-ASH

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GEOCHECK ADDENDUM

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

BUFORD ACCESS RD
PLEASANT HILL, OR 97455

COORDINATES

Latitude (North):	44.022100 - 44° 1' 19.6"
Longitude (West):	122.957400 - 122° 57' 26.6"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	503414.2
UTM Y (Meters):	4874112.0
Elevation:	486 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	44122-A8 SPRINGFIELD, OR
Most Recent Revision:	1986

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	2006, 2005
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL........................ National Priority List

EXECUTIVE SUMMARY

Proposed NPL	Proposed National Priority List Sites
NPL LIENS	Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL	National Priority List Deletions

Federal CERCLIS list

CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY	Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP	CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS	Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF	RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG	RCRA - Large Quantity Generators
RCRA-SQG	RCRA - Small Quantity Generators

Federal institutional controls / engineering controls registries

US ENG CONTROLS	Engineering Controls Sites List
US INST CONTROL	Sites with Institutional Controls

Federal ERNS list

ERNS	Emergency Response Notification System

State- and tribal - equivalent NPL

ECSI	Environmental Cleanup Site Information System

State- and tribal - equivalent CERCLIS

OR CRL	Confirmed Release List and Inventory

State and tribal leaking storage tank lists

INDIAN LUST	Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

UST	Underground Storage Tank Database
AST	Aboveground Storage Tanks
INDIAN UST	Underground Storage Tanks on Indian Land

EXECUTIVE SUMMARY

FEMA UST	Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

ENG CONTROLS	Engineering Controls Recorded at ESCI Sites
INST CONTROL	Institutional Controls Recorded at ESCI Sites

State and tribal voluntary cleanup sites

VCP	Voluntary Cleanup Program Sites
INDIAN VCP	Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS	Brownfields Projects

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS	A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
HIST LF	Old Closed SW Disposal Sites
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL	Clandestine Drug Labs
AOCONCERN	Columbia Slough
CDL	Uninhabitable Drug Lab Properties
US HIST CDL	National Clandestine Laboratory Register

Local Land Records

LIENS 2	CERCLA Lien Information
LUCIS	Land Use Control Information System

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	Spill Database

Other Ascertainable Records

RCRA-NonGen	RCRA - Non Generators
DOT OPS	Incident and Accident Data
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision

EXECUTIVE SUMMARY

UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
FINDS	Facility Index System/Facility Registry System
RAATS	RCRA Administrative Action Tracking System
UIC	Underground Injection Control Program Database
MANIFEST	Manifest Information
OR HAZMAT	Hazmat/Incidents
DRYCLEANERS	Drycleaning Facilities
NPDES	Wastewater Permits Database
AIRS	Oregon Title V Facility Listing
HSIS	Hazardous Substance Information Survey
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER	PCB Transformer Registration Database
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
COAL ASH DOE	Sleam-Electric Plan Operation Data
FINANCIAL ASSURANCE	Financial Assurance Information Listing
COAL ASH	Coal Ash Disposal Sites Listing

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

STANDARD ENVIRONMENTAL RECORDS

Federal RCRA generators list

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 03/11/2011 has revealed that there is 1 RCRA-CESQG site within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
LOYD BAKERS MFG & WELDING	***1350 CLEARWATER LANE***	***N 1/2 - 1 (0.536 mi.)***	***1***	***7***

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Department of Environmental Quality's Closure & Regular Solid Waste Active Disposal Permits database.

A review of the SWF/LF list, as provided by EDR, and dated 06/13/2011 has revealed that there is 1 SWF/LF site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CLEARWATER LANDFILL	***CLEARWATER LANE***	***NE 1/2 - 1 (0.605 mi.)***	***2***	***9***

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environmental Quality's LUST Database List.

A review of the LUST list, as provided by EDR, and dated 04/01/2011 has revealed that there is 1 LUST site within approximately 1 mile of the target property.

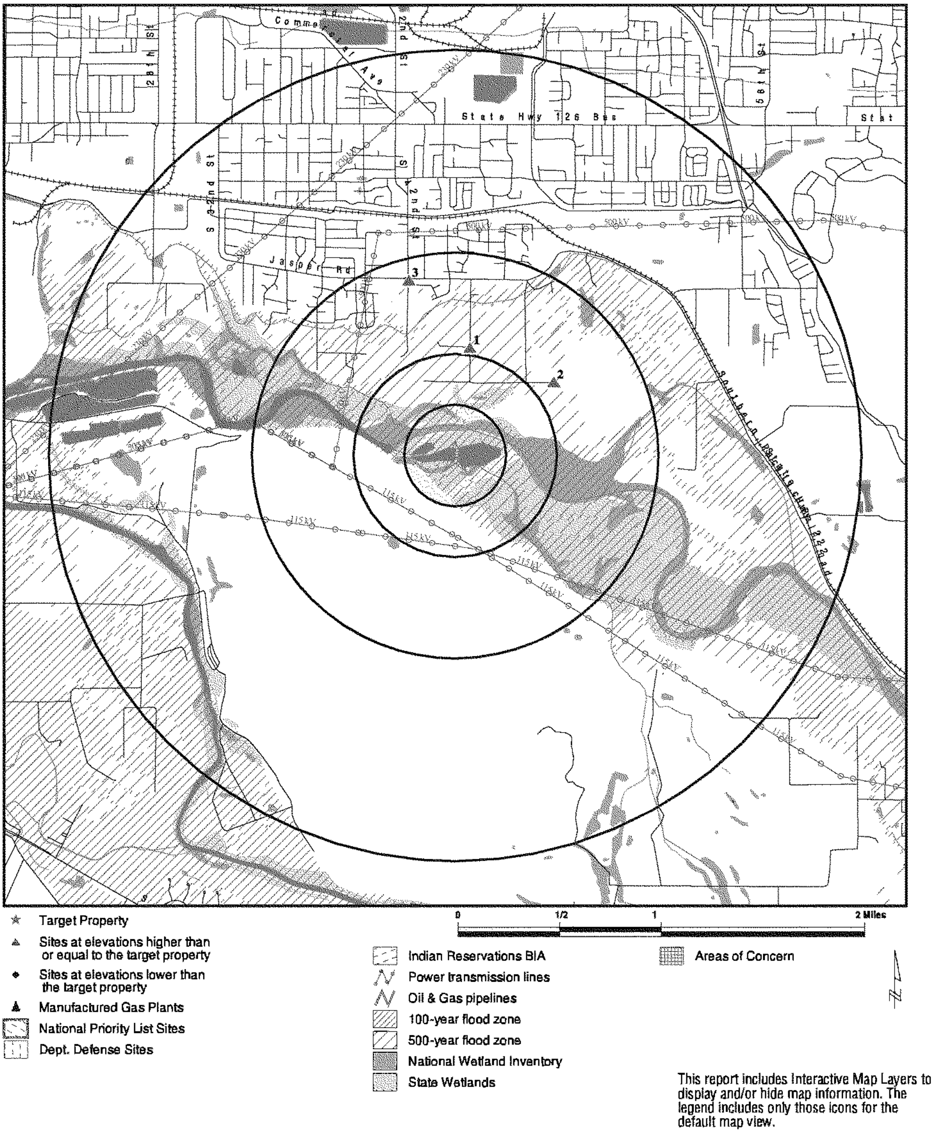
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WENTWORTH BUICK Cleanup Complete: 05/06/1999	2200 W SEVENTH	NNW 1/2 - 1 (0.893 mi.)	3	9

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 30 records.

Site Name	Database(s)
TUGMAN PARK LANDFILL	ECSI, OR CRL, INST CONTROL, VCP
LANE COUNTY - BLOOMBERG RD. LANDFI	ECSI
ODOT - GLASS BAR STOCKPILE	ECSI, VCP
IZAAK WALTON LEAGUE SHOOTING RANGE	ECSI, VCP
SPRINGFIELD AIRPORT (ABANDONED)	ECSI, BROWNFIELDS
BLOOMBERG PARK LEAF COMPOSTING FAC	SWF/LF
WASTE ALTERNATIVES	SWF/LF
FUTURE LOGGING CO.	LUST
JAMES RIVER TAG FUELING SITE	LUST
WEYERHAEUSER COMPANY	LUST
STATON COMPANIES	RCRA-NonGen
GOSHEN AUTO RECYCLERS	RCRA-NonGen
ODOT GLASS BAR STOCKPILE SITE	RCRA-NonGen, FINDS
OIL RE-REFINING COMPANY	RCRA-NonGen
WEYERHAEUSER NR CO SOUTH VALLEY	RCRA-CESQG, FINDS
JAMES RIVER TAG FUELING SITE	FINDS
MCKENZIE HWY 126E MP 49	OR HAZMAT
HWY 58 & CLOVERDALE	OR HAZMAT
85809 HWY 58	OR HAZMAT
MCKENZIE HWY	OR HAZMAT
MCKENZIE HWY	OR HAZMAT
MCCABE, DON(OWNER:TESORO)	UIC
WEYERHAEUSER NR COMPANY	HSIS
ZIP-O-LOG MILLS INC	HSIS
WEYERHAEUSER CO	ICIS
CONE LUMBER COMPANY	NPDES
REMOTE AUTO DISMANTLING	NPDES
GOSHEN AUTO RECYCLERS	NPDES
JASPER JUNCTION	NPDES
MIDDLE FORK WILLAMETTE RIVER LOOP	NPDES

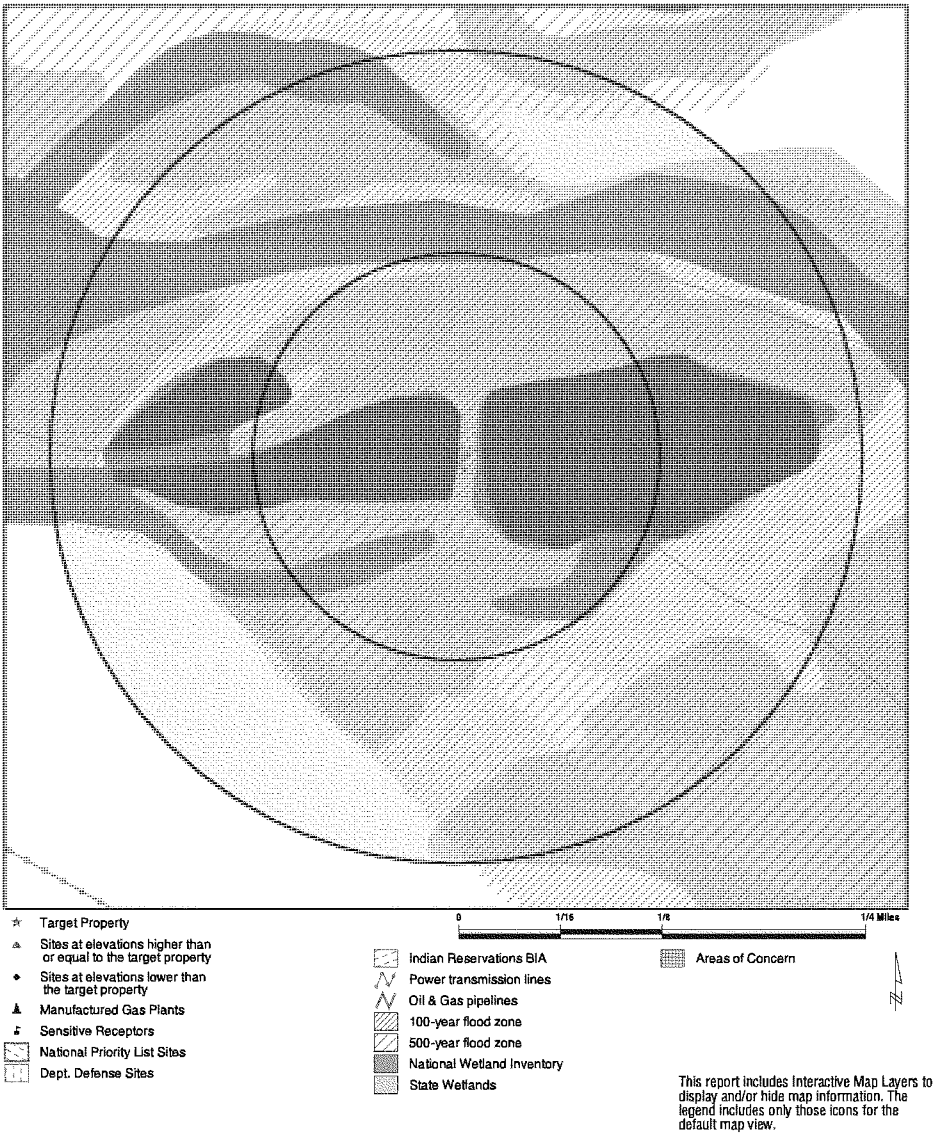
OVERVIEW MAP - 3118160.10s



This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Site M2A ADDRESS: Buford Access Rd Pleasant Hill OR 97455 LAT/LONG: 44.0221 / 122.9574	CLIENT: Tetra Tech EM, Inc. CONTACT: Merri Martz INQUIRY #: 3118160.10s DATE: July 08, 2011 10:15 am

DETAIL MAP - 3118160.10s



This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Site M2A	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Buford Access Rd Pleasant Hill OR 97455	CONTACT:	Merri Martz
		INQUIRY #:	3118160.10s
LAT/LONG:	44.0221 / 122.9574	DATE:	July 08, 2011 10:15 am

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.500	0	0	0	0	0	0
Proposed NPL		1.500	0	0	0	0	0	0
NPL LIENS		0.500	0	0	0	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.500	0	0	0	0	0	0
Federal CERCLIS list								
CERCLIS		1.000	0	0	0	0	NR	0
FEDERAL FACILITY		1.500	0	0	0	0	0	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		1.000	0	0	0	0	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS		1.500	0	0	0	0	0	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		1.000	0	0	0	0	NR	0
Federal RCRA generators list								
RCRA-LQG		0.750	0	0	0	0	NR	0
RCRA-SQG		0.750	0	0	0	0	NR	0
RCRA-CESQG		0.750	0	0	0	1	NR	1
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		1.000	0	0	0	0	NR	0
US INST CONTROL		1.000	0	0	0	0	NR	0
Federal ERNS list								
ERNS		0.500	0	0	0	NR	NR	0
State- and tribal - equivalent NPL								
ECSI		1.500	0	0	0	0	0	0
State- and tribal - equivalent CERCLIS								
OR CRL		1.000	0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		1.000	0	0	0	1	NR	1
State and tribal leaking storage tank lists								
LUST		1.000	0	0	0	1	NR	1
INDIAN LUST		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
State and tribal registered storage tank lists								
UST		0.750	0	0	0	0	NR	0
AST		0.750	0	0	0	0	NR	0
INDIAN UST		0.750	0	0	0	0	NR	0
FEMA UST		0.750	0	0	0	0	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS		1.000	0	0	0	0	NR	0
INST CONTROL		1.000	0	0	0	0	NR	0
State and tribal voluntary cleanup sites								
VCP		1.000	0	0	0	0	NR	0
INDIAN VCP		1.000	0	0	0	0	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		1.000	0	0	0	0	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		1.000	0	0	0	0	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9		1.000	0	0	0	0	NR	0
ODI		1.000	0	0	0	0	NR	0
HIST LF		1.000	0	0	0	0	NR	0
INDIAN ODI		1.000	0	0	0	0	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		0.500	0	0	0	NR	NR	0
AOCONCERN		1.500	0	0	0	0	0	0
CDL		0.500	0	0	0	NR	NR	0
US HIST CDL		0.500	0	0	0	NR	NR	0
Local Land Records								
LIENS 2		0.500	0	0	0	NR	NR	0
LUCIS		1.000	0	0	0	0	NR	0
Records of Emergency Release Reports								
HMIRS		0.500	0	0	0	NR	NR	0
SPILLS		0.500	0	0	0	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.750	0	0	0	0	NR	0
DOT OPS		0.500	0	0	0	NR	NR	0
DOD		1.500	0	0	0	0	0	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FUDS		1.500	0	0	0	0	0	0
CONSENT		1.500	0	0	0	0	0	0
ROD		1.500	0	0	0	0	0	0
UMTRA		1.000	0	0	0	0	NR	0
MINES		0.750	0	0	0	0	NR	0
TRIS		0.500	0	0	0	NR	NR	0
TSCA		0.500	0	0	0	NR	NR	0
FTTS		0.500	0	0	0	NR	NR	0
HIST FTTS		0.500	0	0	0	NR	NR	0
SSTS		0.500	0	0	0	NR	NR	0
ICIS		0.500	0	0	0	NR	NR	0
PADS		0.500	0	0	0	NR	NR	0
MLTS		0.500	0	0	0	NR	NR	0
RADINFO		0.500	0	0	0	NR	NR	0
FINDS		0.500	0	0	0	NR	NR	0
RAATS		0.500	0	0	0	NR	NR	0
UIC		0.500	0	0	0	NR	NR	0
MANIFEST		0.750	0	0	0	0	NR	0
OR HAZMAT		0.500	0	0	0	NR	NR	0
DRYCLEANERS		0.750	0	0	0	0	NR	0
NPDES		0.500	0	0	0	NR	NR	0
AIRS		0.500	0	0	0	NR	NR	0
HSIS		0.500	0	0	0	NR	NR	0
INDIAN RESERV		1.500	0	0	0	0	0	0
SCRD DRYCLEANERS		1.000	0	0	0	0	NR	0
PCB TRANSFORMER		0.500	0	0	0	NR	NR	0
COAL ASH EPA		1.000	0	0	0	0	NR	0
COAL ASH DOE		0.500	0	0	0	NR	NR	0
FINANCIAL ASSURANCE		0.500	0	0	0	NR	NR	0
COAL ASH		1.000	0	0	0	0	NR	0
EDR PROPRIETARY RECORDS								
EDR Proprietary Records								
Manufactured Gas Plants		1.500	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

MAP FINDINGS

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
1 **North** **1/2-1** **0.536 mi.** **2832 ft.**	**LOYD BAKERS MFG & WELDING** **1350 CLEARWATER LANE** **SRINGFIELD, OR 97478**	**RCRA-CESQG** **FINDS**	**1004770148** **ORD131974818**

Relative:
Higher

Actual:
489 ft.

RCRA-CESQG:
Date form received by agency: 09/28/1988
Facility name: LOYD BAKERS MFG & WELDING
Facility address: 1350 CLEARWATER LANE
SRINGFIELD, OR 97478
EPA ID: ORD131974818
Mailing address: CLEARWATER LANE
SRINGFIELD, OR 97478
Contact: LOYD BAKER
Contact address: 1350 CLEARWATER LANE
SRINGFIELD, OR 97478
Contact country: US
Contact telephone: (503) 746-2241
Contact email: Not reported
EPA Region: 10
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:
Owner/operator name: LOYD BAKER
Owner/operator address: Not reported
Not reported
Owner/operator country: Not reported
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No

LOYD BAKERS MFG & WELDING (Continued) **1004770148**

Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Hazardous Waste Summary:

Waste code: D000
Waste name: Not Defined

Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: F003
Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste code: F005
Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Violation Status: No violations found

FINDS:

Registry ID: 110006430736

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
2 **NE** **1/2-1** **0.605 mi.** **3195 ft.**	**CLEARWATER LANDFILL** **CLEARWATER LANE** **SPRINGFIELD, OR 97478**	**FINDS** **SWF/LF**	**1006836917** **N/A**

Relative:
Higher

Actual:
497 ft.

FINDS:

Registry ID: 110013978053

Environmental Interest/Information System

OR-DEQ (Oregon - Department Of Environmental Quality) is a regulatory agency whose job is to protect the quality of Oregon's Environment. DEQ uses a combination of technical assistance, inspections and permitting to help public and private facilities and citizens understand and comply with state and federal environmental regulations.

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

LF:

Permit Number: 1120
Facility Id: 104326
Facility Telephone: (541) 744-0828
Facility Telephone 2: 541-513-2103
Lat/Long: 44.024500000000003 / -122.9462
Solid Waste Class: Industrial
Solid Waste Type: Landfill (Captive)
Date Opened: 2/25/1982
End Date: Not reported
Date Closed: Not reported
Permit Status: Active
Organization: Silica West, LLC
Contact Name: Richard Gross
Mailing Address: 1990 Clearwater Ln
Mailing City: Springfield
Mailing Zip: 97478-9560

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
3 **NNW** **1/2-1** **0.893 mi.** **4714 ft.**	**WENTWORTH BUICK** **2200 W SEVENTH** **EUGENE, OR 97402**	**LUST**	**S100498997** **N/A**

Relative:
Higher

Actual:
490 ft.

LUST:

Region: Western Region
Facility ID: 20-90-4152
Cleanup Received Date: 07/20/1990
Cleanup Start Date: 07/10/1990
Cleanup Complete Date: 05/06/1999

Count: 30 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
EUGENE	S105613775	TUGMAN PARK LANDFILL	E 39TH AVENUE NEAR FERRY ST	97405	ECSI, OR CRL, INST CONTROL, VCP
EUGENE	S100499505	FUTURE LOGGING CO.	34531 HWY 58	97478	LUST
EUGENE	1004770383	WEYERHAEUSER NR CO SOUTH VALLEY	85647 HWY 99 S	97405	RCRA-CESQG, FINDS
EUGENE	S108659178	CONE LUMBER COMPANY	85810 HWY 99 S	97405	NPDES
EUGENE	1008404775	STATON COMPANIES	85386 HWY 99 S	97405	RCRA-NonGen
EUGENE	S105980659	BLOOMBERG PARK LEAF COMPOSTING FAC	BLOOMBERG RD	97405	SWF/LF
EUGENE	S106236393	LANE COUNTY - BLOOMBERG RD. LANDFI	BLOOMBERG RD	97405	ECSI
EUGENE	S105614159	ODOT - GLASS BAR STOCKPILE	FRANKLIN BLVD	97405	ECSI, VCP
EUGENE	S104337256	WEYERHAEUSER NR COMPANY	85647 S HWY 99	97405	HSIS
EUGENE	1011490948	GOSHEN AUTO RECYCLERS	85741 S HWY 99	97405	RCRA-NonGen
EUGENE	S110292497	ZIP-O-LOG MILLS INC	85810 S HWY 99	97405	HSIS
EUGENE	1006852738	IZAAK WALTON LEAGUE SHOOTING RANGE	IZAAK WALTON RD	97405	ECSI, VCP
EUGENE	1000834779	ODOT GLASS BAR STOCKPILE SITE	NEAR I-5 SOUTH BETWEEN MILEPOS	97405	RCRA-NonGen, FINDS
EUGENE	1014400756	OIL RE-REFINING COMPANY	85951 OLD HIGHWAY 99	97405	RCRA-NonGen
EUGENE	S105225676	WASTE ALTERNATIVES	85507 STATE HIGHWAY 99 S	97405	SWF/LF
EUGENE	S108987584	REMOTE AUTO DISMANTLING	85709 STATE HIGHWAY 99 S	97405	NPDES
EUGENE	S110121603	GOSHEN AUTO RECYCLERS	85741 STATE 99 S	97405	NPDES
LANE COUNTY	S109577609		MCKENZIE HWY 126E MP 49		OR HAZMAT
OREGON CITY	1006854720	JAMES RIVER TAG FUELING SITE	MILEPOST 752, HIGHWAY 99E	97405	FINDS
OREGON CITY	S100499089	JAMES RIVER TAG FUELING SITE	MILEPOST 752, HIGHWAY 99E	97405	LUST
PLEASANT HILL	S105524238		HWY 58 & CLOVERDALE	97455	OR HAZMAT
PLEASANT HILL	S105524243		85809 HWY 58	97455	OR HAZMAT
SPRINGFIELD	S106770361	MCCABE, DON(OWNER:TESORO)	363 N 42ND ST	97478	UIC
SPRINGFIELD	1011614817	WEYERHAEUSER CO	785 N 42ND ST	97478	ICIS
SPRINGFIELD	S108572047	WEYERHAEUSER COMPANY	740 N 42ND ST	97478	LUST
SPRINGFIELD	S108660478	JASPER JUNCTION	920TH S 42ND ST & JASPER RD	97478	NPDES
SPRINGFIELD	S110647106	MIDDLE FORK WILLAMETTE RIVER LOOP	CLEARWATER PARK	97478	NPDES
SPRINGFIELD	S106236342	SPRINGFIELD AIRPORT (ABANDONED)	SW COR OF 28TH & OLYMPIC STS	97478	ECSI, BROWNFIELDS
SPRINGFIELD	S105524274		MCKENZIE HWY	97478	OR HAZMAT
SPRINGFIELD	S105524278		MCKENZIE HWY	97478	OR HAZMAT

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 05/16/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPAa??s Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010
Date Data Arrived at EDR: 01/11/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/15/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/09/2011	Source: EPA
Date Data Arrived at EDR: 03/15/2011	Telephone: 800-424-9346
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/16/2011
Number of Days to Update: 91	Next Scheduled EDR Contact: 08/29/2011
	Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/05/2011	Telephone: (206) 553-1200
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 07/07/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/05/2011	Telephone: (206) 553-1200
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 07/07/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/05/2011	Telephone: (206) 553-1200
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 07/07/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/05/2011	Telephone: (206) 553-1200
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 07/07/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/16/2011
Date Data Arrived at EDR: 03/25/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 81

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/16/2011
Date Data Arrived at EDR: 03/25/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 81

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 04/05/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 70

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Annually

State- and tribal - equivalent NPL

ECSI: Environmental Cleanup Site Information System

Sites that are or may be contaminated and may require cleanup.

Date of Government Version: 06/01/2011
Date Data Arrived at EDR: 06/03/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 27

Source: Department of Environmental Quality
Telephone: 503-229-6629
Last EDR Contact: 06/03/2011
Next Scheduled EDR Contact: 08/08/2011
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

CRL: Confirmed Release List and Inventory

All facilities with a confirmed release.

Date of Government Version: 05/24/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 36

Source: Department of Environmental Quality
Telephone: 503-229-6170
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

SWF/LF: Solid Waste Facilities List

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 06/13/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/15/2011	Telephone: 503-229-6299
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 15	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Semi-Annually

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 04/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 05/25/2011	Telephone: 503-229-5790
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 05/25/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 09/05/2011
	Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/31/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 02/01/2011	Telephone: 415-972-3372
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 48	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 03/03/2011	Source: EPA Region 4
Date Data Arrived at EDR: 03/18/2011	Telephone: 404-562-8677
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 45	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 05/17/2011	Source: EPA Region 10
Date Data Arrived at EDR: 05/19/2011	Telephone: 206-553-2857
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 26	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 03/07/2011	Source: EPA Region 1
Date Data Arrived at EDR: 05/20/2011	Telephone: 617-918-1313
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/03/2011
Number of Days to Update: 25	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 11/04/2009
Date Data Arrived at EDR: 05/04/2010
Date Made Active in Reports: 07/07/2010
Number of Days to Update: 64

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/04/2010
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/16/2011
Date Data Arrived at EDR: 05/17/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 28

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 04/01/2011
Date Data Arrived at EDR: 05/25/2011
Date Made Active in Reports: 06/29/2011
Number of Days to Update: 35

Source: Department of Environmental Quality
Telephone: 503-229-5815
Last EDR Contact: 05/25/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Quarterly

AST: Aboveground Storage Tanks
Aboveground storage tank locations reported to the Office of State Fire Marshal.

Date of Government Version: 12/01/2010
Date Data Arrived at EDR: 01/25/2011
Date Made Active in Reports: 02/24/2011
Number of Days to Update: 30

Source: Office of State Fire Marshal
Telephone: 503-378-3473
Last EDR Contact: 05/13/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Semi-Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 03/03/2011
Date Data Arrived at EDR: 03/18/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 45

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 05/18/2011	Source: EPA Region 9
Date Data Arrived at EDR: 05/26/2011	Telephone: 415-972-3368
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 19	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 05/16/2011	Source: EPA Region 8
Date Data Arrived at EDR: 05/17/2011	Telephone: 303-312-6137
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 28	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 05/17/2011	Source: EPA Region 10
Date Data Arrived at EDR: 05/19/2011	Telephone: 206-553-2857
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 26	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 03/07/2011	Source: EPA, Region 1
Date Data Arrived at EDR: 05/04/2011	Telephone: 617-918-1313
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/03/2011
Number of Days to Update: 41	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 01/01/2011	Source: EPA Region 5
Date Data Arrived at EDR: 02/23/2011	Telephone: 312-886-6136
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 68	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011	Source: EPA Region 6
Date Data Arrived at EDR: 05/11/2011	Telephone: 214-665-7591
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 34	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/01/2011
Date Data Arrived at EDR: 06/01/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 13

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 02/03/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/18/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Recorded at ESCI Sites
Engineering controls are physical measures selected or approved by the Director for the purpose of preventing or minimizing exposure to hazardous substances. Engineering controls may include, but are not limited to, fencing, capping, horizontal or vertical barriers, hydraulic controls, and alternative water supplies.

Date of Government Version: 06/01/2011
Date Data Arrived at EDR: 06/03/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 27

Source: Department of Environmental Quality
Telephone: 503-229-5193
Last EDR Contact: 06/03/2011
Next Scheduled EDR Contact: 08/08/2011
Data Release Frequency: Quarterly

INST CONTROL: Institutional Controls Recorded at ESCI Sites
An institutional control is a legal or administrative tool or action taken to reduce the potential for exposure to hazardous substances. Institutional controls may include, but are not limited to, use restrictions, environmental monitoring requirements, and site access and security measures.

Date of Government Version: 06/01/2011
Date Data Arrived at EDR: 06/03/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 27

Source: Department of Environmental Quality
Telephone: 503-229-5193
Last EDR Contact: 06/03/2011
Next Scheduled EDR Contact: 08/08/2011
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

VCS: Voluntary Cleanup Program Sites
Responsible parties have entered into an agreement with DEQ to voluntarily address contamination associated with their property.

Date of Government Version: 04/22/2011
Date Data Arrived at EDR: 04/27/2011
Date Made Active in Reports: 05/16/2011
Number of Days to Update: 19

Source: DEQ
Telephone: 503-229-5256
Last EDR Contact: 04/11/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 70

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008	Source: EPA, Region 7
Date Data Arrived at EDR: 04/22/2008	Telephone: 913-551-7365
Date Made Active in Reports: 05/19/2008	Last EDR Contact: 04/20/2009
Number of Days to Update: 27	Next Scheduled EDR Contact: 07/20/2009
	Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Projects

Brownfields investigations and/or cleanups that have been conducted in Oregon.

Date of Government Version: 05/24/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 05/25/2011	Telephone: 503-229-6801
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 05/25/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 09/05/2011
	Data Release Frequency: Semi-Annually

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 03/29/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/29/2011	Telephone: 202-566-2777
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 06/27/2011
Number of Days to Update: 77	Next Scheduled EDR Contact: 10/10/2011
	Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985	Source: Environmental Protection Agency
Date Data Arrived at EDR: 08/09/2004	Telephone: 800-424-9346
Date Made Active in Reports: 09/17/2004	Last EDR Contact: 06/09/2004
Number of Days to Update: 39	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009	Source: EPA, Region 9
Date Data Arrived at EDR: 05/07/2009	Telephone: 415-947-4219
Date Made Active in Reports: 09/21/2009	Last EDR Contact: 06/27/2011
Number of Days to Update: 137	Next Scheduled EDR Contact: 10/10/2011
	Data Release Frequency: No Update Planned

HIST LF: Old Closed SW Disposal Sites
A list of solid waste disposal sites that have been closed for a long while.

Date of Government Version: 04/01/2000	Source: Department of Environmental Quality
Date Data Arrived at EDR: 07/08/2003	Telephone: 503-229-5409
Date Made Active in Reports: 07/18/2003	Last EDR Contact: 07/08/2003
Number of Days to Update: 10	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/03/2007	Telephone: 703-308-8245
Date Made Active in Reports: 01/24/2008	Last EDR Contact: 05/09/2011
Number of Days to Update: 52	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/02/2011	Source: Drug Enforcement Administration
Date Data Arrived at EDR: 03/17/2011	Telephone: 202-307-1000
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 06/07/2011
Number of Days to Update: 46	Next Scheduled EDR Contact: 09/19/2011
	Data Release Frequency: Quarterly

AOC MU: East Multnomah County Area
Approximate extent of TSA VOC plume February , 2002

Date of Government Version: N/A	Source: City of Portland Environmental Services
Date Data Arrived at EDR: 10/07/2002	Telephone: 503-823-5310
Date Made Active in Reports: 10/22/2002	Last EDR Contact: 03/13/2007
Number of Days to Update: 15	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

AOC COL: Columbia Slough
Columbia Slough waterway boundaries.

Date of Government Version: 08/10/2005	Source: City of Portland Environmental Services
Date Data Arrived at EDR: 05/17/2006	Telephone: 503-823-5310
Date Made Active in Reports: 06/16/2006	Last EDR Contact: 03/13/2007
Number of Days to Update: 30	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

CDL 2: Clandestine Drug Lab Site Listing
A listing of clandestine drug lab site locations included in the Incident database.

Date of Government Version: 02/02/2011
Date Data Arrived at EDR: 05/04/2011
Date Made Active in Reports: 06/22/2011
Number of Days to Update: 49

Source: Oregon State Police
Telephone: 503-373-1540
Last EDR Contact: 05/04/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

CDL: Uninhabitable Drug Lab Properties

The properties listed on these county pages have been declared by a law enforcement agency to be unfit for use due to meth lab and/or storage activities. The properties are considered uninhabitable until cleaned up by a state certified decontamination contractor and a certificate of fitness is issued by the Oregon Health Division.

Date of Government Version: 04/27/2011
Date Data Arrived at EDR: 05/27/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 34

Source: Department of Consumer & Business Services
Telephone: 503-378-4133
Last EDR Contact: 11/24/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 06/21/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/05/2011
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 51

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Annually

SPILLS: Spill Data
Oil and hazardous material spills reported to the Environmental Response Program.

Date of Government Version: 04/12/2011
Date Data Arrived at EDR: 04/14/2011
Date Made Active in Reports: 05/16/2011
Number of Days to Update: 32

Source: Department of Environmental Quality
Telephone: 503-229-5815
Last EDR Contact: 04/11/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Semi-Annually

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/11/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data
Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/12/2011
Date Data Arrived at EDR: 02/11/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 05/11/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Varies

DOD: Department of Defense Sites
This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites
The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 08/12/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 112

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2010	Source: Department of Justice, Consent Decree Library
Date Data Arrived at EDR: 04/05/2011	Telephone: Varies
Date Made Active in Reports: 06/14/2011	Last EDR Contact: 07/01/2011
Number of Days to Update: 70	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 02/25/2011	Source: EPA
Date Data Arrived at EDR: 03/16/2011	Telephone: 703-416-0223
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 06/15/2011
Number of Days to Update: 5	Next Scheduled EDR Contact: 09/26/2011
	Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010	Source: Department of Energy
Date Data Arrived at EDR: 10/21/2010	Telephone: 505-845-0011
Date Made Active in Reports: 01/28/2011	Last EDR Contact: 06/02/2011
Number of Days to Update: 99	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/08/2011	Source: Department of Labor, Mine Safety and Health Administration
Date Data Arrived at EDR: 03/09/2011	Telephone: 303-231-5959
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 06/08/2011
Number of Days to Update: 54	Next Scheduled EDR Contact: 09/19/2011
	Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009	Source: EPA
Date Data Arrived at EDR: 12/17/2010	Telephone: 202-566-0250
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 05/27/2011
Number of Days to Update: 94	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006	Source: EPA
Date Data Arrived at EDR: 09/29/2010	Telephone: 202-260-5521
Date Made Active in Reports: 12/02/2010	Last EDR Contact: 06/30/2011
Number of Days to Update: 64	Next Scheduled EDR Contact: 10/10/2011
	Data Release Frequency: Every 4 Years

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/07/2011
Date Data Arrived at EDR: 01/21/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 59

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/22/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/18/2010
Date Data Arrived at EDR: 04/06/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 51

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/13/2011
Next Scheduled EDR Contact: 07/25/2011
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010
Date Data Arrived at EDR: 04/16/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 41

Source: EPA
Telephone: (206) 553-1200
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 05/27/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Biennially

UIC: Underground Injection Control Program Database

DEQ's Underground Injection Control Program is authorized by the Environmental Protection Agency (EPA) to regulate all underground injection in Oregon to protect groundwater resources.

Date of Government Version: 03/03/2011
Date Data Arrived at EDR: 03/04/2011
Date Made Active in Reports: 03/29/2011
Number of Days to Update: 25

Source: Department of Environmental Quality
Telephone: 503-229-5945
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

OR MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 09/08/2010
Date Made Active in Reports: 10/15/2010
Number of Days to Update: 37

Source: Department of Environmental Quality
Telephone: N/A
Last EDR Contact: 05/16/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: Annually

HAZMAT: Hazmat/Incidents

Hazardous material incidents reported to the State Fire Marshal by emergency responders. The hazardous material may or may not have been released.

Date of Government Version: 02/02/2011
Date Data Arrived at EDR: 05/04/2011
Date Made Active in Reports: 06/22/2011
Number of Days to Update: 49

Source: State Fire Marshal's Office
Telephone: 503-373-1540
Last EDR Contact: 05/04/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Semi-Annually

DRYCLEANERS: Drycleaning Facilities

A listing of registered drycleaning facilities in Oregon.

Date of Government Version: 02/07/2011
Date Data Arrived at EDR: 02/09/2011
Date Made Active in Reports: 02/23/2011
Number of Days to Update: 14

Source: Department of Environmental Quality
Telephone: 503-229-6783
Last EDR Contact: 06/06/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Varies

NPDES: Wastewater Permits Database

A listing of permitted wastewater facilities.

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/12/2011
Date Made Active in Reports: 06/22/2011
Number of Days to Update: 41

Source: Department of Environmental Quality
Telephone: 503-229-5657
Last EDR Contact: 06/27/2011
Next Scheduled EDR Contact: 08/29/2011
Data Release Frequency: Quarterly

AIRS: Oregon Title V Facility Listing
A listing of Title V facility source and emissions information.

Date of Government Version: 12/31/2007	Source: Department of Environmental Quality
Date Data Arrived at EDR: 12/28/2009	Telephone: 503-229-6459
Date Made Active in Reports: 01/19/2010	Last EDR Contact: 06/20/2011
Number of Days to Update: 22	Next Scheduled EDR Contact: 09/19/2011
	Data Release Frequency: Varies

HSIS: Hazardous Substance Information Survey
Companies in Oregon submitting the Hazardous Substance Information Survey and either reporting or not reporting hazardous substances.

Date of Government Version: 12/01/2010	Source: State Fire Marshal's Office
Date Data Arrived at EDR: 01/25/2011	Telephone: 503-373-1540
Date Made Active in Reports: 02/24/2011	Last EDR Contact: 05/13/2011
Number of Days to Update: 30	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Semi-Annually

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005	Source: USGS
Date Data Arrived at EDR: 12/08/2006	Telephone: 202-208-3710
Date Made Active in Reports: 01/11/2007	Last EDR Contact: 04/21/2011
Number of Days to Update: 34	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/09/2011	Telephone: 615-532-8599
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 06/06/2011
Number of Days to Update: 54	Next Scheduled EDR Contact: 08/08/2011
	Data Release Frequency: Varies

FINANCIAL ASSURANCE 1: Financial Assurance Information Listing
Financial assurance information for hazardous waste facilities.

Date of Government Version: 03/29/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 03/31/2011	Telephone: 541-633-2011
Date Made Active in Reports: 05/06/2011	Last EDR Contact: 06/13/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites Listing
A listing of coal ash disposal sites.

Date of Government Version: 06/01/2011	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/02/2011	Telephone: 541-298-7255
Date Made Active in Reports: 06/30/2011	Last EDR Contact: 05/31/2011
Number of Days to Update: 28	Next Scheduled EDR Contact: 09/12/2011
	Data Release Frequency: Varies

FINANCIAL ASSURANCE 2: Financial Assurance Information Listing

Financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 06/13/2011
Date Data Arrived at EDR: 06/15/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 15

Source: Department of Environmental Quality
Telephone: 503-229-5521
Last EDR Contact: 06/13/2011
Next Scheduled EDR Contact: 09/12/2011
Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 04/19/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/14/2011
Next Scheduled EDR Contact: 09/26/2011
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008
Date Data Arrived at EDR: 02/18/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 100

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 05/05/2011
Next Scheduled EDR Contact: 08/15/2011
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/21/2011
Next Scheduled EDR Contact: 08/01/2011
Data Release Frequency: N/A

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 05/12/2011
Date Made Active in Reports: 05/24/2011
Number of Days to Update: 12

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/12/2011
Next Scheduled EDR Contact: 08/22/2011
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 07/06/2010
Date Made Active in Reports: 07/26/2010
Number of Days to Update: 20

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 06/20/2011
Next Scheduled EDR Contact: 10/03/2011
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.
Daycare Centers: Child Care Listings
Source: Employment Department
Telephone: 503-947-1420

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory Data
Source: Oregon Geospatial Enterprise Office
Telephone: 503-378-2166

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

GEOCHECK ® - PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

SITE M2A
BUFORD ACCESS RD
PLEASANT HILL, OR 97455

TARGET PROPERTY COORDINATES

Latitude (North):	44.02210 - 44° 1' 19.6"
Longitude (West):	122.9574 - 122° 57' 26.6"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	503414.2
UTM Y (Meters):	4874112.0
Elevation:	486 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	44122-A8 SPRINGFIELD, OR
Most Recent Revision:	1986

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

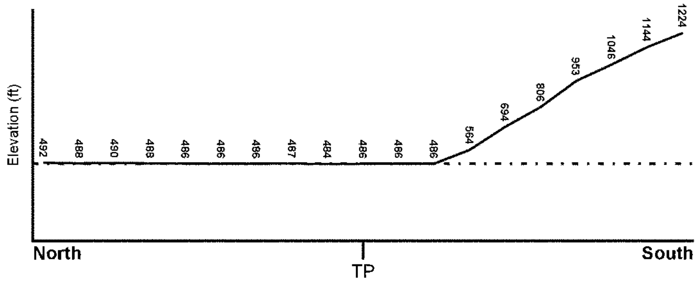
TOPOGRAPHIC INFORMATION

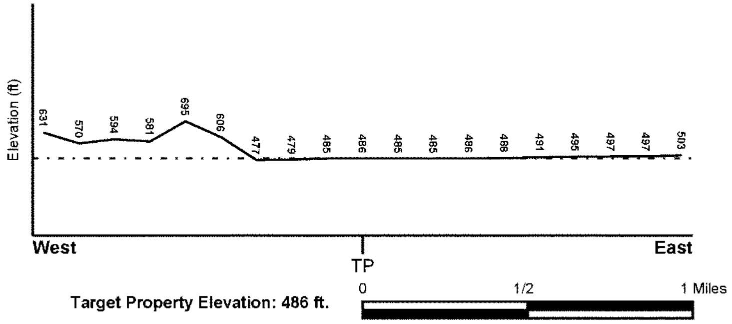
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General West

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 486 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
LANE, OR	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 41039C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
SPRINGFIELD	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT **GEOLOGIC AGE IDENTIFICATION**

Era:	Cenozoic	Category:	Stratifed Sequence
System:	Quaternary		
Series:	Quaternary		
Code:	Q *(decoded above as Era, System & Series)*		

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3118160.10s

SITE NAME:	Site M2A	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Buford Access Rd Pleasant Hill OR 97455	CONTACT:	Merri Martz
		INQUIRY #:	3118160.10s
LAT/LONG:	44.0221 / 122.9574	DATE:	July 08, 2011 10:16 am

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name:	Water
Soil Surface Texture:	
Hydrologic Group:	Not reported
Soil Drainage Class:	
Hydric Status: Unknown	
Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

No Layer Information available.

Soil Map ID: 2

Soil Component Name:	Riverwash
Soil Surface Texture:	stratified gravel to sand
Hydrologic Group:	Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
Soil Drainage Class:	Poorly drained
Hydric Status: All hydric	
Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 31 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	59 inches	stratified gravel to sand	Not reported	Not reported	Max: Min:	Max: Min:

Soil Map ID: 3

Soil Component Name: Fluvents

Soil Surface Texture: stratified gravel to sand

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

Soil Map ID: 4

Soil Component Name: Camas

Soil Surface Texture: gravelly sandy loam

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			**Classification**		**Saturated hydraulic conductivity micro m/sec**	**Soil Reaction (pH)**
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**		
1	0 inches	14 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 7.3 Min: 5.6
2	14 inches	59 inches	very gravelly sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 7.3 Min: 5.6

Soil Map ID: 5

Soil Component Name:	Newberg
Soil Surface Texture:	fine sandy loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6
2	14 inches	64 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 6.5 Min: 5.6

Soil Map ID: 6

Soil Component Name:	Witzel
Soil Surface Texture:	very cobbly loam
Hydrologic Group:	Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
Soil Drainage Class:	Well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 43 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	3 inches	very cobbly loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	3 inches	16 inches	very cobbly clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
3	16 inches	20 inches	unweathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:

Soil Map ID: 7

Soil Component Name:	Hazelair
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
Soil Drainage Class:	Moderately well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	Moderate
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 46 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: Min:	Max: Min:

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	14 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: Min:	Max: Min:
3	14 inches	35 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: Min:	Max: Min:
4	35 inches	46 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: Min:	Max: Min:

Soil Map ID: 8

Soil Component Name:	Nekia
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	High
Depth to Bedrock Min:	> 89 inches
Depth to Watertable Min:	> 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: Min:	Max: Min:
2	9 inches	35 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: Min:	Max: Min:
3	35 inches	38 inches	unweathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: Min:	Max: Min:

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	ORI400000003330	1/4 - 1/2 Mile NNW
2	ORI400000003389	1/2 - 1 Mile NNE
3	ORW400000001842	1/2 - 1 Mile North
4	ORW400000001840	1/2 - 1 Mile NNE

PHYSICAL SETTING SOURCE MAP - 3118160.10s

County Boundary
Major Roads
Contour Lines
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

Groundwater Flow Direction
(CI) Indeterminate Groundwater Flow at Location
(GV) Groundwater Flow Varies at Location

SITE NAME:	Site M2A	CLIENT:	Tetra Tech EM, Inc.
ADDRESS:	Buford Access Rd Pleasant Hill OR 97455	CONTACT:	Merri Martz
		INQUIRY #:	3118160.10s
LAT/LONG:	44.0221 / 122.9574	DATE:	July 08, 2011 10:16 am

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation	Database	EDR ID Number
1 **NNW** **1/4 - 1/2 Mile** **Lower**	**OR WELLS**	**ORI400000003330**

Well inspe:	35780		
Physical l:	Not Reported	Inspection:	06/08/2004
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	SWEENEY, HAL		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0
Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	Not Reported		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0

Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	1707		
Township:	18		
Township c:	S		
Range:	2		
Range char:	W		
Sctn:	5		
Qtr40:	SW	Qtr160:	SE
Latitude d:	44.02779		
Longitude :	122.95968		
Gps horizo:	Not Reported		
Year const:	2004		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	N	Previous i:	0
Inspected1:	KRB	Wm region:	NW
Well tag a:	SCREWS		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	SS	Pictures t:	0
Street of :	Not Reported		
Street of1:	1522 CLEARWATER LANE, SPRINGFIELD		
Last updt :	06/09/2004	Last updt1:	byrdkr
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	44.02779		
Newlong:	-122.95968		
Site id:	ORI400000003330		

2
NNE
1/2 - 1 Mile
Higher

OR WELLS **ORI400000003389**

Well inspe:	32389		
Physical l:	Not Reported	Inspection:	02/05/2004
Startcard :	Not Reported	Wl county :	Not Reported
Wl nbr:	Not Reported	Startcard1:	Not Reported
Well tag n:	Not Reported	No log:	0
Property o:	Not Reported	Inspecti 1:	Not Reported
Special st:	0	Title:	Not Reported
Inspecti 2:	Not Reported	Witnesses:	Not Reported
Name owner:	GETCHELL, JAMES J; 4689 JASPER RD, SPRINGFIELD		
Street:	Not Reported	City:	Not Reported
State:	Not Reported	Zip:	Not Reported
Phone home:	Not Reported	Phone comp:	Not Reported
Gps on wel:	0	Distance t:	Not Reported
Bearing to:	Not Reported	Drilling m:	Not Reported
Use of wel:	Not Reported	Drilling 1:	0
Rough log :	0	Inspected :	Not Reported
Well tag r:	Not Reported		
Monitoring:	Not Reported	Monitori 1:	0
Protective:	0	Well locke:	0
Consultant:	0	Water in v:	0

Seal test :	Not Reported	Samples ta:	0
Casing dia:	Not Reported	Csg above :	Not Reported
Csg gauge:	Not Reported	Borehole d:	Not Reported
Dedicated :	0	Access por:	0
Access p 1:	Not Reported	Measuring :	Not Reported
Measuring1:	0	Depth belo:	Not Reported
Depth be 1:	Not Reported	Tape hold:	Not Reported
Tape missi:	Not Reported	Tape cut:	Not Reported
Water leve:	Not Reported	Water le 1:	Not Reported
Cascading :	0	Pump type:	Not Reported
Pump make:	Not Reported	Pump hp:	Not Reported
Flowmeter :	Not Reported	Flowmeter1:	Not Reported
Flowmete 1:	Not Reported	Flowmete 2:	Not Reported
Associated:	Not Reported	Nbr of hou:	Not Reported
Deficiency:	Not Reported		
Inspecti 3:	UNABLE TO PROBE PAST 3 FT; FELT LIKE A BLOCKAGE ALL AROUND CASING; UNABLE TO DIG		
Work new:	-1	Work deepe:	0
Work conve:	0	Work alter:	0
Work aband:	0	Work exist:	0
Work other:	Not Reported	Drill rota:	0
Drill ro 1:	0	Drill cabl:	0
Drill ca 1:	0	Drill reve:	0
Drill re 1:	0	Drill auge:	0
Drill push:	0	Drill hand:	0
Drill holl:	0	Drill soni:	0
Drill othe:	Not Reported	Use domest:	0
Use irriga:	0	Use commun:	0
Use indust:	0	Use livest:	0
Use dewate:	0	Use monito:	0
Use therma:	0	Use inject:	0
Use piezom:	0	Use observ:	0
Use recove:	0	Use other:	Not Reported
Bentonite :	0	Conductivi:	Not Reported
Conducti 1:	Not Reported		
Measuremen:	Not Reported		
Well tag 1:	Not Reported	Bonded lic:	Not Reported
Unbonded l:	Not Reported	Bonded dri:	Not Reported
Unbonded d:	Not Reported	County cod:	LANE
Tax lot:	3800		
Township:	18		
Township c:	S		
Range:	2		
Range char:	W		
Sctn:	5		
Qtr40:	NE	Qtr160:	NE
Latitude d:	44.03342		
Longitude :	122.95325		
Gps horizo:	Not Reported		
Year const:	2004		
Date const:	Not Reported	Date con 1:	Not Reported
Deficienci:	U	Previous i:	0
Inspected1:	KRB	Wm region:	NW
Well tag a:	BANDED		
Well tag 2:	Not Reported	Depth:	Not Reported
Static wat:	Not Reported	Status of :	CMP
Location r:	Not Reported		
Site visit:	0	Type of lo:	Not Reported
Casing cap:	Not Reported	Pictures t:	0
Street of :	Not Reported		
Street of1:	Not Reported		

Last updt :	01/01/2000	Last updt1:	byrdkr
Rec creati:	06/01/2009	Rec crea 1:	OWRD\migrate
Newlat:	44.03342		
Newlong:	-122.95325		
Site id:	ORI400000003389		

3
North
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001842**

Logid:	LANE 15266	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	490	Site id:	ORW400000001842

4
NNE
1/2 - 1 Mile
Higher

OR WELLS **ORW400000001840**

Logid:	LANE 15255	Lstupdate:	Not Reported
Establby:	KARL WOZNIAK	Xysource:	UNKNOWN
Horizerr:	9999	Sourceorg:	USGS
Sourceowrd:	WILLGW		
Welltag:	0		
Sownum:	0	Obswell:	9
Recwell:	9	Obsflagall:	Not Reported
Lsdelev:	490	Site id:	ORW400000001840

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: OR Radon

Radon Test Results

Zipcode	Num Tests	Maximum	Minimum	Average	# > 4 pCi/L
97455	1	1.3	1.3	1.3	0

Federal EPA Radon Zone for LANE County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for LANE COUNTY, OR

Number of sites tested: 19

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area	0.850 pCi/L	100%	0%	0%
Basement	1.360 pCi/L	88%	12%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory Data
Source: Oregon Geospatial Enterprise Office
Telephone: 503-378-2166

HYDROGEOLOGIC INFORMATION

AQUIFLOW^R Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Data
Source: Department of Water Resources
Telephone: 503-986-0843

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Locations
Source: Department of Geology and Mineral Industries
Telephone: 971-673-1540
A listing of oil and gas well locations in the state.

RADON

State Database: OR Radon
Source: Oregon Health Services
Telephone: 503-731-4272
Radon Levels in Orgeon

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

U.S. Army Corps
of Engineers
Portland District

Willamette River Floodplain Restoration, Oregon
Integrated Feasibility Report/Environmental Assessment

Lower Coast and Middle Fork Willamette River Subbasins

VOLUME 4: APPENDICES G THROUGH J

November 2013

Prepared by:

Tetra Tech, Inc.
1020 SW Taylor St.
Suite 530
Portland, OR 97205

APPENDIX G: Real Estate Plan

November 2013

US Army Corps
of Engineers ®
Portland District

Willamette Floodplain Restoration Project Lane County, Oregon

APPENDIX G

REAL ESTATE PLAN

Project Partners:
U.S. Army Corps of Engineers
Mid-Willamette Council of Governments
The Nature Conservancy

November 2013

Prepared by:
Tetra Tech, Inc.
Portland, Oregon

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WILLAMETTE RIVER FLOODPLAIN RESTORATION, OREGON

REAL ESTATE PLAN

PROJECT SUMMARY AND AUTHORITY

This Real Estate Plan (REP) is developed in support of the Willamette River Floodplain Restoration Project, Integrated Feasibility Report/Environmental Assessment. This study is a cost-shared ecosystem restoration General Investigation study. The feasibility cost-sharing sponsor is the Mid-Willamette Council of Governments; the non-Federal sponsor for design and implementation is The Nature Conservancy. This REP identifies and describes the real estate requirements (the needed Lands, Easements and Rights-of-Way) for construction, operation and maintenance of the recommended features for this proposed project, which is to restore approximately 574 acres of floodplain fish and wildlife habitat on both publicly and privately owned lands. This REP will identify and describe the necessary facility and utility relocations, the required disposal of dredged, borrowed or excavated material, the required relocations of homes and businesses, as well as the estimated value together with the estimated administrative and incidental costs attributable to providing the Lands, Easements and Rights-of-Way and Temporary Disposal Areas (LERD). This REP will also describe the land acquisition process required to support project implementation. It will describe who will be acquiring the LERD, the types of property interest required, and the non-Federal sponsor's capability to acquire lands to support the project.

This proposed habitat restoration project is authorized under the Willamette River Basin Comprehensive Study (Senate Resolution adopted 15 November 1961), the Willamette Basin Review Study (House Resolution adopted 8 September 1988) and approval of the 905(b) report on 18 June 1999.

DESCRIPTION OF THE PROJECT LANDS

This General Investigation project proposes to restore approximately 574 acres of floodplain fish and wildlife habitat on both publicly and privately owned lands at 5 distinct sites as described herein.

(a) Site C1B (Figure 2). This site is located on the south bank of the Coast Fork Willamette River near River mile (RM) 0.5 and encompasses 90.94 acres. Access is available to the site from Franklin Blvd. with a semi-developed point of ingress/egress. The site includes portions of 9 parcels, but the primary property is currently owned by Lane County. The site has been gravel mined in the past but is not currently mined and is used informally by the public for recreation purposes. The site is within the 100-year floodplain and the majority of the site is within the designated floodway. The majority of the site is zoned for Sand, Gravel, and Rock Products by Lane County, with a small area zoned as Rural Industrial.

(b) Site C1C (Figure 3). This site is located on the south bank of the Coast Fork Willamette River near RM 1.2 and encompasses 80.01 acres. The street address is 34003 Seavey Loop Road and there is an existing gravel road access to the site from Franklin Boulevard. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. The majority of the site is zoned for Sand, Gravel, and Rock Products, with one parcel zoned for Exclusive Farm Use. Existing conservation easements are present on the parcels owned by The Nature Conservancy to both the Bonneville Power Administration (BPA; Federal Government) and the Oregon Watershed Enhancement Board

(State of Oregon).

(c) Site M1A (Figure 4). This site is located between the Coast Fork and the Middle Fork of the Willamette River near RMs 2 and 188, respectively and encompasses 150.54 acres. Access is available to the site via a gravel road from Seavey Loop Road and Site C1C. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. The majority of the site is zoned for Sand, Gravel, and Rock Products. Existing conservation easements are present on the parcels owned by The Nature Conservancy to both the BPA (Federal Government) and the Oregon Watershed Enhancement Board (State of Oregon).

(d) Site M1B (Figure 5). This site is located on the left bank of the Middle Fork Willamette River near RM 189 and encompasses 174.51 acres. The site is accessible via gravel roads from Seavey Loop Road (via Site C1C) or from the Buford Access Road through Buford/Mt. Pisgah County Recreation Area. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. The majority of the site is zoned for Sand, Gravel, and Rock Products. Existing conservation easements are present on the parcels owned by The Nature Conservancy to both the BPA (Federal Government) and the Oregon Watershed Enhancement Board (State of Oregon).

(e) Site M2A (Figure 6). This site is located on the left bank of the Middle Fork Willamette River near RM 191 and encompasses 77.71 acres. The site is accessible via gravel roads from Buford Access Road through Site M1B. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. The majority of the site is zoned for Sand, Gravel, and Rock Products. Existing conservation easements are present on the parcels owned by The Nature Conservancy to both the BPA (Federal Government) and the Oregon Watershed Enhancement Board (State of Oregon).

The lands required for construction, operation and maintenance are shown in Table 1. Fee title (possibly conservation easement encumbered) or permanent or perpetual ecosystem restoration easements will be required for all sites. Staging areas will be located within the fee title or permanent or perpetual easement areas, thus no temporary staging areas are required. The primary elements of the proposed restoration activities include removal of invasive non-native species, grading of formerly mined gravel ponds to provide gentler slopes and larger areas of shallow water, grading of connector channels, installation of engineered log jams and floodplain large woody debris, and riparian and wetland revegetation with native species. See Figures 2 through 6.

There are no residences on any of the parcels and the only structures present are a limited number of old outbuildings. The majority of the parcels are generally fallow or otherwise in open space or recreational designations. All gravel mining operations have ceased on all parcels that were previously mined, but debris, piles of aggregate and topsoil, and the presence of numerous invasive vegetative species, such as blackberry are evidence of the disturbed nature of all sites.

HISTORY OF NATURE CONSERVANCY LAND ACQUISITION

The Nature Conservancy owned lands identified in Table 1 were acquired in 2010 from Wildish Sand and Gravel. The Nature Conservancy conducted negotiations for the purchase of approximately 1,271 acres of floodplain, gravel mined ponds, and adjacent uplands located adjacent to the confluence of the Coast and Middle Forks of the Willamette River. The previous owner had mined substantial areas of the floodplain for sand and gravel resources over several decades from the 1960s to present and there are many access roads suitable for truck and equipment traffic on the property. Additionally, some areas of the property have been leased for grazing or other agricultural uses. The previous landowner had considered developing portions of the property (uplands) for residential or other uses and also documented that there were substantial remaining sand/gravel resources that had not yet been mined. When the purchase and sale agreement was finally negotiated on the property in 2010, the entire property was valued at approximately $23 million. The portion of the property included in the recommended plan is 456.18 acres. This is primarily the gravel pit areas. These were considered to be the most valuable portions of the overall property and had an estimated value of $25,000 per acre.

The Nature Conservancy conducted fund-raising and submitted grant applications for the acquisition of the property and BPA and OWEB (Oregon Watershed Enhancement Board) agreed to provide funding for the majority of the purchase. As part of the provision of funding for the purchase, BPA and OWEB required that the Nature Conservancy encumber the property with conservation easements to ensure that it was protected from gravel mining in perpetuity. The conservation easements preserve and protect the conservation values in perpetuity and prevent any further use of the property that would harm or interfere with the conservation values. It was intended that restoration and enhancement measures should be undertaken to improve the conservation values of the properties as they have been heavily degraded by past sand/gravel mining. The purchase was completed in late 2010.

Table 1. Lands Required for Willamette Floodplain Restoration Project, by Site.

Parcel ID	Tax Lot	Owner	Zoning or Classification	Acreage within Project Footprint	Total Parcel Acreage	Estate to be Provided	Larger Parcel Code	Map Location
		Site C1B						
0088	1803110000088	Oregon Department of State Lands	Submerged	1.73	N/A	Ecosystem Restoration Easement	Submerged Parcel 2	Figure 2
0100	1803113000100	Lane County	Sand, Gravel, Rock Products	63.22	63.22	Ecosystem Restoration Easement	Larger Parcel 2	
0200	1803113000200	Oregon Parks and Recreation		10.62	10.62	Ecosystem Restoration Easement	Larger Parcel 1	
0500	1803110000500	Nature Conservancy	Conservation	6.15	85.87	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0600	1803110000600	Oregon Parks and Recreation		2.5	56.66	Ecosystem Restoration Easement	Larger Parcel 1	
0800	1803110000800	Oregon Parks and Recreation		6	6	Ecosystem Restoration Easement	Larger Parcel 1	
3802	1803113003802	Lane County	Rural Industrial	0.62	0.62	Ecosystem Restoration Easement	Larger Parcel 2	
4300	1803113004300	County Owned Lands Department	Sand, Gravel, Rock Products	0.1	0.1	Ecosystem Restoration Easement	Larger Parcel 2	
Total for Site C1B				*90.94*	-			
		Site C1C						
0088a	1803110000088	Oregon Department of State Lands	Submerged	0.8	N/A	Ecosystem Restoration Easement	Submerged Parcel 5	Figure 3
0088b	1803120000088	Oregon Department of State Lands	Submerged	2.9	N/A	Ecosystem Restoration Easement	Submerged Parcel 4	
0500	1803110000500	Nature Conservancy	Conservation	50.25	85.87	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0900	1803120000900	Nature Conservancy	Conservation	10.96	84.31	Fee Title (conservation easement encumbered)	Larger Parcel 4	
1000a	1803120001000	Nature Conservancy	Conservation	15.1	16	Fee Title (conservation easement encumbered)	Larger Parcel 4	
Total for Site C1C				*80.01*	-			
		Site M1A						
0088	1803110000088	Oregon Department of State Lands	Submerged	2.47	N/A	Ecosystem Restoration Easement	Submerged Parcel 3	Figure 4
0200a	1803110000200	Rhoads Family Real Estate LLC		6.4	6.4	Ecosystem Restoration Easement	Larger Parcel 5	
0300a	1803110000300	Rhoads Family Real Estate LLC		6.0	6.0	Ecosystem Restoration Easement	Larger Parcel 5	
0300b	1803120000300	Nature Conservancy	Conservation	5.0	165.72	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0400a	1803110000400	Nature Conservancy	Conservation	3.35	6.55	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0400b	1803120000400	Nature Conservancy	Conservation	45.52	56.24	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0500	1803110000500	Nature Conservancy	Conservation	13.87	85.87	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0600	1803110000600	Oregon Parks & Recreation		1.90	56.66	Ecosystem Restoration Easement	Larger Parcel 1	
0900	1803120000900	Nature Conservancy	Conservation	66.03	84.31	Fee Title (conservation easement encumbered)	Larger Parcel 4	
Total for Site M1A				*150.54*	-			
		Site M1B						
0200a	1802070000200	Nature Conservancy	Conservation	2.17	14	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0300	1803120000300	Nature Conservancy	Conservation	148.95	165.72	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0400	1803120000400	Nature Conservancy	Conservation	15.2	56.24	Fee Title (conservation easement encumbered)	Larger Parcel 4	
1501	1802060001501	PacifiCorp		0.66	30.0	Ecosystem Restoration Easement	Larger Parcel 7	
3001	1803010003001	Nature Conservancy	Conservation	4.08	4.08	Fee Title (conservation easement encumbered)	Larger Parcel 4	
3400	1803010003400	Oregon Dept. of Transportation		3.45	3.45	Ecosystem Restoration Easement	Larger Parcel 6	
Total for Site M1B				*174.51*	-			
		Site M2A						
088	1802080000088	Oregon Department of State Lands	Submerged	5.99	N/A	Ecosystem Restoration Easement	Submerged Parcel 1	Figure 8
0100	1802070000100	Nature Conservancy	Forest	1.11	133.28	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0201	1802080000201	Nature Conservancy	Conservation	4.3	4.3	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0401	1802080000401	Nature Conservancy	Conservation	26.62	30.07	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0601	1802080000601	Nature Conservancy	Conservation	30.8	63.92	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0700	1802080000700	Nature Conservancy	Conservation	3.7	295.17	Fee Title (conservation easement encumbered)	Larger Parcel 4	
0900	1802080000900	Nature Conservancy	Conservation	5.04	24.74	Fee Title (conservation easement encumbered)	Larger Parcel 4	
1000	1802070001000	Nature Conservancy	Conservation	0.15	9.21	Fee Title (conservation easement encumbered)	Larger Parcel 4	
Total for Site M2A				*77.71*	-			

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PROPOSED ACTION

Work crews with mowers, brush cutters and small excavators will be used to reduce the invasive vegetation. Once the vegetation is cut and removed, an herbicide spray will be used to minimize renewed growth of the invasive species. A second treatment of mowing and herbicide treatment will occur to prepare the lands for planting of native vegetation. Excavators and graders will be used to grade out the pond banks and excavate connector channels. Riprap and debris will be removed with excavators and hauled away with dump trucks. Some riprap may be reused on site, the remainder and all debris will be hauled to a landfill as it would degrade the habitat values at the site to leave the material on site and there are no adjacent sites available. Disposal at a landfill is the least cost to the Federal Government. Large woody debris will be acquired from a commercial source and delivered to the site via dump trucks. Engineered log jams will be installed with excavators and other heavy equipment and may require the installation of coffer dams or silt curtains within the Coast and/or Middle Forks of the Willamette River. Large wood installed in the floodplain will not be anchored, but will be placed amongst trees and shrubs so that it is unlikely to move more than a short distance even during flood events. Riparian and wetland plantings will be conducted by work crews using hand equipment.

Maintenance is expected for the first few years of the project life. Spot spraying to control invasive species, along with select replanting of native species in areas where the original plantings fail to take hold, are expected. The engineered log jams and channel and pond features are not expected to require maintenance. They are likely to change over time, but still provide suitable habitat and channel forming actions as they slowly decay over time.

Access is available on all sites via existing gravel access roadways from public roads. Public recreation occurs at Site C1B. It will be necessary to restrict public access during construction to ensure public safety. Signage, fencing, and gates will need to be provided by the construction contractor(s) and appropriate security (locked gates and fencing) as expected for work within the City of Eugene. All other sites would be accessed by gravel roadways on the non-Federal sponsor's lands. The construction contractor(s) would need to coordinate with the non-Federal sponsor for appropriate locks for existing gates.

REAL ESTATE MAPS

Real estate maps were prepared by Tetra Tech, Inc. and are attached as Exhibit A.

REQUIRED ESTATES

ER 405-1-12, paragraph 12-9b(6) requires fee title be obtained for ecosystem restoration projects, unless a lesser estate is appropriate based on the extent of interests required for operation and maintenance of the project.

The non-Federal sponsor owns an "encumbered fee title" to several of the project parcels, i.e. there are conservation easements held by BPA and OWEB that restrict what can be done with the properties. However, the conservation easements are in harmony with the proposed project activities. Both BPA and OWEB have communicated their support of the project and willingness to formally authorize project activities as not being in violation of their easement interests.

This being the case, while acknowledging that technically the NFS does not own pure fee title, it seems that the NFS's interest combined with the easement holders' concurrence equates to fee title. Therefore, a non-standard estate request is not considered necessary in this situation.

On the other lands proposed for inclusion in the project, the landowners are not willing to sell, but are willing to provide an ecosystem restoration easement and allow access for the non-Federal sponsor to provide operation and maintenance. Submerged lands will also be acquired via an ecosystem restoration easement as the State of Oregon does not sell its submerged lands. The District will continue to further refine the terms of the proposed NSE and will submit same to NWD and HQUSACE for review and final approval during the design phase.

The following estates are proposed:

1. STANDARD ESTATE – FEE TITLE.

The fee simple title to (Parcel Nos. 1802070000100, 1802070000200, 1802080000201, 1802080000401, 1802080000601, 1802080000700, 1802080000900, 1803010003001, 1803110000300, 1803110000400, 1803110000500, 1803120000300, 1803120000400, 1803120000900, 1803120001000,), Subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

2. NON-STANDARD ESTATE – ECOSYSTEM RESTORATION EASEMENT.

A perpetual and assignable right and easement in, on, over and across the lands of the Grantors shown/described in Figures 2 through 6 and listed here (Parcel Nos. 1802060001501, 1802080000088, 1803010003400, 1803110000088, 1803110000200, 1803110000300, 1803110000600, 1803113000100, 1803113000200, 1803113003802, 1803113004300, 1803120000088) to construct, operate, maintain, repair, alter, rehabilitate, remove, replace and monitor features of the Willamette Floodplain Restoration Project, including the following rights for the purposes of restoring fish and wildlife habitat and ecological resource values: regrading of riverbanks, ponds and floodplain areas including construction of connector channels and shallow water habitats; invasive species removal including herbicide application, vegetative plantings with native riparian plants and trees; modifications and improvements within and adjacent to the channel or shore for bank stabilization purposes including placement of erosion control fabric, coir fiber logs and mats, straw blankets, root wads and other bioengineering materials; fish and wildlife habitat or other ecosystem restoration improvements including placement of materials or structures in the bed, banks, or shorelines that influence stream velocity or channel form and; removal or placement of gravels, cobbles, boulders, woody debris, and other structures in the bed, banks, or shoreline to improve in-stream fish and wildlife habitat; together with the right to clear, cut, fell, remove and dispose of any and all timber, trees, underbrush, structures or obstructions; reserving, however, to the owners, their heirs and assigns, all other rights and privileges that may be used without interfering with or abridging the purposes of restoring and maintaining fish and wildlife habitat and ecological resource values and without interfering with or abridging the enumerated rights and easement hereby conveyed and acquired; all subject to existing easements for public roads and highways, public utilities, and pipelines.

NEAREST OTHER EXISTING FEDERAL PROJECT

The Willamette River Basin Project (Willamette Project), Oregon, is a system of 13 dams and reservoirs (11 are multiple purpose storage reservoirs and 2 are re-regulating reservoirs), an authorized navigation channel, and bank protection works are present in the project vicinity. The Willamette Project was authorized principally by three separate successive Flood Control Acts (FCAs): 1938, 1950 and 1960. Dorena and Cottage Grove dams are located upstream of the project area on the Row River and Coast Fork Willamette River, respectively, and would not be affected by this project. Dexter and Lookout Point dams are located upstream of the project area on the Middle Fork Willamette River and Fall Creek and Hills Creek dams are located upstream of the project area on Fall Creek and Hills Creek (tributaries to the Middle Fork), and would likewise not be affected by this project. The Willamette Bank Protection

Program authorized as part of the Willamette Project included the authorization for the USACE to construct and maintain 450,000 linear feet of bank protection works in the Willamette basin, including multiple projects on both the Coast and Middle Forks of the Willamette. These bank protection revetments are primarily located upstream of the project sites.

However, one bank protection site (Evans) is located on the M1A site (located on right bank of the Coast Fork Willamette River) and extends for approximately 1,200 linear feet on the right bank of the Coast Fork at and immediately upstream of the bridge crossing owned by the Nature Conservancy (about 1.3 acres). The proposed project at Site M1A will not modify this bank protection site or affect the U.S. Government's existing easement for access to maintain this revetment. This easement was granted to the U.S.A. (Corps) for right of way and access to construct and maintain bank protection and channel improvement works and is documented on parcel 1803120000900. This easement did not authorize right-of-way or construction/maintenance for other activities such as habitat restoration. This project will not interfere with the Evans bank proteetion site.

The Scott Whiteford memo dated 13 May 2013 denying a crediting waiver request stated in part, "the Corps policy precludes credit for lands provided for another project." This was in reference to the BPA role in funding the land acquisition by TNC and associated conservation easement. LERRD crediting is no longer being sought for the ownership interest that BPA has retained, i.e. the conservation easement interest. The BPA interest is in harmony, not in conflict, with the proposed project.

FEDERALLY OWNED LAND

No federally owned lands are present within the boundaries of the subject project.

BPA owns a conservation easement on the lands owned by TNC that constitute the majority of sites C1C, M1A, M1B, and M2A. The conservation easement ensures that the site is protected from gravel mining in perpetuity. The conservation easement preserves and protects the conservation values in perpetuity and prevents any further use of the property that would harm or interfere with the conservation values. However, this conservation easement does not provide a sufficient interest to the Federal Government (i.e. USACE) to implement (i.e. construct the project). The BPA conservation easement indicates that TNC shall not "grant any easement, lien, or other property interest for any purpose, in whole or in part (including but not limited to water rights), over the Property, or any other right to use the Property without the written consent of Grantee." Thus written permission from BPA is required for TNC to certify the lands. Portland District is working with BPA to receive written permission. OWEB holds a similar conservation easement, and the District is working with OWEB as well to receive written permission.

NAVIGATION SERVITUDE

The Federal government recognizes the state's claim of ownership of submerged and submersible lands. Navigation Servitude will not be exercised for this project and is not available because the project purpose is strictly for environmental restoration without the necessary nexus to commercial navigation. A perpetual ecosystem restoration easement for submerged state lands will be required because Navigation Servitude will not be exercised.

POSSIBLE INDUCED FLOODING

No induced flooding is anticipated with regard to this project as a result of the proposed habitat restoration activities. No increases will occur to the current floodplain level or to the current river stage; minor decreases may occur as a result of reconnection of the floodplain areas to the river for additional storage. However, this is estimated as being negligible. As a result, there are neither anticipated takings nor any potential compensation due to any of the landholders on or adjacent to the Coast or Middle Forks of the Willamette River.

BASELINE COST ESTIMATE FOR REAL ESTATE (BCRE)

The baseline estimate of real estate cost is provided below and detailed in Table 2. Table 2 provides an estimated value of each parcel, whether for fee or easement. Although the gross appraisal indicated that the value for TNC parcels ranged from $0 to $75/acre and that special benefits would be provided to the owner from this project, the value of $75/acre is applied to these parcels for the purpose of the feasibility valuation. Seattle District has approval authority for the appraisal and approved the gross appraisal on January 23, 2012.

Estate	Acres	Estimated Lands and Damages Cost	NFS LERR Admin. Cost	NFS LERR Cost (Lands and Damages + Admin.)	Federal LERR Admin Cost
Encumbered Fee Title	458.35	$34,376	$15,000	$49,376	$5,000
Ecosystem Restoration Easement	115.36	$279,400	$30,000	$309,400	$15,000
Subtotal	573.71	$313,776	$45,000	$358,776	$20,000
Contingency (33.8%)		$106,056	$15,210	$121,266	$6,760
Totals		**$419,832**	**$60,210**	**$480,042**	**$26,760**

Total Baseline Cost Estimate: $507,000 (rounded)

A gross appraisal was prepared for this study by Day Appraisal Company, Inc. dated 12/30/2011. Multiple parcels were valued and each was appraised separately. Before and After appraisals were conducted for most parcels; Taking and Damages format was used for minor acquisitions associated with the larger areas of M1B and C3B. The parcels owned by the Non-Federal Sponsor were valued using the Federal Rule. Other properties were valued using the State Rule.

Extraordinary Assumptions for the appraisal include the following:

- The subject inspections have been restricted or limited. The appraiser assumes that the subject properties are as described in this report.
- Title reports showing encumbrances affecting the subject properties were not provided, except for larger parcel 4 (TNC). The appraiser assumes that any encumbrances that exist that have not been reviewed would not have a material effect on the value opinions.
- Due to the uncertainty as the presence of valuable minerals or orchards, no contributory value was included.

- Parcel 4 reportedly had Measure 37 and 49 claims. The conservation easements that now encumber that parcel eliminate those claims. For the other parcels, it was assumed that there are no claims that would affect the valuation.
- It is assumed that legal access is available to Larger Parcel 1 (OPRD) across Larger Parcel 2 (Lane County), as it appeared on the date of inspection.
- Per a telephone direction on November 23, 2011, with Karen Peterson of the USACE, it is assumed that the conservation easements on Larger Parcel 4 will not prohibit the placement of the acquisition easements on the property.

The Highest and Best Use is addressed, including analysis of the subject's overall position within its market area. The valuation analysis includes research, independent confirmation, and analysis of appropriate data. The geographic area from which market data is primarily derived includes Lane, Linn, Benton, and Douglas Counties and covering a time frame since 2006.

Data sources used in conjunction with the appraisal include county records, MetroScan, CoStar Comps, Willamette Valley Multiple Listing Service, Regional Multiple Listing Service, and proprietary data files.

A Sales Comparison Approach was applied in the appraisal. A Sales Comparison Approach indicates the value of a given property by comparing it with like properties that have recently sold. This approach is largely based on the principal of substitution. This principal states that one would pay no more for the subject than the price of other properties available in the market with similar characteristics. The sale properties are compared and contrasted. The appraiser compared and contrasted the sale properties with the subject property for such factors as physical characteristics, market conditions (date of sale), and financial considerations.

Table 2. Parcel Valuation Summary Table.

Parcel ID	Tax Lot	Owner	Estate	Preliminary Value
	Site C1B			
0088	1803110000088	Oregon Department of State Lands	Ecosystem Restoration	$300.00
0100	1803113000100	Lane County	Ecosystem Restoration	$219,500.16
0200	1803113000200	Oregon Parks and Recreation	Ecosystem Restoration	$21,219.80
0500	1803110000500	Nature Conservancy	Fee Title - encumbered	$461.25
0600	1803110000600	Oregon Parks and Recreation	Ecosystem Restoration	$4,995.20
0800	1803110000800	Oregon Parks and Recreation	Ecosystem Restoration	$11,988.60
3802	1803113003802	Lane County	Ecosystem Restoration	$2,152.64
4300	1803113004300	County Owned Lands Department	Ecosystem Restoration	$347.20
TOTAL				$260,964.85
	Site C1C			
0088a	1803110000088	Oregon Department of State Lands	Ecosystem Restoration	$100.00
0088b	1803120000088	Oregon Department of State Lands	Ecosystem Restoration	$100.00
0500	1803110000500	Nature Conservancy	Fee Title - encumbered	$3,712.50
0500	1803110000500	Nature Conservancy	Fee Title - encumbered	$56.25
0900	1803120000900	Nature Conservancy	Fee Title - encumbered	$822.00
1000a	1803120001000	Nature Conservancy	Fee Title - encumbered	$1,132.50
TOTAL				$5,923.25
	Site M1A			
0088	1803110000088	Oregon Department of State Lands	Ecosystem Restoration	$100.00
0200a	1803110000200	Rhoads Family Real Estate LLC	Ecosystem Restoration	$5,006.50
0300a	1803110000300	Rhoads Family Real Estate LLC	Ecosystem Restoration	$4,693.50
0300b	1803120000300	Nature Conservancy	Fee Title - encumbered	$375.00
0400a	1803110000400	Nature Conservancy	Fee Title - encumbered	$251.25

Parcel ID	Tax Lot	Owner	Estate	Preliminary Value
0400b	1803120000400	Nature Conservancy	Fee Title - encumbered	$3,414.00
0500	1803110000500	Nature Conservancy	Fee Title - encumbered	$956.25
0500	1803110000500	Nature Conservancy	Fee Title - encumbered	$84.00
0600	1803110000600	Oregon Parks & Recreation	Ecosystem Restoration	$3,796.40
0900	1803120000900	Nature Conservancy	Fee Title - encumbered	$4,952.25
TOTAL				$23,629.15
	Site M1B			
0200a	1802070000200	Nature Conservancy	Fee Title - encumbered	$22.50
0200a	1802070000200	Nature Conservancy	Fee Title – encumbered	$140.25
0300	1803120000300	Nature Conservancy	Fee Title – encumbered	$11,171.25
0400	1803120000400	Nature Conservancy	Fee Title – encumbered	$1,140.00
1501	1802060001501	PacifiCorp	Ecosystem Restoration	$900.00
3001	1803010003001	Nature Conservancy	Fee Title – encumbered	$306.00
3400	1803010003400	Oregon Dept. of Transportation	Ecosystem Restoration	$4,100.00
TOTAL				$17,780.00
	Site M2A			
088	1802080000088	Oregon Department of State Lands	Ecosystem Restoration	$100.00
0100	1802070000100	Nature Conservancy	Fee Title – encumbered	$109.50
0201	1802080000201	Nature Conservancy	Fee Title – encumbered	$322.50
0401	1802080000401	Nature Conservancy	Fee Title – encumbered	$1,996.50
0601	1802080000601	Nature Conservancy	Fee Title – encumbered	$2,310.00
0700	1802080000700	Nature Conservancy	Fee Title – encumbered	$262.50
0900	1802080000900	Nature Conservancy	Fee Title – encumbered	$378.00
1000	1802070001000	Nature Conservancy	Fee Title - encumbered	$12.00
TOTAL				$5,491.00

RISKS ASSOCIATED WITH ADVANCED LAND ACQUISITION

The current NFS has been advised of the risks associated with advance land acquisition activities in writing. The current NFS owns a portion of the proposed project lands and would provide other required lands prior to implementation. Risks associated with advanced land acquisition that the NFS was advised of include, but are not limited to, the following:

1) Congress may not appropriate funds to construct the proposed project;
2) The proposed project may otherwise not be funded or approved for construction;
3) A PPA mutually agreeable to the NFS and the Government may not be executed and implemented;
4) The NFS may incur liability and expense by virtue of its ownership of contaminated lands, or interests therein, whether such liability should arise out of local, state, or Federal laws or regulations including liability arising out of CERCLA, as amended;
5) The NFS may acquire interests or estates that are later determined by the Government to be inappropriate, insufficient, or otherwise not required for the project;
6) The NFS may initially acquire insufficient or excessive real property acreage which may result in additional negotiations and/or benefit payments under P.L. 91-646 as well as the payment of additional fair market value to affected landowners which could have been avoided by delaying acquisition until after PPA execution and the Government's notice to commence acquisition and performance of LERD; and

7) The NFS may incur costs or expenses in connection with its decision to acquire or perform LERD in advance of the executed PPA and the Government's notice to proceed which may not be creditable under the provisions of P.L. 99-662 or the PPA.

PUBLIC LAW 91-646 AND LERD ACQUISITION

No Public Law 91-464 residential relocation assistance benefits are needed for the proposed project. There are no families or businesses that will be temporarily or permanently displaced by the proposed project.

OUTSTANDING THIRD PARTY INTERESTS

All property interests acquired in support of the proposed project must take priority over any third party interests that could defeat or impair the NFS' title to the property or interfere with construction, operation and maintenance of the project. All third party interests must be cleared from the title, or subordinated to the interest being made available for the project. The NFS attorney will be expected to review title reports for project parcels and discuss within the Outstanding Third Party Risk Analysis document all special exceptions to fee title that have the potential to defeat the project purpose.

MINERAL/TIMBER ACTIVITY

Gravel mining has been conducted on all sites, but is no longer being conducted, and generally has not been conducted since the 1980s. The Nature Conservancy purchased Larger Parcel #4 with Bonneville Power Administration (BPA) and Oregon Watershed Enhancement Board (OWEB) funds in 2010, as described above. The purchase price included a substantial mineral value (for gravel mining). A condition of that purchase was to place a Conservation Easement on the property that precludes further mining. No known other active or authorized mining is present on any of the other sites that could impair the implementation of the project.

SPONSORSHIP CAPABILITY

The Nature Conservancy is the non-Federal sponsor. They currently own the majority of the lands required for the project. The NFS has land acquisition experience and is capable of acquiring property interests required for the project. Exhibit B provides an assessment of the NFS' real estate acquisition capability. While they do not have the authority to condemn property, they have discussed the acquisition of easements with all other landowners to ensure they can obtain all required LERRDs. Exhibit C is a Legal Memorandum drafted by the NFS attorney that provides a determination that the NFS has full authority to execute and perform the requirements of a Local Cooperation Agreement (i.e., Project Partnership Agreement) for the construction of the proposed environmental restoration project. Exhibit D is a draft Certification of Lands and Authorization for Entry, Attorney's Certificate, and Outstanding Third Party Risk Analysis document package. The NFS will be expected to complete, sign and submit the Certification of Lands documents along with copies of vesting deeds and title reports not more than 90 days-old that show the NFS owns or controls the minimum property interests required for construction, operation and maintenance of the proposed project.

Within 180 days after certifying project lands available for construction, the NFS shall coordinate with RE Seattle District to perform a fair market value appraisal of project lands and to provide all supporting LERD crediting documentation for RE Seattle District and Northwest Division review and approval.

ZONING ORDINANCES

There are no zoning ordinances currently proposed in lieu of, or to facilitate land acquisition in connection with this project.

SCHEDULE

The estimated project schedule is as follows:

Activity	Projected Dates
Completion of Feasibility Study	September 2013
Chief's Report	Anticipated in December 2013
Congressional Authorization	tbd
Design Phase	October 2013 – September 2015
Acquisition of Easements, Submerged Lands	January 2014 – August 2014
Acquisition of Easements, Other Public Lands	June 2014 – March 2015
Acquisition of Easements, Private Lands	June 2014 – June 2015
Sponsor Certifies Lands	August 2014 – August 2015
Construction	September 2014 – June 2019

UTILITIES/FACILITIES TO BE RELOCATED

There are no utility or facility relocations anticipated as a result of this project. Therefore, no Attorney's Opinion of Compensability is required.

ANY CONCLUSION OR CATEGORIZATION CONTAINED IN THIS REAL ESTATE PLAN, OR ELSEWHERE IN THIS PROJECT REPORT, THAT AN ITEM IS A UTILIITY OR FACILITY RELOCATION TO BE PERFORMED BY THE NON-FEDERAL SPONSOR AS PART OF ITS LERRD RESPONSIBILITIES IS PRELIMINARY ONLY. THE GOVERNMENT WILL MAKE A FINAL DETERMINATION OF THE RELOCATIONS NECESSARY FOR THE CONSTRUCTION, OPERATION AND MAINTENANCE OF THE PROJECT AFTER FURTHER ANALYSIS, AND COMPLETION AND APROVAL OF A FINAL ATTORNEY'S OPINION OF COMPENSABILITY FOR EACH OF THE IMACTED UTILITIES AND FACILITIES.

PRESENCE OF CONTAMINANTS

An assessment for HTRW was completed and it was determined that there are no unacceptable levels of contaminants located in, on, under, or adjacent to the proposed project sites (see main report and Hahn and Associates 2010). The Nature Conservancy is fully aware of their obligations regarding CERCLA.

VIEWS OF AGENCIES AND STAKEHOLDERS

The Corps has met with representatives of the U.S. Fish and Wildlife Service, NOAA National Marine Fisheries Service, Oregon Department of Fish and Wildlife, and the Coast and Middle Fork Watershed Councils. All agencies and interest groups are supportive of the proposed action.

Outreach has also been conducted via the Coast Fork Watershed Council and the Middle Fork Watershed Council with other landowners in the project area. No issues or concerns have been raised regarding floodplain restoration on the proposed project lands.

ANY OTHER REAL ESTATE ISSUES

Tasks to be completed in the design phase:

1. Update real estate maps to reflect final real estate requirements for the final design, including the approved non-standard estate.
2. Coordinate with NFS regarding acquiring and certifying lands available for the project.
3. Update real estate requirements and LERRD map to support the final 100% project design.

Existing and Foreseeable Non-project Use of Lands

The District conducted an analysis to assess whether current and future land uses are consistent with the proposed ecosystem restoration project. Each proposed easement parcel was reviewed to determine current and projected future land use (See Table E-1). Analysis was conducted to determine the impact of the proposed NSE use restrictions on each parcel. The District conducted the parcel analysis with complete cooperation from the Non-Federal Sponsor (NFS). It was determined that all of the proposed easement parcels are compatible with the use restrictions in the proposed NSE with the following details:

1) The Rhoads Family parcels used for a hazelnut orchard are expected to continue to be used for this purpose in the future. Rhoads Family Trust lowlands that are not used for farming operations have been initially targeted for ecosystem restoration. If restoration is limited to the Rhoads Family Trust lands which aren't currently used for hazelnut orchard operations, the NSE and its restrictions will apply to these lands. For example, farming, use of machinery, removal of vegetation and the application of herbicides will not be permitted in the NSE footprint. It is anticipated that the Rhoads Family Trust will continue their hazelnut orchard operations on areas outside of the NSE footprint/Project boundary but this is not expected to impact any of the ecosystem restoration features within the Project boundary. The Non-Federal sponsor has fully briefed the Rhoads Family of anticipated ecosystem restoration activities as well as proposed NSE restrictions (no farming, herbicide applications, etc.) and received complete buy-in from the landowner. The Non-Federal Sponsor is attempting to acquire the entire Rhodes Family Trust parcel in fee. If negotiations are successful, the proposed NSE will not be required. At this point, negotiations are stalled for various reasons, thus the request for the NSE. Future use of the Rhodes Family Trust property is compatible with the ecosystem restoration project. Natural plantings will be introduced to help control invasive species and to improve riparian lands. Finally, public access will be controlled to be compatible with the ecosystem restoration features. Any residual recreational access to the property is incidental to the primary purpose. There are no recreational features included in this restoration project.
2) The PacifiCorp parcel is used for an access road for power transmission lines and the Project will require the use of this road as well. Accordingly, a permanent road easement is a more appropriate estate for the PacifiCorp property since the required project lands only involve a 10-foot wide access road that will remain open to both TNC and PacifiCorp during and after project construction.
3) Finally, the Oregon Parks and Recreation Department land is available for pedestrian fishing access and will remain so. While there is no reason to think that fishing access will conflict with the proposed NSE language, care should be taken to make sure project features are not placed in areas where heavy foot traffic will occur. It should be possible to address this concern in the design.

On numerous occasions during past months, the NFS assured the District that they have secured complete project support from all affected public and private landowners. The Non-Federal Sponsor has also secured each landowner's firm commitment to refrain from actions that would adversely impact the proposed ecosystem project. NWS-RE verbally re-confirmed that support during an 8/22/2013 conversation with the NFS.

Conclusions:

NWS' parcel analysis found non-use project lands are compatible with the proposed project.

Table 3. Analysis of Non-Standard Easements.

Parcel ID	Tax Lot	Owner	Zoning or Classification	Acreage within Project Footprint	Total Parcel Acreage	Estate to be Provided	Current and Future Use
0088	1803110000088	Oregon Department of State Lands	Submerged	1.73	N/A	Ecosystem Restoration Easement	Submerged Lands
0100	1803113000100	Lane County	Sand, Gravel, Rock Products	63.22	63.22	Ecosystem Restoration Easement	All sand gravel rock production has ceased for last 20 years, currently fallow lands; Future Use: passive public use ecosystem restoration site.
0200	1803113000200	Oregon Parks and Recreation	Parks and Recreation	10.62	10.62	Ecosystem Restoration Easement	River access only –anglers pull ashore and fish once they're in the river (passive fishing). Very light fishing pressure –most fishing will occur from boats NOT from the lands. Future Use: passive public ecosystem restoration site and fishing.
0600	1803110000600	Oregon Parks and Recreation	Parks and Recreation	2.5	56.66	Ecosystem Restoration Easement	Same as above
0800	1803110000800	Oregon Parks and Recreation	Parks and Recreation	6	6	Ecosystem Restoration Easement	Same as above
3802	1803113003802	Lane County	Rural Industrial	0.62	0.62	Ecosystem Restoration Easement	Currently fallow lands; Future Use: passive public use ecosystem restoration site
4300	1803113004300	County Owned Lands Department	Sand, Gravel, Rock Products	0.1	0.1	Ecosystem Restoration Easement	All sand and gravel operations discontinued during past twenty years; currently fallow lands Future Use: passive ecosystem restoration site
0088a	1803110000088	Oregon Department of State Lands	Submerged	0.8	N/A	Ecosystem Restoration Easement	Submerged Lands

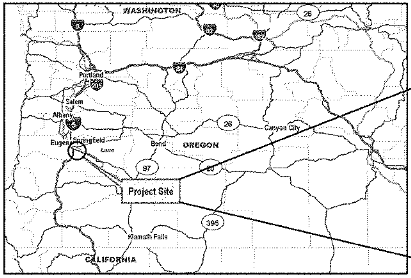
Parcel ID	Tax Lot	Owner	Zoning or Classification	Acreage within Project Footprint	Total Parcel Acreage	Estate to be Provided	Current and Future Use
0088b	1803120000088	Oregon Department of State Lands	Submerged	2.9	N/A	Ecosystem Restoration Easement	Submerged Lands
0088	1803110000088	Oregon Department of State Lands	Submerged	2.47	N/A	Ecosystem Restoration Easement	Submerged Lands
0200a	1803110000200	Rhoads Family Real Estate LLC	Farming	6.4	6.4	Ecosystem Restoration Easement No farming restriction language in NSE;	Hazel nut orchard – All orchard farming operations take place on the uplands portion of the property. Farming activities will not impact floodplain restoration activities. Upland revegetation will support floodplain restoration. Expect farming to continue post NSE.
0300a	1803110000300	Rhoads Family Real Estate LLC	Farming	6.0	6.0	Ecosystem Restoration Easement	Same as above
1501	1802060001501	PacifiCorp	Forest	0.66	30.0	Use Permanent Road Easement instead of Ecosystem Restoration Easement	10-foot wide access road on edge of PacifiCorp property that serves both TNC and PacifiCorp. Access road will remain open during and post project construction.
088	1802080000088	Oregon Department of State Lands	Submerged	5.99	N/A	Ecosystem Restoration Easement	Submerged lands

REFERENCES

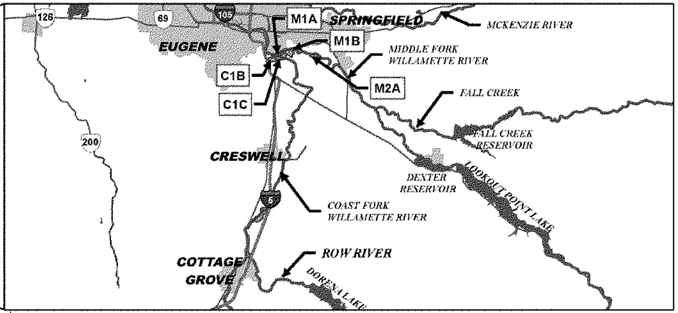
Hahn and Associates. 2010. Phase 1 Environmental Site Assessment, Wildish Property. Prepared for The Nature Conservancy, Portland, Oregon, August 17, 2010.

WILLAMETTE FLOODPLAIN RESTORATION STUDY
LANE COUNTY, OREGON

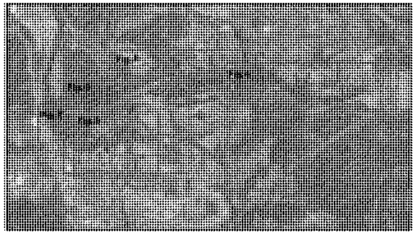
REAL ESTATE MAPS



VICINITY MAP
NOT TO SCALE

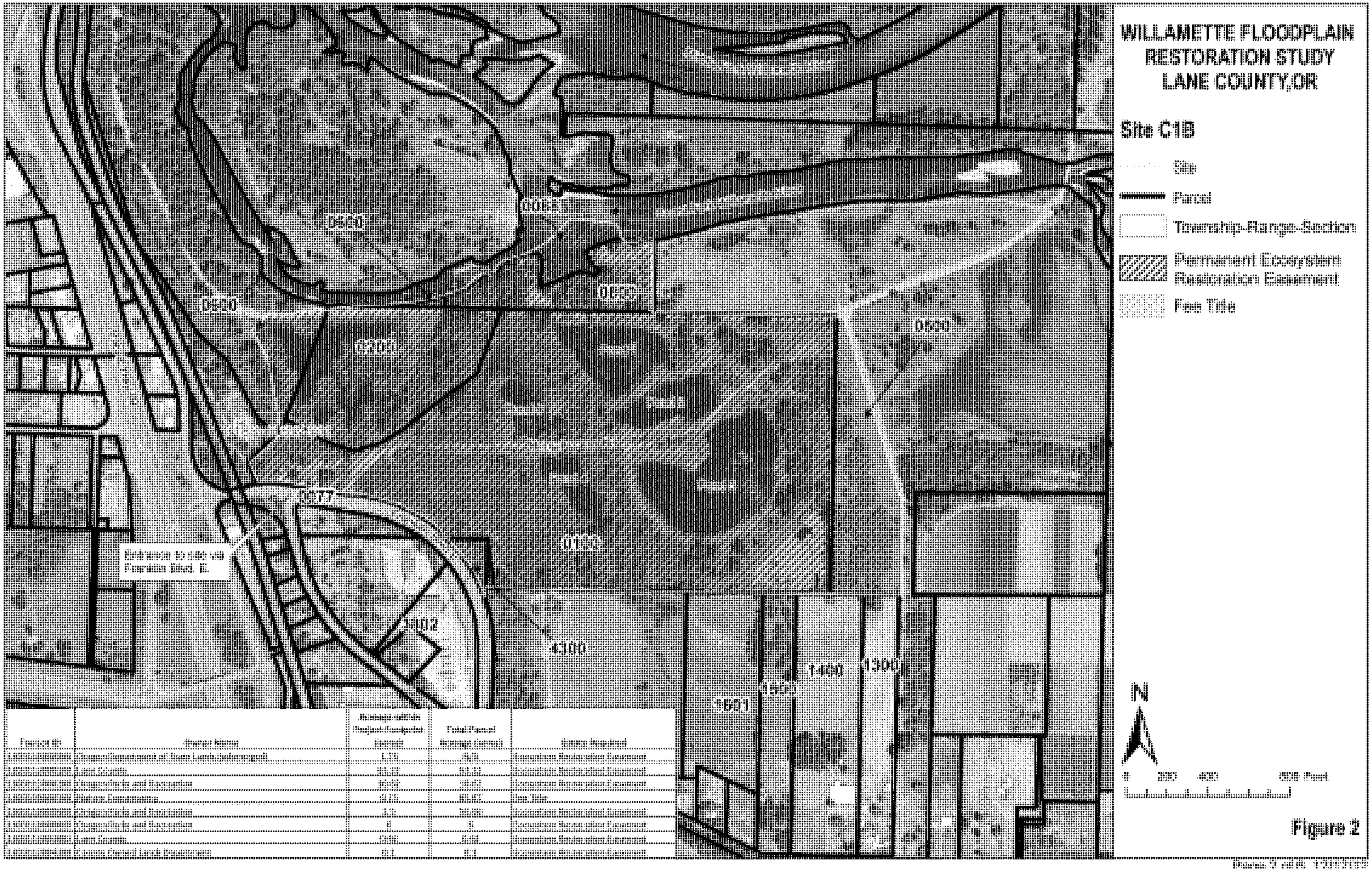


PROJECT LOCATION
NOT TO SCALE



MAP KEY
NOT TO SCALE

Figure 1



Taxlot ID	Owner Name	Acreage within Project Footprint (acres)	Total Parcel Acreage (acres)	Estate Required
[illegible]	Oregon Department of State Lands (submerged)	[illegible]	[illegible]	Ecosystem Restoration Easement
[illegible]	Lane County	[illegible]	[illegible]	Ecosystem Restoration Easement
[illegible]	Oregon Parks and Recreation	[illegible]	[illegible]	Ecosystem Restoration Easement
[illegible]	[illegible]	[illegible]	[illegible]	Fee Title
[illegible]	Oregon Parks and Recreation	[illegible]	[illegible]	Ecosystem Restoration Easement
[illegible]	Oregon Parks and Recreation	[illegible]	[illegible]	Ecosystem Restoration Easement
[illegible]	Lane County	[illegible]	[illegible]	Ecosystem Restoration Easement
[illegible]	[illegible]	[illegible]	[illegible]	Ecosystem Restoration Easement

Figure 2

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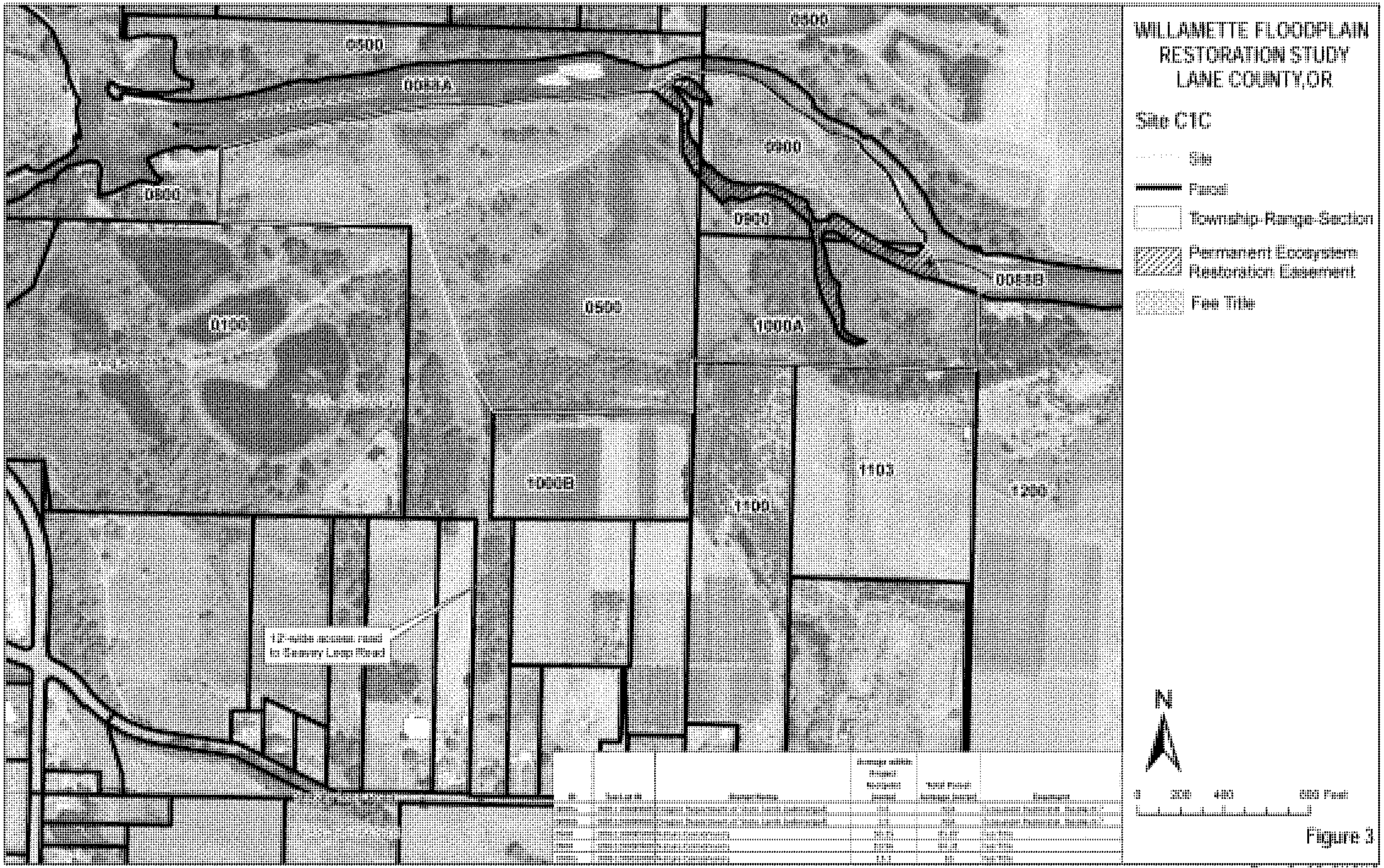

Figure 3

Page 3 of 6, 6/10/13

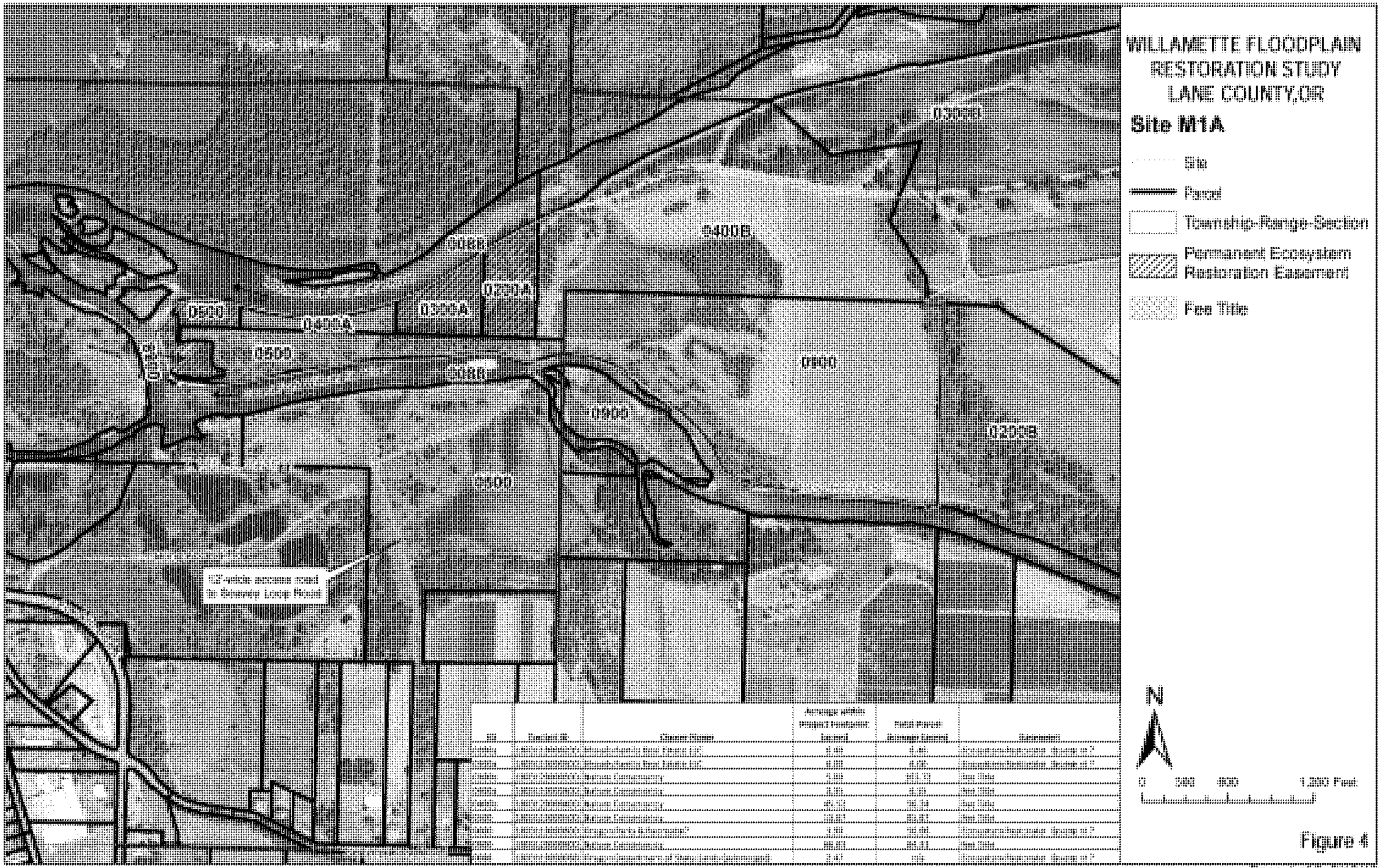

Figure 4

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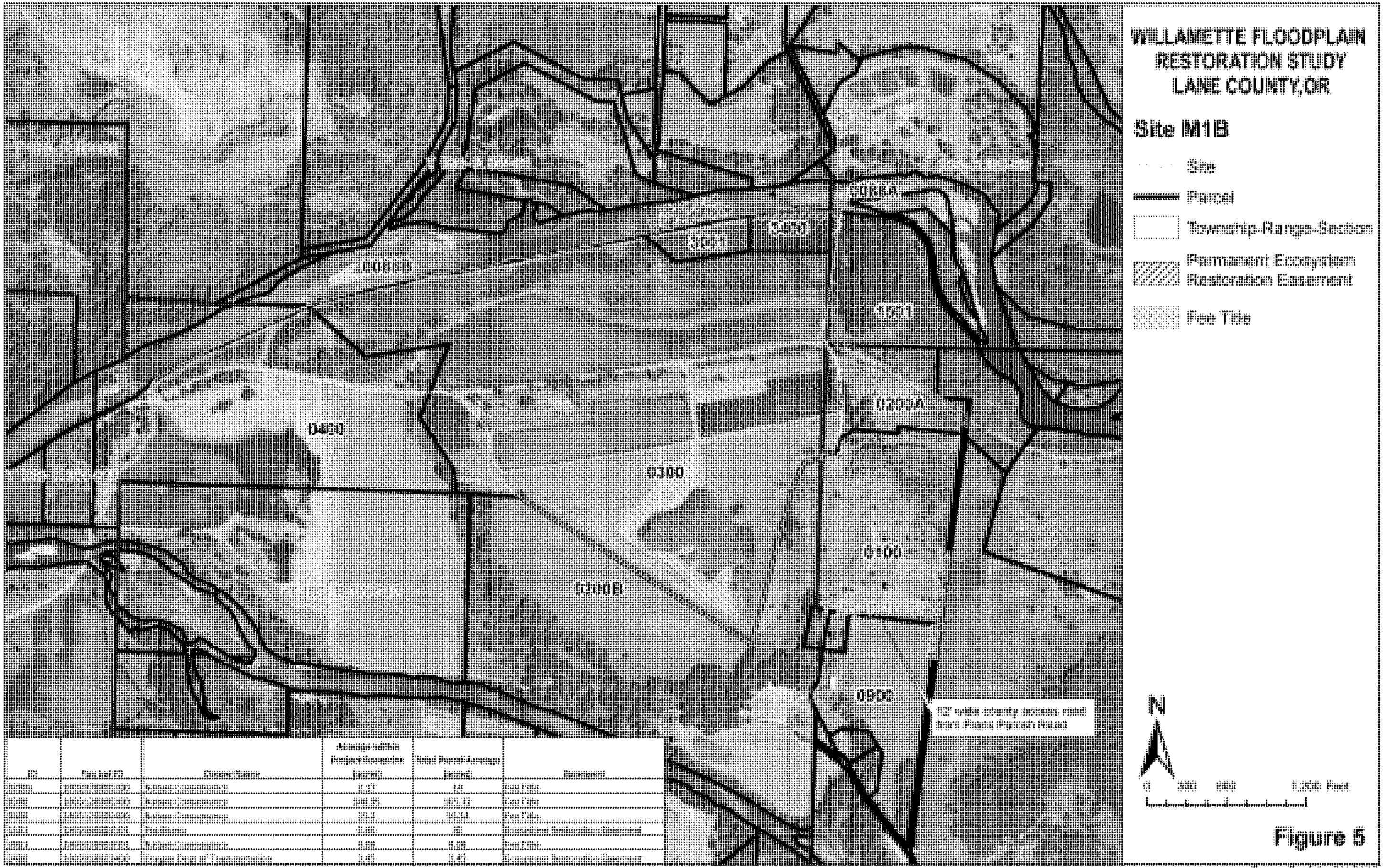

ID	Tax Lot ID	Owner Name	Acreage within Project Footprint (acres)	Total Parcel Acreage (acres)	Easement
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Fee Title
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Fee Title
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Fee Title
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Fee Title
[illegible]	[illegible]	Oregon Dept of Transportation	[illegible]	[illegible]	[illegible]

Figure 5

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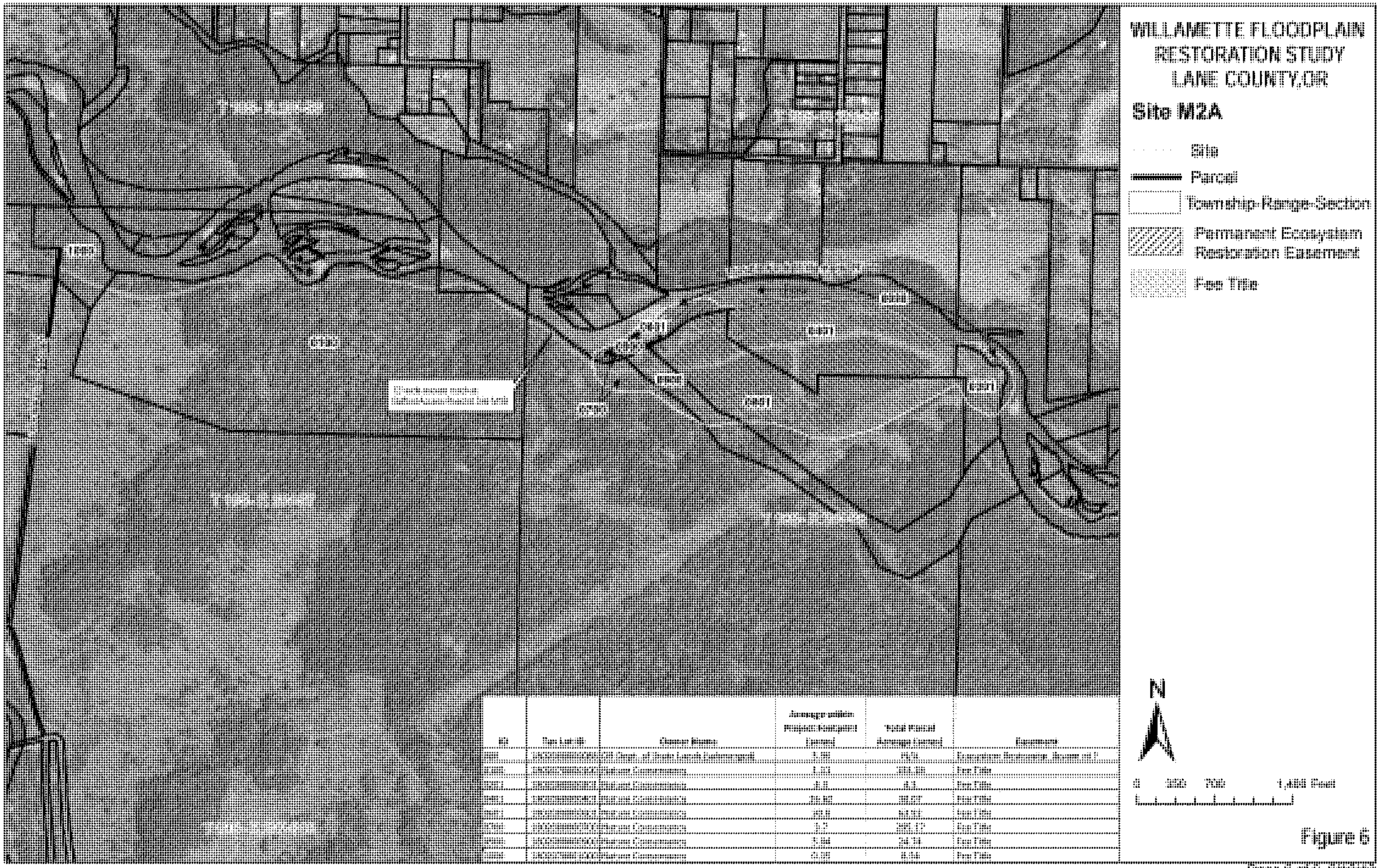

Figure 6

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EXHIBIT B

REAL ESTATE PLAN WILLAMETTE FLOODPLAIN ECOSYSTEM RESTORATION G.I. FEASIBILITY STUDY

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITY

I. **Legal Authority:**

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? Yes

b. Does the sponsor have the power of eminent domain for this project? No

c. Does the sponsor have "quick-take" authority for this project? No

d. Are any of the lands /interests in land required for the project located outside the sponsor's political boundary? N/A--The Sponsor is a non-profit environmental/ land conservation organization.

e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? Yes

II. **Human Resource Requirements:**

a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P.L. 91-646, as amended? No

b. If the answer to II.a. is "yes," has a reasonable plan been developed to provide such training? N/A

c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? Yes

d. Is the sponsor's projected in-house staff level sufficient considering its other work load, if any, and the project schedule? Yes

e. Can the sponsor obtain contractor support, if required, in a timely fashion? Yes

f. Will the sponsor likely request USACE assistance in acquiring real estate? No

III. **Other Project Variables:**

a. Will the sponsor's staff be located within reasonable proximity to the project site? (yes)

b. Has the sponsor approved the project/real estate schedule/milestones? (yes)

IV. **Overall Assessment:**

a. Has the sponsor performed satisfactorily on other USACE projects? (yes)

b. With regard to this project, the sponsor is anticipated to be: ___ highly capable _X__ fully capable ___ moderately capable ___ marginally capable ___ insufficiently capable. (If sponsor is believed to be "insufficiently capable:, provide explanation).

V. **Coordination:**

a. Has this assessment been coordinated with the sponsor? (yes)

b. Does the sponsor concur with this assessment? (yes).

Prepared by:

Doris L. Cope
Realty Specialist

Reviewed and approved by:

Christopher D. Borton
Chief, Real Estate Division

EXHIBIT C DRAFT

DATE

Department of the Army Seattle District, Corps of Engineers ATTN: Real Estate Division Post Office Box 3755 Seattle, Washington 98124-3755

RE: Certification of Lands and Authorization for Willamette Floodplain Ecosystem Restoration GI Study

Dear Ladies and Gentlemen:

This is to certify that The Nature Conservancy (hereinafter referred to as the "Public Sponsor") has sufficient title and interest in the lands hereinafter shown on Exhibit A, attached, to provide all lands necessary for the construction, operation, and maintenance of the Willamette Floodplain River Ecosystem Restoration Feasibility Study.

Said lands and/or interest therein are owned or have been acquired by the Public Sponsor, and are to be used for the construction, operation and maintenance of the above referenced project and include but are not limited to the following specifically enumerated rights and uses, except as hereinafter noted:

Fee Simple

The fee simple title to the lands shown in the project footprint, as depicted in Exhibit A.

Perpetual Road Easement

A perpetual exclusive easement and right-of-way in, on, over and across the land described in Exhibit A for the location, construction, operation, maintenance, alteration replacement of roads and appurtenances thereto; together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the owners, their heirs and assigns, the right to cross over or under the right-of-way as access to their adjoining land at the locations indicated in Exhibit A subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Ecosystem Restoration Easement

A perpetual and assignable right and easement in, on, over and across the lands depicted in Exhibit A to construct, operate, maintain, repair, alter, rehabilitate, remove, replace and monitor features of the Willamette Floodplain Restoration Project, including the following rights for the purposes of restoring fish and wildlife habitat and ecological resource values: regrading of riverbanks, ponds and floodplain areas including construction of connector channels and shallow water habitats; invasive species removal including herbicide application, vegetative plantings with native riparian plants and trees; modifications and improvements within and adjacent to the channel or shore for bank stabilization purposes including placement of erosion control fabric, coir fiber logs and mats, straw blankets, root wads and other bioengineering materials; fish and wildlife habitat or other ecosystem restoration improvements including placement of materials or structures in the bed, banks, or shorelines that influence stream velocity or channel form and; removal or placement of gravels, cobbles, boulders, woody debris, and other structures in the bed, banks, or shoreline to improve in-stream fish and wildlife habitat; together with the right to clear, cut, fell, remove and dispose of any and all timber, trees, underbrush, structures or obstructions; reserving, however, to the owners, their heirs and assigns, all other rights and privileges that may be used without interfering with or abridging the purposes of restoring and maintaining fish and wildlife habitat and ecological resource values and without interfering with or abridging the enumerated rights and easement hereby conveyed and acquired; all subject to existing easements for public roads and highways, public utilities, and pipelines, and conservation purposes.

The Public Sponsor does hereby grant to the United States of America, its representatives, agents and contractors, an irrevocable right, privilege and permission to enter upon the lands hereinbefore mentioned for the purpose of prosecuting the project.

The Public Sponsor certifies to the United States of America that any lands acquired subsequent to the execution of the Cooperation Agreement that are necessary for this project have been accomplished in compliance with the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (Public Law 91-646) as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR, Part 24.

DATE: ____________________ BY: ________________________________

Attorney for The Nature Conservancy

EXHIBIT D

DRAFT

ATTORNEY'S CERTIFICATE

RE: Certification of Lands and Authorization for Willamette Floodplain Ecosystem Restoration GI Study

I, ________________________________, an attorney admitted to practice law in the State of ________ certify that:

I am the attorney for The Nature Conservancy (hereinafter referred to as the "Public Sponsor").

I have examined the title to ____ [Parcel # (s)] of land identified by the U.S. Army Corps of Engineers as needed for the Ecosystem Restoration G.I. Feasibility Study, which is included in the Certification of Lands and Authorization for Entry document to which this Certificate is appended.

The Public Sponsor is vested with sufficient title and interest in the described lands required by the United States of America to support the construction, operation, and maintenance of the Ecosystem GI Study.

There [ ] are (see attached risk analysis) [ ] are no outstanding third party interests of record that could defeat or impair the title and interests of the Public Sponsor in and to the lands described, or interfere with construction, operation, and maintenance of the Project. Such interests include, but are not limited to, public roads and highways, public utilities, railroads, pipelines, other public and private rights of way, liens and judgments. To the extent such interests existed prior to acquisition of the described lands by the Public Sponsor such interests have either been cleared or subordinated to the title and interests so acquired except as provided in the attached risk analysis.

The Public Sponsor has authority to grant the Certification of Lands and Authorization for Entry to which this Certificate is appended; that said Certification of Lands and authorization for entry is executed by the proper duly authorized authority; and that the authorization for entry is in sufficient form to grant the authorization therein stated.

DATED AND SIGNED at __________________ , this ____ day of ________ 20__.

____

Attorney for The Nature Conservancy

EXHIBIT E

DRAFT

RISK ANALYSIS FOR OUTSTANDING THIRD PARTY INTERESTS

RE: Certification of Lands and Authorization for Willamette Floodplain Ecosystem Restoration GI Study

There are outstanding third party interests of record in and to the lands required for the Project. An evaluation of those interests is as follows:

1. **IDENTIFICATION OF THIRD PARTY INTERESTS**:
   a. Conservation Easement deeded to the U.S. Government (Bonneville Power Administration). Perpetual and irrevocable real property interest for conservation purposes. Includes access, inspection, enforcement, and conveyance rights.
   b. Conservation Easement deed to the State of Oregon (Oregon Watershed Enhancement Board) to protect conservation values. Includes access and enforcement. Specifically encourages restoration such as that identified by the Willamette Floodplain Restoration Study.

2. **ASSESSMENT:** (Discuss whether the exercise of that interest is likely to physically impair the Project. Discuss the legal implications if the interest is not cleared or subordinated. Discuss the practical impediments to the exercise of the interest such as any required permits, land use restrictions, or compensation.)

The Willamette Floodplain Ecosystem Restoration GI Study will enhance the conservation value of the property and is not in conflict with the third-party interests.

3. **PLAN TO RESOLVE:** (Discuss recourse available to protect the Project in the event the outstanding interest is exercised).

USACE and the Nature Conservancy to obtain permission in writing from the Bonneville Power Administration and Oregon Watershed Enhancement Board to implement the Willamette Floodplain Ecosystem Restoration project prior to certifying lands as available. Exercise of the outstanding interest would not damage the project in any way.

Signed:

_______________________________ DATE ____________

Attorney for The Nature Conservancy

APPENDIX H: Public and Stakeholder Involvement

November 2013

Stakeholder Input Summary

The following stakeholders were invited to participate in periodic meetings and updates to provide feedback and direction to the Willamette Floodplain Restoration study. Regular participants were primarily the watershed councils, Friends of Buford Park, and federal and state agencies.

Stakeholders Invited to Participate in Feasibility Study

Watershed Councils	**Local Governments**
Coast Fork Willamette Watershed Council	Lane County
Middle Fork Willamette Watershed Council	Lane Council of Governments
Federal Agencies	City of Springfield
USDA Forest Service	City of Cottage Grove
National Marine Fisheries Service	City of Creswell
Natural Resources Conservation Service	City of Lowell
Bureau of Land Management	City of Oakridge
U.S. Fish and Wildlife Service	East Lane Soil and Water Conservation District
U.S. Environmental Protection Agency	**Other Interest Groups**
State Agencies	Willamette Restoration Initiative
Oregon Department of Agriculture	Friends of Buford Park & Mt. Pisgah
Oregon Dept. of Environmental Quality	McKenzie River Land Trust
Oregon Dept. of Fish and Wildlife	The Nature Conservancy
Oregon Dept. of Forestry	Oregon State University
Oregon Dept. of Geology & Mineral Industries	Pacific Northwest Ecosystem Research Consortium
Oregon Dept. of Land Conservation and Development	The Trust for Public Land
Oregon Watershed Enhancement Board	Willamette Riverkeepers

Stakeholder Meetings

- Convened stakeholder group in 2005
- August 3, 2006 project update meeting and presentation of plan formulation process at Lane Council of Governments
- March 10, 2008 project update meeting at the Nature Conservancy
- May 2, 2008 meeting to identify restoration opportunities (measures and locations) at Oregon Department of Fish and Wildlife
- March 20, 2009 project alternatives and public outreach meeting at the Middle Fork Willamette Watershed Council
- July 8, 2009 plan formulation and alternatives meeting at Oregon Department of Fish and Wildlife
- January 22, 2010 alternatives meeting for Oregon State Park lands at the Middle Fork Willamette Watershed Council
- February 12, 2010 meeting with City of Cottage Grove at City offices
- February 16, 2010 meeting with Lane County in Eugene
- September 16, 2010 meeting to review alternatives and solicit design feedback at Oregon Department of Fish and Wildlife

- November 17, 2010 meeting with ODFW
- January 6, 2011 meeting with NOAA
- April 1, 2011 meeting with Coast Fork Watershed Council

Comments/Feedback Received from Stakeholders

- Need to get information on gravel mined pond depths and locations of Oregon chub
- Confluence area is very good opportunity to restore gravel mined ponds and also restore historic side channels
- Important to consider removal or bioengineering of revetments – opportunity at Lane County mitigation site on Coast Fork
- Blackberry removal/control very important in confluence area
- Cinderella Park on Coast Fork has significant invasive species problems
- Several possible side channels to restore in Camas Swale reach of Coast Fork
- Gravel pond restoration in reach C3 could be important opportunities
- Lynx Hollow reach is some of the best braided channel habitat in the Coast Fork, don't want to over-engineer in this reach, ELJs may be best options
- Suggest adjusting polygons to segregate public lands from private lands to make individual sites easier to implement
- Make sure all sites are kept in report so other entities could implement even if not in Corps recommended plan
- Potential additional project for list at Thompson Slough and Coast Fork
- Potential to increase site M2A to the east to include extensive side channel habitat
- Recommend more wood at confluence to allow river to move freely with less channel excavation
- Ensure wood in channel (especially below Clearwater Park) is designed with boater safety in mind
- Culverts and bridges need to meet ODFW fish passage requirements
- Encourage more backwater connections to gravel ponds instead of flow-through to reduce risk of channel avulsion
- Bank lowering, particularly at M1B may be better than channel excavation to allow passive river connections
- Reduce excavation in areas where good existing forest cover and focus on areas with limited vegetation (or invasives)
- At confluence area there is plenty of topsoil to reuse on site that has been stockpiled in windrows
- Suggest not connecting further ponds inland at Site M1B as it is good waterfowl habitat and so far from river
- Remove Elijah Bristow sites M5A and M5C from list as partners will implement sooner
- Remove Site R1C from list as partners will implement sooner

Public Involvement Summary

Public outreach and involvement was conducted several times during the Willamette Floodplain Restoration feasibility study. Part of the in-kind work completed by the non-Federal sponsor included outreach led by the Coast Fork and Middle Fork Willamette River Watershed Councils. The following summarizes key meetings and input received from public outreach, to date.

Public Meetings and Workshops

- June 5, 2006 introductory open house at Creswell
- June 6, 2006 introductory open house at Pleasant Hill
- June 7, 2006 introductory open house at Mt. Pisgah
- October 22, 2008 at Cottage Grove Community Center
- November 19, 2008 at ODFW Springfield
- March 28, 2013 public meeting in Springfield during draft report/EA review period

Comments/Feedback Received from Public 2006-2008

- Concerns about flooding and unintended consequences of restoration
- Questions about river regulation
- Would like to see culverts replaced with bridges to better accommodate flows
- Issues of actions by other landowners, i.e. riprap placement that may be causing erosion on adjacent lands
- Supportive of restoration
- Questions on whether the Corps could remove some of their revetments that are no longer functional
- Concerns about floodplain development and if Corps can work with County to reduce it
- Existing erosion and tree and land loss are major concerns
- Specific questions about individual properties, potential to restore and reduce flooding at same time?
- Questions about managing invasive species
- Questions about accuracy of floodplain mapping and modeling
- How will this information be shared to public?
- Questions about water rights and irrigation
- Concerns about water quality and temperature
- Questions about floodplain management and regulatory process
- Interest in potential side channel projects, possible to reduce ponding/flooding by allowing downstream connections to river

Public Comments Received During Review of Draft Report/EA, 2013

The Draft Feasibility Report/EA and Draft FONSI were made available for public review and comment from March 11 through April 10, 2013.The following major categories of comments were received via discussions at the public meeting on March 28, 2013 and subsequent letters, emails, and voice mails provided to the USACE. As a result of the comments received, additional information has been added to the feasibility report/EA.

Public Comment Category Summary	USACE Response
Numerous invasive species are present on Site C1B and on other parcels. Concerns about introducing these species into the Willamette River if ponds are connected. Some commenters provided listings of species they know are present.	The Corps is interested in the information provided on invasive species. A table of invasive species that may be present on all of the sites in the recommended plan has been added to Appendix J. Invasive species removal/control is a major component of the project and will be developed in detail during the design phase. Many of the invasive species present are widespread throughout the Willamette Valley. Information as to status of each invasive species (rare, common, abundant, etc.) and potential management action for each are provided in Appendix J.
Concerns about contamination on Site C1B. Anecdotal stories/photos of turbid water, dumping of debris, catch basin dumping, barrels of hazardous materials.	The Corps is aware that debris (e.g. concrete) was dumped in gravel ponds on several of the sites and will remove this debris as part of the project. No documentation has been provided for contamination still being present on site. Information developed for the feasibility report included a Level 1 Environmental Assessment, including an exhanstive download of database information from Federal, state, and local agencies as well as site walking tours/reconnaissance. A number of illegal drums were reported in the late 1980s on the state-owned land at site C1B. The State was required to remove these drums and received a No Further Action letter from the Department of Environmental Quality. Occasional illegal dumping of trash and other items has certainly occurred sporadically since the 1990s, but nothing that would be considered "hazardous" or "toxic" is known to be present on any of the proposed project sites. Further site reconnaissance will occur during the design phase to ensure no new contaminants are present. If any hazardous materials are unexpected encountered during construction, the non-Federal sponsor would investigate the situation and remove these materials. .
Concerns about water quality and water temperature in ponds.	Water quality improvements are expected to result from this project as a result of allowing more frequent floodplain connections and groundwater recharge. Ponds will still continue to heat up during summer low flows when there would only be a minimal backwater connection to the rivers. Salmonids and other species that prefer cooler temperatures would migrate out of the ponds as flow levels drop in summer.
Concerns about low flows in summer and gravel deposition in lower Coast Fork that has occurred recently. Potential for river to	Connections channels are generally designed as backwater channels at the downstream ends of ponds or pond complexes. This significantly reduces the potential

Public Comment Category Summary	USACE Response
migrate and cause flooding or erosion.	for channel avulsion into the ponds. The engineered log jams will be evaluated in detail during the design phase to ensure they are placed to not cause channel migration onto non-project properties (i.e. adjacent landowners) or to cause any rise in water surface elevations (i.e. flooding). The reconnection of these floodplain properties during lower flood events will help to recharge the groundwater table and improve water quality in the river. The connection channels are also specifically designed to not reduce river flows during the summer.
Much controversy that Lane County has prohibited public access onto Site C1B and to Glassbar Island (is in river north of Site C1B) in past month. Would like public access restored and concerned about possible land sale to Friends of Buford Park and possibility for future access.	The recent Lane County closure of the site is completely unrelated to the Corps' project at site C1B. While the Friends of Buford Park are considering purchasing the Lane County property they intend to encourage recreation and public access that is compatible with open space and habitat. The Corps will refine design details with Lane County, the State, and the Friends of Buford Park to ensure their goals for compatible recreation are not precluded but complemented by habitat restoration elements (i.e. culverts would be installed at channel crossings for trails).
Would like Coryell plaque recognized that overlooks Glassbar Island (not on project sites).	This plaque has been noted in Section 8.1 of the feasibility report. It is located adjacent to Highway 99 and is not present on any of the project sites and would not be disturbed by the recommended plan.
Would like an assessment of existing habitats and species (particularly sensitive species) to ensure good quality habitats are not damaged during construction.	During the design phase at each site, the Corps and/or the non-Federal sponsor will conduct more detailed site assessments of both native and non-native species and develop detailed plans for: a) removal of invasive species; and b) protection of native fish and wildlife during construction. The purpose of the project is to restore habitats for a wide variety of fish and wildlife species including salmon, Oregon chub, Western pond turtle, native amphibians, and neotropical migratory songbirds. Any existing high quality habitats on the sites would be protected and preserved, while degraded habitat would be restored.
Debris on Site C1B needs cleaning up.	Yes, debris removal (e.g. concrete) is a component of the project.
Concerns about public safety associated with placing wood or ELJs in the river.	During the design phase, the engineered log jams will be evaluated in detail for specific siting and sizing and analyzed hydraulically to ensure they do not increase risk to adjacent landowners (from either channel migration or flooding) and will also be designed to minimize the potential for endangering boaters.
Would like more public involvement and extended deadline for comments.	The Corps has not extended the public comment period however, will continue to evaluate comments as they come in until the report is finalized.

Public Comment Category Summary	USACE Response
Interest in not changing current condition of Site C1B.	The current conditions on Site C1B are highly degraded for many species. The current landowner (Lane County) has had many difficulties in managing public use of the site and has proposed to sell the property to Friends of Buford Park. The landowners are highly interested in restoring habitats and not maintaining current conditions.
Concerns that plan is for development on sites.	The habitat restoration plan proposed is entirely to improve habitats for fish and wildlife species. No development is proposed.
Project will likely be subject to Lane County floodplain fill/removal review.	Thank you, the non-Federal sponsor will ensure compliance with local regulations during the design phase.

APPENDIX I: Environmental Compliance Documents

November 2013

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Fish and Wildlife Coordination Act Letter ....
NMFS Concurrence Letter and Biological Opinion ....
USFWS Concurrence Letter and Biological Opinion..........
SHPO Concurrence Letter ....

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish and Wildlife Office
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266
Phone: (503) 231-6179 FAX: (503) 231-6195

TAKE PRIDE IN AMERICA

Reply To: 7314.0011
File Name: WillametteRiverFloodplainRestorationStudyEA.doc
TS Number: 13-271
Tails: 01EOFW00-2013-CPA-0024
File Type: F

Colonel John W. Eisenhauer, District Engineer
Portland District, Corps of Engineer
ATTN: CENWP-PME, Chief, Environmental Resources Branch (Ms. Joyce E. Casey)
P.O. Box 2946
Portland, Oregon 97208-2946

Subject: Review of Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report / Environmental Assessment, Phase 2, lower Coast and Middle Forks of the Willamette River, Lane County, Oregon (Township 18 South, Range 3 West, Sections 1, 2, 3, 8, 10, 11, and 12).

Dear Colonel Eisenhauer:

On January 24, 2013, the U.S. Fish and Wildlife Service's (Service) Oregon Fish and Wildlife Office received a letter from the Portland District Corps of Engineers (Corps) requesting review and recommendations on the Willamette River Floodplain Restoration Study Draft Integrated Feasibility/Environmental Assessment Report (Report) under the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq) (FWCA).

The Service is supportive of the goals of the Willamette River Floodplain Restoration Study and recognizes the Corps' need to include formal FWCA recommendations as part of its draft Feasibility Report. The Service is able to offer a number of proposed conditions and other recommendations in-lieu of a CAR. These in-lieu recommendations, once incorporated into the Feasibility Study Report, will satisfy the Service's FWCA goals for the Report.

The Service looks forward to continuing to coordinate with the Corps on this project, including the development of a work plan for the Service's formal involvement in the pre-construction, engineering, and design (PED) phase leading to construction. Through this involvement, the Corps and the Service will further address their respective mission standards and goals under both FWCA and the Endangered Species Act.

Consistent with the above, the Service has reviewed the Report prepared in June of 2012 and provides the following comments and recommendations.

Objective of the Recommended Restoration Plan

Seven floodplain project sites have been selected as the tentative restoration plan and will be moved forward for feasibility level designs. Four sites (C3A, C3B, C1B, C1C) occur in the Coast Fork Willamette River below Cottage Grove dam from RM 18 down to the confluence of the Middle Fork Willamette River. Three sites (M1A, M1B, M2A) occur in the lower Middle Fork Willamette River below Dexter dam from RM 192 down to the confluence. A descriptive overview of each site is located in the plan (Corps of Engineers 2012, chapter 5, pages 138 – 139).

The proposed plan intends to provide 854 acres of restored and reconnected floodplain in the Coast and Middle Fork Willamette River subbasins and to provide essential habitats for multiple listed fish and wildlife species and species of concern that occur in the subbasins, and contribute towards their recovery. Of primary focus are salmonid species including the listed Upper Willamette Chinook salmon (*Onchorynchus tshawytscha*), cutthroat trout (*Oncorhynchus clarkii*), Oregon chub (*Oregonichthys crameri*), Western pond turtle (*Actinemys marmorata*), riparian dependent wildlife such as beaver (*Castor canadensis*) and wood duck (*Aix sponsa*), Neotropical migratory song birds such as yellow warbler (*Setophaga petechia*), native amphibians, and raptors. The plan proposes to provide fish access to off-channel habitats, provide more suitable off-channel water depths that vary naturally with the season, improvements in cover and shading, increases in large wood and small woody debris, removal of invasive species, revegetation with native species, and interspersion of habitat types. The proposed plan also intends to contribute to the restoration of natural riverine processes including channel migration and the recruitment of large woody debris over time as the riparian vegetation grows and matures. Particularly near the confluence of the rivers, this will stimulate the formation of natural habitats along nearly 3 miles of river (1 mile on the Coast Fork and 2 miles on the Middle Fork), such as pools, riffles, alcoves, and side channels.

Fish and Wildlife Resource Concerns

The Willamette Basin supports an intricate network of fish and wildlife species including plants, benthic invertebrates, fish, reptiles, amphibians, birds, and mammals. Included in this network are migratory birds and anadromous and resident fish. Wildlife of importance to the Service includes migratory and resident piscivorous birds such as bald eagle (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*). Important representatives of fish species include chinook (*Oncorhynchus tshawytscha*); steelhead (*O. mykiss*) and cutthroat (*O. clarki*) trout; and Pacific lamprey (*Lampetra tridentata*).

A number of fish and wildlife have reduced or limited number of individuals and are the focus of conservation concerns. Factors contributing to these declines include habitat loss, introduced species, and direct human disturbance. For example, predation by introduced species may be at least partly responsible for observed declines in valley populations of the Oregon spotted frog (*Rana pretiosa*) and the Western pond turtle. These species may have relied heavily on the backwater habitats along the Willamette River and other wetland that have been substantially reduced in the past 150 years. Although this restoration plan is intended to enhance habitat features for these sensitive species, we are concerned construction activities, may have short-term adverse impacts to fish and wildlife, and if not properly implemented, may inadvertently cause exotic species such as bull frogs (*Rana catesbeiana*) and warm water game fish to be introduced.

Conservation Recommendations

The restoration plan proposes to restore natural floodplain functions and fish and wildlife habitats along the lower Coast and Middle Forks of the Willamette River. The types of individual restoration measures proposed in this restoration plan proposes to be conducted using appropriate conservation measures and best management practices (BMPs) to avoid and minimize any adverse effects during construction (including SLOPES IV Restoration). The long-term effects of this proposed plan are intended to be beneficial and specifically benefit sensitive fish and wildlife species and contribute to the restoration of natural riverine and floodplain processes. Due to the large scale of the feasibility study, site specific information regarding current fish and wildlife habitat conditions is not available for each of the individual sites. The Service therefore is unable to specifically evaluate the potential short-term adverse effects of the constructions activities to fish and wildlife resources. At this time, the Service requests the Corps incorporate the following conservation measures or BMPs into this restoration plan in addition to those measures already considered, to provide protection to listed and sensitive species, and further minimize any short-term negative impacts to their habitats during construction activities. These conservation recommendations provided below should reduce the overall project impacts and improve habitat conditions for aquatic and riparian dependent species.

<u>General Aquatic Conservation Measures</u>

The activities considered by this restoration plan are intended to protect and restore fish and wildlife habitat with long-term benefits to ESA listed species and species of concern. However, project construction may have short-term adverse effects. To minimize these short-term adverse effects and make them predictable for purposes of programmatic analysis, the following general conservation measures are recommended to be followed for all projects.

Documentation

1) Name(s), phone number(s), and address(es) of the person(s) responsible for oversight will be posted at the work site;
2) A description of hazardous materials that will be used, including inventory, storage, and handling procedures will be available on-site;
3) Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities, will be readily available on-site;
4) A standing order to cease work in the event of high flows (above those addressed in the design and implementation plans), or exceedance of incidental take or water quality limits, will be posted on-site.

Project Design and Site Preparation

1) <u>Climate change</u>. Best available science regarding the future effects within the project area of climate change, such as changes in stream flows and water temperatures, will be considered during project design.

2) State and Federal Permits. All applicable regulatory permits and official project authorizations will be obtained before project implementation. These permits and authorizations include, but are not limited to, National Environmental Policy Act, National Historic Preservation Act, and the appropriate state agency removal and fill permit, Army Corps of Engineers 404 permits, and Clean Water Act (CWA) section 401 water quality certifications.

3) Timing of in-water work. Appropriate state Oregon Department of Fish and Wildlife (ODFW) guidelines for timing of in-water work windows (IWW) will be followed.
   a) Oregon chub – if work occurs in occupied habitat, in-water work will not occur between June 1 and August 15.
   b) Bull trout – if work occurs in occupied habitat, contact the appropriate Service bull trout point of contact: Oregon Fish and Wildlife Office – 503.231.6179. Projects will not occur where bull trout spawning is suspected because eggs, alevin, and fry are in the substrate or closely associated habitats nearly year round.
   c) Proposed restoration activities will not adversely modify designated and/or proposed critical habitats for bull trout, Oregon chub, or Upper Willamette River Chinook salmon.
   d) Lamprey – the project sponsor and/or their contractors will avoid working in stream or river channels that contain Pacific Lamprey from March 1 to July 1. If this timeframe is incompatible with other objectives, the area will be surveyed for nests and lamprey presence, and avoided if possible. If lampreys are known to exist, the project sponsor will utilize dewatering and salvage procedures outlined in US Fish and Wildlife Service (2010)[1].
   e) Proposed restoration activities will follow the Oregon guidelines for the timing of IWW (2008)[2] for each affected stream reach, unless ODFW approves an extension based on current year site specific conditions. Work will not proceed outside of the IWW until the exception is approved by e-mails from NMFS and the Service.

4) Contaminants. The project sponsor will complete a site assessment with the following elements to identify the type, quantity, and extent of any potential contamination for any action that involves excavation of more than 20 cubic yards of material:
   a) A review of available records, such as former site use, building plans, and records of any prior contamination events;
   b) A site visit to inspect the areas used for various industrial processes and the condition of the property;
   c) Interviews with knowledgeable people, such as site owners, operators, and occupants, neighbors, or local government officials; and
   d) A summary, stored with the project file, that includes an assessment of the likelihood that contaminants are present at the site, based on items 3(a) through 3(c).

5) Site layout and flagging. Prior to construction, the action area will be clearly flagged to identify the following:

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[1] U.S. Fish and Wildlife Service. 2010. Best management practices to minimize adverse effects to Pacific lamprey. Available online at: http://www.fws.gov/pacific/Fisheries/sphabcon/lamprey/pdf/Best%20Management%20Practices%20for%20Pacific%20Lamprey%20April%202010%20Version.pdf.

[2] Oregon Department of Fish and Wildlife. 2008. Oregon guidelines for timing of in-water work to protect fish and wildlife resources. Available online at: http://www.dfw.state.or.us/lands/inwater/Oregon_Guidelines_for_Timing_of_%20InWater_Work2008.pdf.

   a) Sensitive resource areas, such as areas below ordinary high water, spawning areas, springs, Western pond turtle nesting sites, and wetlands;
   b) Equipment entry and exit points;
   c) Road and stream crossing alignments;
   d) Staging, storage, and stockpile areas; and
   e) No-spray areas and buffers.

6) <u>Temporary access roads and paths</u>.
   a) Existing access roads and paths will be preferentially used whenever reasonable, and the number and length of temporary access roads and paths through riparian areas and floodplains will be minimized to lessen soil disturbance and compaction, and impacts to vegetation.
   b) Temporary access roads and paths will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. If slopes are steeper than 30%, then the road will be designed by a civil engineer with experience in steep road design.
   c) The removal of riparian vegetation during construction of temporary access roads will be minimized. When temporary vegetation removal is required, vegetation will be cut at ground level (not grubbed).
   d) At project completion, all temporary access roads and paths will be obliterated, and the soil will be stabilized and revegetated. Road and path obliteration refers to the most comprehensive degree of decommissioning and involves decompacting the surface and ditch, pulling the fill material onto the running surface, and reshaping to match the original contour.
   e) Temporary roads and paths in wet areas or areas prone to flooding will be obliterated by the end of the in-water work window.

7) <u>Temporary stream crossings</u>.
   a) Existing stream crossings will be preferentially used whenever reasonable, and the number of temporary stream crossings will be minimized.
   b) Temporary bridges and culverts will be installed to allow for equipment and vehicle crossing over perennial streams during construction.
   c) Equipment and vehicles will cross the stream in the wet only where:
      i) The streambed is bedrock; or
      ii) Mats or off-site logs are placed in the stream and used as a crossing.
   d) Vehicles and machinery will cross streams at right angles to the main channel wherever possible.
   e) The location of the temporary crossing will avoid areas that may increase the risk of channel re-routing or avulsion.
   f) Potential spawning habitat (i.e., pool tailouts) and pools will be avoided to the maximum extent possible.
   g) No stream crossings will occur at active spawning sites, when holding adult listed fish are present, or when eggs or alevins are in the gravel. The appropriate state fish and wildlife agency will be contacted for specific timing information.
   h) After project completion, temporary stream crossings will be obliterated and the stream channel and banks restored.

8) Staging, storage, and stockpile areas.
   a) Staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, and hazardous material storage) will be 150 feet or more from any natural water body or wetland, or on an adjacent, established road area in a location and manner that will preclude erosion into or contamination of the stream or floodplain.
   b) Natural materials used for implementation of aquatic restoration, such as large wood, gravel, and boulders, may be staged within the 100-year floodplain.
   c) Any large wood, topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration at a specifically identified and flagged area.
   d) Any material not used in restoration, and not native to the floodplain, will be removed to a location outside of the 100-year floodplain for disposal.

9) Equipment. Mechanized equipment and vehicles will be selected, operated, and maintained in a manner that minimizes adverse effects on the environment (e.g., minimally-sized, low pressure tires; minimal hard-turn paths for tracked vehicles; temporary mats or plates within wet areas or on sensitive soils). All vehicles and other mechanized equipment will be:
   a) Stored, fueled, and maintained in a vehicle staging area placed 150 feet or more from any natural water body or wetland or on an adjacent, established road area;
   b) Refueled in a vehicle staging area placed 150 feet or more from a natural waterbody or wetland, or in an isolated hard zone, such as a paved parking lot or adjacent, established road (this measure applies only to gas-powered equipment with tanks larger than 5 gallons);
   c) Biodegradable lubricants and fluids should be used, if possible, on equipment operating in and adjacent to the stream channel and live water.
   d) Inspected daily for fluid leaks before leaving the vehicle staging area for operation within 150 feet of any natural water body or wetland; and
   e) Thoroughly cleaned before operation below ordinary high water, and as often as necessary during operation, to remain grease free.

10) Erosion control. Erosion control measures will be prepared and carried out, commensurate in scope with the action, that may include the following:
   a) Temporary erosion controls.
      i) Temporary erosion controls will be in place before any significant alteration of the action site and appropriately installed downslope of project activity within the riparian buffer area until site rehabilitation is complete.
      ii) If there is a potential for eroded sediment to enter the stream, sediment barriers will be installed and maintained for the duration of project implementation.
      iii) Temporary erosion control measures may include fiber wattles, silt fences, jute matting, wood fiber mulch and soil binder, or geotextiles and geosynthetic fabric.
      iv) Soil stabilization utilizing wood fiber mulch and tackifier (hydro-applied) may be used to reduce erosion of bare soil if the materials are noxious weed free and nontoxic to aquatic and terrestrial animals, soil microorganisms, and vegetation.
      v) Sediment will be removed from erosion controls once it has reached 1/3 of the exposed height of the control.
      vi) Once the site is stabilized after construction, temporary erosion control measures will be removed.

   b) Emergency erosion controls. The following materials for emergency erosion control will be available at the work site:
      i) A supply of sediment control materials; and
      ii) An oil-absorbing floating boom whenever surface water is present.

11) Dust abatement. The project sponsor will determine the appropriate dust control measures (if necessary) by considering soil type, equipment usage, prevailing wind direction, and the effects caused by other erosion and sediment control measures. In addition, the following criteria will be followed:
   a) Work will be sequenced and scheduled to reduce exposed bare soil subject to wind erosion.
   b) Dust-abatement additives and stabilization chemicals (typically magnesium chloride, calcium chloride salts, or ligninsulfonate) will not be applied within 25 feet of water or a stream channel and will be applied so as to minimize the likelihood that they will enter streams. Applications of ligninsulfonate will be limited to a maximum rate of 0.5 gallons per square yard of road surface, assuming a 50:50 (ligninsulfonate to water) solution.
   c) Application of dust abatement chemicals will be avoided during or just before wet weather, and at stream crossings or other areas that could result in unfiltered delivery of the dust abatement materials to a waterbody (typically these would be areas within 25 feet of a waterbody or stream channel; distances may be greater where vegetation is sparse or slopes are steep).
   d) Spill containment equipment will be available during application of dust abatement chemicals.
   e) Petroleum-based products will not be used for dust abatement.

12) Spill prevention, control, and countermeasures. The use of mechanized machinery increases the risk for accidental spills of fuel, lubricants, hydraulic fluid, or other contaminants into the riparian zone or directly into the water. Additionally, uncured concrete and form materials adjacent to the active stream channel may result in accidental discharge into the water. These contaminants can degrade habitat, and injure or kill aquatic food organisms and ESA listed species. The project sponsor will adhere to the following measures:
   a) A description of hazardous materials that will be used, including inventory, storage, and handling procedures will be available on-site.
   b) Written procedures for notifying environmental response agencies will be posted at the work site.
   c) Spill containment kits (including instructions for cleanup and disposal) adequate for the types and quantity of hazardous materials used at the site will be available at the work site.
   d) Workers will be trained in spill containment procedures and will be informed of the location of spill containment kits.
   e) Any waste liquids generated at the staging areas will be temporarily stored under an impervious cover, such as a tarpaulin, until they can be properly transported to and disposed of at a facility that is approved for receipt of hazardous materials.

13) Invasive species control. The following measures will be followed to avoid introduction of invasive plants and noxious weeds into project areas:

a) Prior to entering the site, all vehicles and equipment will be power washed, allowed to fully dry, and inspected to make sure no plants, soil, or other organic material adheres to the surface.
b) Watercraft, waders, boots, and any other gear to be used in or near water will be inspected for aquatic invasive species.
c) During project design, actions will be identified and implemented, in conjunction with ODFW, to prevent, if feasible, future introductions of bull frogs, warm water game fish, and other aquatic invasive species.

Construction Conservation Measures

1) Work Area Isolation & Fish Salvage.
   a) Any work area within the wetted channel will be isolated from the active stream whenever ESA listed fish are reasonably certain to be present, or if the work area is less than 300-feet upstream from known spawning habitats.
   b) When work area isolation is required, engineering design plans will include all isolation elements, fish release areas, and, when a pump is used to dewater the isolation area and fish are present, a fish screen that meets NMFS's fish screen criteria (NMFS 2011[2], or most current).
   c) Work area isolation and fish capture activities will occur during periods of the coolest air and water temperatures possible, normally early in the morning versus late in the day, and during conditions appropriate to minimize stress and death of species present.
   d) Salvage operations will follow the ordering, methodologies, and conservation measures specified below in Steps 1 through 6. Steps 1 and 2 will be implemented for all projects where work area isolation is necessary according to condition 1(a) above. Electrofishing (Step 3) can be implemented to ensure all fish have been removed following Steps 1 and 2, or when other means of fish capture may not be feasible or effective. Dewatering and rewatering (Steps 4 and 5) will be implemented unless wetted in-stream work is deemed to be minimally harmful to fish, and is beneficial to other aquatic species. Dewatering will not be conducted in areas occupied by lamprey, unless lampreys are salvaged using guidance set forth in US Fish and Wildlife Service (2010)[3].
      i) **Step 1: Isolate**
         (1) Block nets will be installed at up and downstream locations and maintained in a secured position to exclude fish from entering the project area.
         (2) Nets will be secured to the stream channel bed and banks until fish capture and transport activities are complete. Nets may be left in place for the duration of the project to exclude fish.
         (3) If block nets or traps remain in place more than one day, the nets and traps will be monitored at least daily to ensure they are secured to the banks and free of organic accumulation, and to minimize fish predation in the trap.

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[2] National Marine Fisheries Service. 2011. Anadromous salmonid passage facility design. Northwest Region. Available online at: http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf

[3] U.S. Fish and Wildlife Service. 2010. Best management practices to minimize adverse effects to Pacific lamprey. Available online at: http://www.fws.gov/pacific/Fisheries/sphabcon/lamprey/pdf/Best%20Management%20Practices%20for%20Pacific%20Lamprey%20April%202010%20Version.pdf

    - (4) Nets and traps will be monitored hourly anytime there is instream disturbance.
- ii) **Step 2: Salvage** – As described below, fish trapped within the isolated work area will be captured to minimize the risk of injury, then released at a safe site:
    - (1) Remove as many fish as possible prior to dewatering.
    - (2) During dewatering, any remaining fish will be collected by hand or dip nets.
    - (3) Seines with a mesh size to ensure entrapment of the residing ESA-listed fish will be used.
    - (4) Minnow traps will be left in place overnight and used in conjunction with seining.
    - (5) If buckets are used to transport fish:
        - (a) The time fish are in a transport bucket will be limited, and will be released as quickly as possible;
        - (b) The number of fish within a bucket will be limited based on size, and fish will be of relatively comparable size to minimize predation;
        - (c) Aerators for buckets will be used or the bucket water will be frequently changed with cold clear water at 15 minute or more frequent intervals.
        - (d) Buckets will be kept in shaded areas or will be covered by a canopy in exposed areas.
        - (e) Dead fish will not be stored in transport buckets, but will be left on the stream bank to avoid mortality counting errors.
    - (6) As rapidly as possible (especially for temperature-sensitive bull trout), fish will be released in an area that provides adequate cover and flow refuge. Upstream release is generally preferred, but fish released downstream will be sufficiently outside of the influence of construction.
    - (7) Salvage will be supervised by a qualified fisheries biologist experienced with work area isolation and competent to ensure the safe handling of all fish.
- iii) **Step 3: Electrofishing** – Electrofishing will be used only after other salvage methods have been employed or when other means of fish capture may not be feasible or effective.
    - (1) If electrofishing will be used to capture fish for salvage, the salvage operation will be led by an experienced fisheries biologist and the following guidelines will be followed:
        - (a) The NMFS's electrofishing guidelines (NMFS 2000)[4].
        - (b) Only direct current (DC) or pulsed direct current (PDC) will be used.
            - (i) If conductivity is less than 100 µs, voltage ranges from 900 to 1100 will be used;
            - (ii) For conductivity ranges between 100 to 300 µs, voltage ranges will be 500 to 800;
            - (iii) For conductivity greater than 300 µs, voltage will be less than 400.
        - (c) Electrofishing will begin with a minimum pulse width and recommended voltage and then gradually increase to the point where fish are immobilized.
        - (d) The anode will not intentionally contact fish.

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[4] National Marine Fisheries Service. 2000. Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act. Portland, Oregon and Santa Rosa, California. Available online at http://www.nwr.noaa.gov/ESA-Salmon-Regulations-Permits/4d-Rules/upload/electro2000.pdf

(e) Electrofishing shall not be conducted when the water conditions are turbid and visibility is poor. This condition may be experienced when the sampler cannot see the stream bottom in 1-foot of water.

(f) If mortality or obvious injury (defined as dark bands on the body, spinal deformations, de-scaling of 25% or more of body, and torpidity or inability to maintain upright attitude after sufficient recovery time) occurs during electrofishing, operations will be immediately discontinued, machine settings, water temperature and conductivity checked, and procedures adjusted or postponed to reduce mortality

(2) In known bull trout spawning areas, electrofishing shall only occur from May 1 (or after emergence occurs) to July 31. No electrofishing will occur in any bull trout habitat after August 15. Electrofishing will not be conducted within core areas that contain 100 or fewer adult bull trout.

iv) **Step 4: Dewater** – Dewatering, when necessary, will be conducted over a sufficient period of time to allow species to naturally migrate out of the work area and will be limited to the shortest linear extent practicable.

(1) Diversion around the construction site may be accomplished with a coffer dam and a by-pass culvert or pipe, or a lined, non-erodible diversion ditch. Where gravity feed is not possible, a pump may be used, but must be operated in such a way as to avoid repetitive dewatering and rewatering of the site. Impoundment behind the cofferdam must occur slowly through the transition, while constant flow is delivered to the downstream reaches.

(2) All pumps will have fish screens to avoid juvenile fish entrainment, and will be operated in accordance with NMFS's current fish screen criteria (NMFS 2011[5], or most recent version). If the pumping rate exceeds 3 cfs, a NMFS Hydro fish passage review will be necessary.

(3) Dissipation of flow energy at the bypass outflow will be provided to prevent damage to riparian vegetation or stream channel.

(4) Safe reentry of fish into the stream channel will be provided, preferably into pool habitat with cover, if the diversion allows for downstream fish passage.

(5) Seepage water will be pumped to a temporary storage and treatment site or into upland areas to allow water to percolate through soil or to filter through vegetation prior to reentering the stream channel.

v) **Step 5: Re-watering** – Upon project completion, the construction site will be slowly re-watered to prevent loss of surface flow downstream and to prevent a sudden increase in stream turbidity. During re-watering, the site will be monitored to prevent stranding of aquatic organisms below the construction site.

vi) **Step 6: Salvage Notice** – Monitoring and recording of fish presence, handling, and mortality must occur during the duration of the isolation, salvage, electrofishing, dewatering, and rewatering operations. Once operations are completed, a salvage report will document procedures used, any fish injuries or deaths (including numbers of fish affected), and causes of any deaths.

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[5] National Marine Fisheries Service. 2011. Anadromous salmonid passage facility design. Northwest Region. Available online at: http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf

2) Fish passage. Fish passage will be provided for any adult or juvenile fish likely to be present in the action area during construction, unless passage did not exist before construction or the stream is naturally impassable at the time of construction. If the provision of temporary fish passage during construction will increase negative effects on aquatic species of interest or their habitat, a variance can be requested from the NMFS Branch Chief and the FWS Field Office Supervisor. Pertinent information, such as the species affected, length of stream reach affected, proposed time for the passage barrier, and alternatives considered, will be included in the variance request. After construction, adult and juvenile passage that meets NMFS' fish passage criteria (NMFS 2011) will be provided for the life of the action.

3) Construction and discharge water.
   a) Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate.
   b) Diversions will not exceed 10% of the available flow.
   c) All construction discharge water will be collected and treated using the best available technology applicable to site conditions.
   d) Treatments to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present will be provided.

4) Minimize time and extent of disturbance. Earthwork (including drilling, excavation, dredging, filling and compacting) in which mechanized equipment is in stream channels, riparian areas, and wetlands will be completed as quickly as possible. Mechanized equipment will be used in streams only when project specialists believe that such actions are the only reasonable alternative for implementation, or would result in less sediment in the stream channel or damage (short- or long-term) to the overall aquatic and riparian ecosystem relative to other alternatives. To the extent feasible, mechanized equipment will work from the top of the bank, unless work from another location would result in less habitat disturbance.

5) Cessation of work. Project operations will cease under the following conditions:
   a) High flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage;
   b) When allowable water quality impacts, as defined by the state CWA section 401 water quality certification, have been exceeded; or
   c) When take limitations have been reached or exceeded.

Post-construction Conservation Measures

1) Site restoration. When construction is complete:
   a) All streambanks, soils, and vegetation will be cleaned up and restored as necessary using stockpiled large wood, topsoil, and native channel material.
   b) All project related waste will be removed.
   c) All temporary access roads, crossings, and staging areas will be obliterated. When necessary for revegetation and infiltration of water, compacted areas of soil will be loosened.
   d) All disturbed areas will be rehabilitated in a manner that results in similar or improved conditions relative to pre-project conditions. This will be achieved through redistribution of stockpiled materials, seeding, and/or planting with local native seed mixes or plants.

2) Revegetation. Long-term soil stabilization of disturbed sites will be accomplished with reestablishment of native vegetation using the following criteria:
    a) Planting and seeding will occur prior to or at the beginning of the first growing season after construction.
    b) An appropriate mix of species that will achieve establishment, shade, and erosion control objectives, preferably forb, grass, shrub, or tree species native to the project area or region and appropriate to the site will be used.
    c) Vegetation, such as willow, sedge and rush mats, will be salvaged from disturbed or abandoned floodplains, stream channels, or wetlands.
    d) Invasive species will not be used.
    e) Short-term stabilization measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques.
    f) Surface fertilizer will not be applied within 50 feet of any stream channel, waterbody, or wetland.
    g) Fencing will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
    h) Re-establishment of vegetation in disturbed areas will achieve at least 70% of pre-project conditions within 3 years.
    i) Invasive plants will be removed or controlled until native plant species are well-established (typically 3-years post-construction).

3) Site access. The project sponsor will retain the right of reasonable access to the site in order to monitor the success of the project over its life.

Inspections and Monitoring

1) Implementation monitoring. Project sponsor staff or their designated representative will provide implementation monitoring to ensure compliance with the applicable biological opinion, including:
    a) General conservation measures are adequately followed; and
    b) Effects to listed species are not greater than predicted and incidental take limitations are not exceeded.

2) CWA section 401 water quality certification. The project sponsor or designated representative will complete and record water quality observations to ensure that in-water work is not degrading water quality. During construction, CWA section 401 water quality certification provisions provided by the Oregon Department of Environmental Quality will be followed.

ESA Listed Plants

Field surveys for listed plants and suitable habitat known or suspected to occur in the action area will occur prior to federal activities during the growing season, before aquatic restoration activities would occur. Any listed plant or plant suitable habitat discovered during the survey that is within 0.25 miles of the proposed aquatic restoration project will cause project planners to design the restoration activities to not "likely to adversely affect" listed plants. Understanding plant distribution and avoiding the plants during restoration activities has proven to be the best way to facilitate conservation for these species and to meet the goals of the agencies. In some cases restoration activities are consistent with listed plant recovery actions and can benefit listed species.

Nesting Birds

Nesting birds are protected under the Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712). Under the Act, taking, killing or possessing migratory birds is unlawful. The best way to avoid disturbing nesting birds is to schedule activities outside the nesting season. The nesting season is not the same for all species, and not all sites will have nesting birds present during the entire nesting season. Here are some general guidelines to help you plan project activities:

1) The time between August 1 – January 31 is the best time to plan for tree removal, invasive plant species management, and grubbing and clearing.
2) Avoid disturbance activities between February 1 – April 15. This is considered the early nesting season. Disturbance to vegetation, especially trees, should be avoided during this time.
3) Avoid disturbance activities between April 15 – July 31. This is considered the primary nesting season. Disturbance to vegetation should be avoided during this time. If birds are not present during nesting season, vegetation removal and other disturbance activities may proceed.
4) If work must occur in the recommended avoidance time frames, the project area and specific vegetation impacted should be surveyed for nesting birds. We recommend you follow the City of Portland bird nesting guidelines at: http://www.portlandoregon.gov/bes/article/322164.

Bald Eagles

The bald eagle was formally delisted from the federal Endangered Species Act in 2008 but remains protected under the Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712), and the Bald and Golden Eagle Protection Act of 1940, as amended (16 USC 668-668d). The nesting season for the bald eagle occurs between January 1 and August 31. If bald eagles are likely to be in the project area and Corps activities may disturb bald eagles during the nesting season, we recommend the Corps refer to the Service's guidance and restrictions at our website: http://www.fws.gov/pacific/eagle/disturb.html .

Thank you for the opportunity to provide these comments. Please contact Kathy Roberts or Joe Zisa (503-231-6179) if you have any questions or concerns regarding this letter.

Sincerely yours,

for Paul Henson, Ph.D
State Supervisor

Literature Cited

Corps of Engineers. 2012. Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Programmatic Environmental Assessment. 197 pages, plus appendices.

NMFS Biological Opinion

Amended Incidental Take Statement – August 29, 2013

Biological Opinion – June 19, 2013

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E. Bldg 1
Seattle, WA 98115

Refer to NMFS No.:
NWR-2012-9318

August 29, 2013

Joyce Casey, Chief
Environmental Resources Branch
Planning, Programs and Project Management Division
U.S. Army Corp of Engineers, Portland District
Attn: CENWP-PM-E/Greg Smith
P.O. Box 2946
Portland, Oregon 97208-2946

RE: Biological Opinion for the Willamette River Floodplain Restoration Study – Amended Incidental Take Statement

Dear Ms. Casey:

On June 19, 2013, NMFS issued a biological opinion and incidental take statement (ITS) to the U.S. Army Corps of Engineers (the Corps), Portland District, regarding the effects of the Willamette River Floodplain Restoration Study.

On July 24, 2013, I received your letter requesting an amendment to that ITS based on review comments from the Corps' Headquarters in Washington, D.C. According to those comments, language in the ITS that refers to "future consultation" suggests that the consultation is not complete. Moreover, the amount of the incidental take that will be exempted by the scope of the ITS and the manner in which that take will be verified must be modified before a complete study package can be presented to Congress for authorization under the Water Resources Development Act.

Based on your request, our staff reviewed the ITS and made several modifications that they agree address the concerns expressed by the Corps' Headquarters while still meeting regulatory requirements for an incidental take statement as described in 50 CFR 402.14(i). These modifications do not alter the effects analysis in the biological opinion or its conclusions, so I am issuing those modifications as a new ITS attached to this letter.

Thank you for your interest in a cooperative resolution of this issue and good luck with the completion of your project. Please direct questions regarding this letter to Marc Liverman, Willamette/Lower Columbia Branch Chief, at 503.231.2336.

Sincerely,

Michael P. Tehan
Assistant Regional Administrator
Habitat Conservation Division

Attachment

cc: Teena Monical, Corps
Greg Smith, Corps

ATTACHMENT

August 28, 2013

Amended Incidental Take Statement
for the
U.S. Army Corps of Engineers
Willamette River Floodplain Restoration Study,
Lane County, Oregon
(NMFS No.: NWR-2012-9318

2.8 Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. For purposes of this consultation, we interpret "harass" to mean an intentional or negligent action that has the potential to injure an animal or disrupt its normal behaviors to a point where such behaviors are abandoned or significantly altered.[1] Section 7(b)(4) and Section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, if that action is performed in compliance with the terms and conditions of this incidental take statement.

2.8.1 Amount or Extent of Take

Work necessary to construct and maintain the restoration projects that will be carried out under this Opinion will take place beside and within aquatic habitats that are reasonably certain to be occupied by UWR Chinook salmon. As described below, each type of restoration action is likely to cause incidental take of one or more of those species. Juvenile life stages are most likely to be affected, although adults may sometimes also be present.

Based on the above effects analysis, we anticipate the following forms of incidental take from the seven categories of actions provided by the proposed action within the action area: 1) Entrapment of juvenile UWR Chinook salmon resulting in injury or death during the in-water work window period of June 1 to October 15; 2) displacement of juvenile fish during construction activities along the bank line, disrupting normal juvenile behavior and leading to

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[1] NMFS has not adopted a regulatory definition of harassment under the ESA. The World English Dictionary defines harass as "to trouble, torment, or confuse by continual persistent attacks, questions, etc." The U.S. Fish and Wildlife Service defines "harass" in its regulations as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering," 50 CFR 17.3. The interpretation we adopt in this consultation is consistent with our understanding of the dictionary definition of harass and is consistent with the U.S. Fish and Wildlife interpretation of the term.

greater exposure to predators; 3) reduced growth rates and survival affected by changes in forage or water quality; 4) displacement of fish from increased turbidity during in-water work, disrupting normal juvenile behavior and potentially leading to greater exposure to predators; and, 5) use of herbicides resulting in short-term sublethal effects altering fish behavior in ways that are likely to impact survival, and through adverse impacts on aquatic habitats, such as reduction in cover and the abundance of food organisms.

Juvenile fish will be captured during work area isolation necessary to minimize construction related disturbance of streambank and channel areas caused by fish passage restoration; off- or side channel reconstruction; set-back of an existing berm, dike or levee; streambank restoration; water control structure removal; or wetland restoration. In-stream disturbance that cannot be avoided by work area isolation will lead to short-term increases in suspended sediment, temperature, dissolved oxygen demand, or other contaminants, and an overall decrease in habitat function that harms adult and juvenile fish by denying them normal use of the action area for reproduction, rearing, feeding, or migration. Exclusion from preferred habitat areas causes increased energy use and an increased likelihood of predation, competition and disease that is reasonably likely to result in injury or death of some individual fish.

Similarly, adult and juvenile fish will be harmed by construction-related disturbance of upland, riparian and in-stream areas for actions related to boulder placement, large wood restoration, streambank restoration, and related in-stream work. The effects of those actions will include additional short-term reductions in water quality, as described above, and will also harm adult and juvenile fish as described above. Herbicide applications may result in herbicide drift or transportation into streams that will harm listed species by chemically impairing normal fish behavioral patterns related to feeding, rearing, and migration that is reasonably likely to result in injury or death of some individual fish.

This take will typically occur within an area that includes the streamside and channel footprint of each project and upstream to the extent that the effects of the project improve fish passage above the construction site. Projects that require two or more years of work to complete will cause adverse effects that last proportionally longer, and effects related to runoff from the construction site may be exacerbated by winter precipitation. These adverse effects may continue intermittently for weeks, months, or years until riparian vegetation and floodplain vegetation are restored and a new topographic equilibrium is reached. Incidental take within that area that meets the terms and conditions of this incidental take statement will be exempt from the taking prohibition.

Capture of juvenile fish during in-water work area isolation. NMFS anticipates that up to 100 juvenile individuals UWR Chinook salmon will be captured as a result of work necessary to isolate in-water construction areas at three sites (C1B, C1C, and M1A) (Table 8). However, of those individual juvenile salmon that are captured, NMFS anticipates that no more than two individuals will be killed per year at each site. Capture and release of adult fish is not likely to occur as part of the proposed isolation of in-water work areas. No adult fish are likely to be included in this total as they can be effectively excluded from the work area before it is completely isolated from flowing water. Of the juvenile fish that will be collected, fewer than 2% are likely to be killed while the remaining fish are likely to be released and survive with no adverse effects (Table 8). We estimated the adult-equivalent for this mortality is less than two adults, which will not delay recovery of any species regardless of the recovery status of the population those juveniles are drawn from.

Harm due to habitat-related effects. Take caused by the habitat-related effects of this action cannot be accurately quantified as a number of fish because the distribution and abundance of fish that occur within an action area are affected by habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and environmental characteristics. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by projects that will be completed under the proposed action. Thus, the distribution and abundance of fish within the program action area cannot be attributed entirely to habitat conditions, nor can NMFS precisely predict the number of fish that are reasonably certain to be injured or killed if their habitat is modified or degraded by actions that will be completed under the proposed program. Additionally, there is no practical way to count the number of fish exposed to the adverse effects of the proposed action without causing additional stress and injury. In such circumstances, NMFS uses the causal link established between the activity and the likely changes in habitat conditions affecting the listed species to describe the extent of take as a numerical level of habitat disturbance.

Construction-related disturbance of streambank and channel areas. The best available indicator for the extent of take due to construction-related disturbance of streambank and channel areas is the total length of stream reach that will be modified by construction each year. This variable is proportional to the amounts of harm that each action is likely to cause through short-term degradation of water quality and physical habitat. NMFS assumes that actions carried out under this Opinion may modify up to 7,500 lineal feet of riparian and shallow-water habitat; therefore, the extent of take for construction-related disturbance of streambank and channel areas is 7,500 linear stream feet.

Construction-related disturbance of upland and wetland areas, or piling removal. The best available indicator for the extent of take caused due to construction-related disturbance of upland and wetland areas during off-and side-channel habitat restoration, set-back of existing berms, dikes and levees, streambank restoration, water control structure removal, and wetland restoration, and in-stream disturbance due to piling removal, is an increase in visible suspended sediment. This variable is proportional to the water quality impairment those actions will cause, including increased sediment, temperature, and contaminants, and reduced dissolved oxygen. NMFS assumes that an increase in sediment will be visible in the immediate vicinity of the action area and for a distance downstream, and the distance that increased sediment will be visible is proportionate both to the size of the disturbance and to the width of the wetted stream as follows (see Rosetta 2005), and whether the area is subject to tidal or coastal scour. Therefore, the extent of take for this category is as follows – a visible increase in suspended sediment up to 50 feet from the project area in streams that are 30 feet wide or less, up to 100 feet from the discharge point or nonpoint source of runoff for streams between 30 and 100 feet wide, up to 200 feet from the discharge point or nonpoint source for streams greater than 100 feet wide, or up to 300 feet from the discharge point or nonpoint source for areas subject to tidal or coastal scour.

Application of herbicides to control invasive and non-native plant species. Direct measurement of herbicide transport using the most commonly accepted method of residue analysis (*e.g.*, liquid chromatography–mass spectrometry; Pico *et al.* 2004) are burdensome and expensive for the type and scale of herbicide applications proposed. Thus, use of those measurements in this take statement as an extent of take indicator is likely to outweigh any benefits of using herbicide as a simple and economical restoration tool, and act as an insurmountable disincentive to their use for plant control under this Opinion. Further, the use of simpler, indirect methods, such as olfactometric tests, do not correlate well with measured levels of the airborne pesticides, and may raise ethical questions (Brown *et al.* 2000) that cannot be resolved in consultation. Therefore, the best available indicators for the extent of take due to the proposed application of herbicides within riparian areas are the extent of treated areas. As described above, total area proposed for herbicide application at all project sites is approximately 330 acres.

In summary, the best available indicators for amount and extent of take for these proposed actions are as follows. For actions that involve:

- ***Capture of juvenile fish during in-water work area isolation*** – the amount of take is 100 ESA-listed fish per project site for a total of 300 ESA-listed fish.
- ***Construction-related disturbance of streambank and channel*** – the extent of take indicator is 7,500 linear stream feet for all project sites.
- ***Construction-related disturbance of upland and wetland areas*** – the extent of take indicator is an increase of visible sediment beyond the discharge point or nonpoint source of runoff for two successive monitoring periods.
- ***Application of herbicide within the riparian area*** – the extent of take indicator is a treated area of up to 330 acres, prior to and annually for up to three years post construction at each project site.

The NMFS relied on the foregoing description of the proposed action, including all proposed design criteria, to complete this consultation. However, unforeseen occurrences or changed circumstances encountered while carrying out the proposed action may require a significant change in the proposed design, construction methods, or other on-the-ground practices. These changes may, in turn, result in effects of the action which exceed the amount or extent of taking specified in the incidental take statement or otherwise affect listed species or designated critical habitat in ways not previously considered.

Table 8. Extent of take indicators for UWR Chinook salmon for the proposed project.

Extent of Take Indicator	Amount or Extent
ESA-listed fish captured (number salvaged)	300
Visible suspended sediment (turbidity)	≥10% increase in natural stream turbidity
Streambank alteration (linear feet)	7,500
Herbicide application (acres)	330

2.8.2 Effect of the Take

In the accompanying biological opinion, NMFS determined that the take anticipated as a result of the proposed action is not likely to result in jeopardy to the species or adverse modification to designated critical habitat.

2.8.3 Reasonable and Prudent Measures and Terms and Conditions

"Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02). "Terms and conditions" implement the reasonable and prudent measures (50 CFR 402.14). These must be carried out for the exemption in section 7(o)(2) to apply. The Corps shall:

1. Minimize incidental take due to Willamette River floodplain restoration by ensuring that all actions use the conservation best management practices to avoid or minimize adverse effects to listed species or water quality, riparian habitat, or other aquatic components of critical habitat.

2. Ensure NMFS has opportunities for formal involvement in the pre-construction, engineering, and design (PED) phases of the project to allow for NMFS review and input into final project design.

3. Ensure completion of comprehensive monitoring and reporting of all actions carried out as part of the Willamette River Floodplain Restoration Project.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps, or any other party affected by these terms and conditions must comply with them to implement the reasonable and prudent measures (50 CFR 402.14). The Corps has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14).

If the following terms and conditions are not complied with, the protective coverage of section 7(o)(2) will likely lapse.

To implement reasonable and prudent measure #1 (conservation best management practices), the Corps shall ensure that:

1. Project Design.
   - a. Obtain all applicable regulatory permits and official project authorizations before beginning construction.
   - b. Minimize the extent and duration of earthwork, *e.g.*, compacting, dredging, drilling, excavation, and filling.
     - i. Avoid use of heavy equipment, vehicles or power tools below bankfull elevation unless project specialists determine such work is necessary, or would result in less risk of sedimentation or other ecological damage than work above that elevation.
     - ii. Complete earthwork in wetlands, riparian areas, and stream channels as quickly as possible.
   - c. Cease project operations when high flows may inundate the project area, except for efforts to avoid or minimize resource damage.

2. Site layout and flagging.
   - a. Before any significant ground disturbance or entry of mechanized equipment or vehicles into the construction area, clearly flag that area to identify:
     - i. Sensitive areas, *e.g.*, wetlands, water bodies, ordinary high water, spawning areas.
     - ii. Equipment entry and exit points.
     - iii. Road and stream crossing alignments.
     - iv. Staging, storage, and stockpile areas.
     - v. Before use of herbicides, clearly flag all buffer areas, including any no-application zones.

3. Staging, storage, and stockpile areas.
   - a. Designate and use staging areas to store hazardous materials, or to store, fuel, or service heavy equipment, vehicles and other power equipment with tanks larger than 5 gallons, that are at least 150 feet from any natural water body or wetland, or on an established paved area, such that sediment and other contaminants from the staging area cannot be deposited in the floodplain or stream.
   - b. Natural materials that are displaced by construction and reserved for restoration, *e.g.*, large wood, gravel, and boulders, may be stockpiled within the 100-year floodplain.
   - c. Dispose of any material not used in restoration and not native to the floodplain outside of the functional floodplain.

   d. After construction is complete, obliterate all staging, storage, or stockpile areas, stabilize the soil, and revegetate the area.[2]

4. Erosion control.
   a. Use site planning and site erosion control measures commensurate with the scope of the project to prevent erosion and sediment discharge from the project site.
   b. Before significant earthwork begins, install appropriate, temporary erosion controls downslope to prevent sediment deposition in the riparian area, wetlands, or water body.
   c. During construction, if eroded sediment appears likely to be deposited in the stream during construction, install additional sediment barriers as necessary.
   d. Temporary erosion control measures may include fiber wattles, silt fences, jute matting, wood fiber mulch and soil binder, or geotextiles and geosynthetic fabric.
   e. Soil stabilization using wood fiber mulch and tackifier (hydro-applied) may be used to reduce erosion of bare soil, if the materials are free of noxious weeds and nontoxic to aquatic and terrestrial animals, soil microorganisms, and vegetation.
   f. Remove sediment from erosion controls if it reaches 1/3 of the exposed height of the control.
   g. Whenever surface water is present, maintain a supply of sediment control materials and an oil-absorbing floating boom at the project site.
   h. Remove temporary erosion controls after construction is complete and the site is fully stabilized.

5. Hazardous material spill prevention and control.
   a. At the project site:
      i. Post written procedures for notifying environmental response agencies, including an inventory and description of all hazardous materials present, and the storage and handling procedures for their use.
      ii. Maintain a spill containment kit, with supplies and instructions for cleanup and disposal, adequate for the types and quantity of hazardous materials present.
      iii. Train workers in spill containment procedures, including the location and use of the spill containment kits.
      iv. Temporarily contain any waste liquids generated under an impervious cover, such as a tarpaulin, in the staging area until the wastes can be properly transported to, and disposed of, at an approved receiving facility.

6. Equipment, vehicles, and power tools.
   a. Select, operate and maintain all heavy equipment, vehicles, and power tools to minimize adverse effects on the environment, *e.g.*, low pressure tires, minimal hard-turn paths for track vehicles, use of temporary mats or plates to protect wet soils.

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[2] Road and path obliteration refers to the most comprehensive degree of decommissioning and involves decompacting the surface and ditch, pulling the fill material onto the running surface, and reshaping to match the original contour.

- b. Before entering wetlands or within 150 feet of a waterbody, replace all petroleum-based hydraulic fluids with biodegradable products.[3]
- c. Invasive species prevention and control.
    - i. Before entering the project site, power wash all heavy equipment, vehicles and power tools, allow them to fully dry, and inspect them to make certain no plants, soil, or other organic material adhering to the surface.
    - ii. Before entering the water, inspect any watercraft, waders, boots, or other gear to be used in or near water and remove any plants, soil, or other organic material adhering to the surface.
- d. Inspect all equipment, vehicles, and power tools for fluid leaks before they leave the staging area.
- e. Before operation within 150 feet of any waterbody , and as often as necessary during operation, thoroughly clean all equipment, vehicles, and power tools to keep them free of external fluids and grease and to prevent leaks and spills from entering the water.
- f. Generators, cranes or other stationary heavy equipment operated within 150 feet of any waterbody must be maintained and protected as necessary to prevent leaks and spills from entering the water.

7. Temporary access roads and paths.
    - a. Whenever reasonable, use existing access roads and paths preferentially.
    - b. Minimize the number and length of temporary access roads and paths through riparian areas and floodplains.
    - c. Minimize removal of riparian vegetation.
    - d. When it is necessary to remove vegetation, cut at ground level (no grubbing).
    - e. Do not build temporary access roads or paths where grade, soil, or other features suggest slope instability.
    - f. Any road on a slope steeper than 30% must be designed by a civil engineer with experience in steep road design.
    - g. After construction is complete, obliterate all temporary access roads and paths, stabilize the soil, and revegetate the area.
    - h. After construction is complete, obliterate all temporary access roads and paths, stabilize the soil, and revegetate the area.
    - i. Temporary roads and paths in wet areas or areas prone to flooding must be obliterated by the end of the in-water work window. Decompact road surfaces and drainage areas, pull fill material onto the running surface, and reshape to match the original contours.

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[3] For additional information and suppliers of biodegradable hydraulic fluids, motor oil, lubricant, or grease. See, Environmentally Acceptable Lubricants by the U.S. EPA (2011); *e.g.*, mineral oil, polyglycol, vegetable oil, synthetic ester; Mobil® biodegradable hydraulic oils, Total® hydraulic fluid, Terresolve Technologies Ltd.® bio-based biodegradable lubricants, Cougar Lubrication® 2XT Bio engine oil, Series 4300 Synthetic Bio-degradable Hydraulic Oil, 8060-2 Synthetic Bio-Degradable Grease No. 2, *etc.* The use of trade, firm, or corporation names in this opinion is for the information and convenience of the action agency and applicants and does not constitute an official endorsement or approval by the U.S. Department of Commerce or NMFS of any product or service to the exclusion of others that may be suitable

8. Dust abatement.
   - a. Employ dust abatement measures commensurate with soil type, equipment use, wind conditions, and the effects of other erosion control measures.
   - b. Sequence and schedule work to reduce the exposure of bare soil to wind erosion. c. Maintain spill containment supplies on-site whenever dust abatement chemicals are applied.
   - c. Do not use petroleum-based products.
   - d. Do not apply dust-abatement chemicals, e.g., magnesium chloride, calcium chloride salts, ligninsulfonate, within 25 feet of water or a stream channel.
   - e. Do not apply ligninsulfonate at rates exceeding 0.5 gallons per square yard of road surface, assuming a 50:50 solution of ligninsulfonate to water.
   - f. Do not apply dust abatement chemicals at stream crossings, within 25 feet of a water body, or in other areas where they may runoff directly into a wetland or water body.

9. Temporary stream crossings.
   - a. No stream crossing may occur at active spawning sites, when holding adult listed fish are present, or when eggs or alevins are in the gravel.
   - b. Do not place temporary crossings in areas that may increase the risk of channel re-routing or avulsion, or in potential spawning habitat, e.g., pools and pool tailouts.
   - c. Minimize the number of temporary stream crossings; use existing stream crossings whenever reasonable.
   - d. Install temporary bridges and culverts to allow for equipment and vehicle crossing over perennial streams during construction.
   - e. Wherever possible, vehicles and machinery must cross streams at right angles to the main channel.
   - f. Equipment and vehicles may cross the stream in the wet only where the streambed is bedrock, or where mats or off-site logs are placed in the stream and used as a crossing.
   - g. Obliterate all temporary stream crossings as soon as they are no longer needed, and restore any damage to affected stream banks or channel.

10. Surface water withdrawal and construction discharge water.
   - a. Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate.
   - b. Diversions may not exceed 10% of the available flow and must have a juvenile fish exclusion device that is consistent with NMFS's criteria (NMFS 2011e).
   - c. Treat all construction discharge water using the best management practices applicable to site conditions to remove debris, sediment, petroleum products, and any other pollutants likely to be present, (e.g., green concrete, contaminated water, silt, welding slag, sandblasting abrasive, grout cured less than 24 hours, drilling fluids) to ensure that no pollutants are discharged from the construction site.

11. Fish passage.
    a. Provide fish passage for any adult or juvenile ESA-listed fish likely to be present in the action area during construction, unless passage did not exist before construction or the stream is naturally impassable at the time of construction.
    b. The plan provides fish passage as part of the restoration action. The Corps should ensure the restoration functions year round and avoid stranding.

12. In-water work timing.
    a. Complete all work within the wetted channel during dates listed in the most recent version of Oregon Guidelines for Timing of In-water Work to Protect Fish and Wildlife Resources (ODFW 2008).
    b. Hydraulic and topographic measurements and placement of large wood or gravel may be completed anytime, provided the affected area is not occupied by adult fish congregating for spawning, or in an area where redds are occupied by eggs or pre-emergent alevins.

13. Work area isolation.
    a. Isolate any work area within the wetted channel from the active stream whenever ESA-listed fish are reasonably certain to be present, or if the work area is less than 300 feet upstream from known spawning habitats.
    b. Engineering design plans for work area isolation must include all isolation elements and fish release areas.
    c. Dewater the shortest linear extent of work area practicable, unless wetted in-stream work is deemed to be minimally harmful to fish, and is beneficial to other aquatic species.
    d. Use a coffer dam and a by-pass culvert or pipe, or a lined, non-erodible diversion ditch to divert flow around the dewatered area. Dissipate flow energy to prevent damage to riparian vegetation or stream channel and provide safe downstream reentry of fish, preferably into pool habitat with cover.
        i. Where gravity feed is not possible, pump water from the work site to avoid rewatering. Maintain a fish screen on the pump intake to avoid juvenile fish entrainment.
        ii. Pump seepage water to a temporary storage and treatment site, or into upland areas, to allow water to percolate through soil or to filter through vegetation before reentering the stream channel with a treatment system comprised of either a hay bale basin or other sediment control device.
        iii. Monitor below the construction site to prevent stranding of aquatic organisms.
        iv. When construction is complete, re-water the construction site slowly to prevent loss of surface flow downstream, and to prevent a sudden increase in stream turbidity.
        v. Whenever a pump is used to dewater the isolation area and ESA-listed fish may be present, a fish screen must be used that meets the most current version of NMFS's fish screen criteria (NMFS 2011e).

14. Fish capture.
    a. If practicable, allow listed fish species to migrate out of the work area or remove fish before dewatering; otherwise remove fish from an exclusion area as it is slowly dewatered with methods such as hand or dip-nets, seining, and trapping with minnow traps (or gee-minnow traps).
    b. Fish capture must be supervised by a qualified fisheries biologist, with experience in work area isolation and competent to ensure the safe handling of all fish.
    c. Conduct fish capture activities during periods of the day with the coolest air and water temperatures possible, normally early in the morning to minimize stress and injury of species present.
    d. Monitor the nets need to isolate a site frequently enough to ensure they stay secured to the banks and free of organic accumulation.
    e. Electrofishing may only be used only after other means of fish capture are determined to be not feasible or ineffective during the coolest time of day.
        i. Do not electrofish when the water appears turbid, *e.g.*, when objects are not visible at depth of 12 inches.
        ii. Do not intentionally contact fish with the anode.
        iii. Follow NMFS (2000) electrofishing guidelines, including use of only direct current (DC) or pulsed direct current within the following ranges:[4]
            1. If conductivity is less than 100 µs, use 900 to 1100 volts.
            2. If conductivity is between 100 to 300 µs, use 500 to 800 volts.
            3. If conductivity greater than 300 µs, use less than 400 volts.
        iv. Begin electrofishing with a minimum pulse width and recommended voltage, then gradually increase to the point where fish are immobilized.
        v. Immediately discontinue electrofishing if fish are killed or injured, *i.e.*, dark bands visible on the body, spinal deformations, significant de- scaling, torpid or inability to maintain upright attitude after sufficient recovery time. Recheck machine settings, water temperature and conductivity, and adjust or postpone procedures as necessary to reduce injuries.
    f. If buckets are used to transport fish
        i. Minimize the time fish are in a transport bucket.
        ii. Keep buckets in shaded areas or, if no shade is available, covered by a canopy.
        iii. Limit the number of fish within a bucket; fish will be of relatively comparable size to minimize predation.
        iv. Use aerators or replace the water in the buckets at least every 15 minutes with cold clear water.
        v. Release fish in an area upstream with adequate cover and flow refuge; downstream is acceptable provided the release site is below the influence of construction.
        vi. Be careful to avoid mortality counting errors.

15. Site restoration.

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[4] National Marine Fisheries Service. 200. Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act. Portland, Oregon and Santa Rosa California.

a. Restore any significant disturbance of riparian vegetation, soils, stream banks or stream channel.
b. Remove all project related waste; e.g., pick up trash, sweep roadways in the project area to avoid runoff-containing sediment, etc.
c. Obliterate all temporary access roads, crossings, and staging areas.
d. Loosen compacted areas of soil when necessary for revegetation or infiltration.

16. Revegetation.
    a. Plant and seed disturbed areas before or at the beginning of the first growing season after construction.
    b. Use species that will achieve shade and erosion control objectives, including forb, grass, shrub, or tree species that are appropriate for the site and native to the project area or region.
    c. Short-term stabilization measures may include use of non-native sterile seed mix if native seeds are not available, weed-free certified straw, jute matting, and similar methods.
    d. Do not apply surface fertilizer within 50 feet of any wetland of water body.
    e. Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
    f. Do not use invasive or non-native species for site restoration.
    g. Remove or control invasive plants until native plant species are well-established.

17. Invasive and non-native plant control.
    a. Non-herbicide methods. Limit vegetation removal and soil disturbance within the riparian zone by limiting the number of workers there to the minimum necessary to complete manual and mechanical plant control (e.g., hand pulling, clipping, stabbing, digging, brush-cutting, mulching or heating with radiant heat, pressurized hot water, or heated foam).
    b. Herbicide Label. Herbicide applicators must comply with all label instructions.
    c. Power equipment. Refuel gas-powered equipment with tanks larger than 5 gallons in a vehicle staging area placed 150 feet or more from any natural waterbody, or in an isolated hazard zone such as a paved parking lot.
    d. Maximum herbicide treatment area. For the total area treated with herbicides within riparian areas, do not exceed 330 acres.
    e. Herbicide applicator qualifications. Herbicides may only be applied only by an appropriately licensed applicator using an herbicide specifically targeted for a particular plant species that will cause the least impact.
    The applicator will be responsible for preparing and carrying out and the herbicide transportation and safely plan, as follows.
    f. Herbicide transportation and safety plan. The applicator will prepare and carry out an herbicide safety/spill response plan to reduce the likelihood of spills or misapplication, to take remedial actions in the event of spills, and to fully report the event.
    g. Herbicides. The only herbicides proposed for use under this opinion are (some common trade names are shown in parentheses):
        i. aquatic imazapyr (*e.g.*, Habitat)

  ii. aquatic glyphosate (*e.g.*, AquaMaster, AquaPro, Rodeo)
  iii. aquatic triclopyr-TEA (*e.g.*, Renovate 3)
  iv. chlorsulfuron (*e.g.*, Telar, Glean, Corsair)
  v. clopyralid (*e.g.*, Transline)
  vi. imazapic (*e.g.*, Plateau)
  vii. imazapyr (*e.g.*, Arsenal, Chopper).
  viii. metsulfuron-methyl (*e.g.*, Escort)
  ix. picloram (*e.g.*, Tordon)
  x. sethoxydim (*e.g.*, Poast, Vantage)
  xi. sulfometuron-methyl (*e.g.*, Oust, Oust XP)

h. Herbicide adjuvants. The only adjuvants proposed for use under this opinion are as follows, with mixing rates described in label instructions (Table 9). Polyethoxylated tallow amine (POEA) surfactant and herbicides that contain POEA (e.g., Roundup) will not be used.

Table 9. Herbicide adjuvants, trade names, and application areas.

Adjuvant Type	Trade Name	Application Area
Surfactants	Agri-Dex	Riparian
	LI 700	Riparian
Drift Retardants	41-A	Riparian
	Vale	Upland

i. Herbicide carriers. Herbicide carriers (solvents) are limited to water or specifically labeled vegetable oil. Use of diesel oil as an herbicide carrier is prohibited.

j. Herbicide mixing. Mix herbicides more than 150 feet from any natural waterbody to minimize the risk of an accidental discharge.

k. Dyes. Use a non-hazardous indicator dye (e.g., Hi-Light or Dynamark™) with herbicides within 100 feet of live water. The presence of dye makes it easier to see where the herbicide has been applied and where or whether it has dripped, spilled, or leaked. Dye also makes it easier to detect missed spots, avoid spraying a plant or area more than once, and minimize over-spraying (SERA 1997).

l. Spill Cleanup Kit. Provide a spill cleanup kit whenever herbicides are used, transported, or stored. At a minimum, cleanup kits will include, Material Safety Data Sheets, the herbicide label, emergency phone numbers, and absorbent material such as cat litter to contain spills.

m. Herbicide application rates. Apply herbicides will be applied at the lowest effective label rates.

n. Herbicide application methods. Apply liquid or granular forms of herbicides as follows:
  i. Broadcast spraying – hand held nozzles attached to back pack tanks or vehicles, or by using vehicle mounted booms.

ii. Spot spraying – hand held nozzles attached to back pack tanks or vehicles, hand-pumped spray, or squirt bottles to spray herbicide directly onto small patches or individual plants using.
iii. Hand/selective – wicking and wiping, basal bark, fill ("hack and squirt"), stem injection, cut-stump.
iv. Triclopyr – will not be applied by broadcast spraying.
v. Keep the spray nozzle within 4 feet of the ground; 6 feet for spot or patch spraying more than 15 feet of the high water mark (HWM) if needed to treat tall vegetation.
vi. Apply spray in swaths parallel towards the project area, away from the creek and desirable vegetation, *i.e.*, the person applying the spray will generally have their back to the creek or other sensitive resource.
vii. Avoid unnecessary run off during cut surface, basal bark, and hack-squirt/injection applications.

o. Washing spray tanks. Wash spray tanks 300 feet or more away from any surface water.

p. Minimization of herbicide drift and leaching. Minimize herbicide drift and leaching will as follows:

i. Do not spray when wind speeds exceed 10 miles per hour, or are less than 2 miles per hour.
ii. Be aware of wind directions and potential for herbicides to affect aquatic habitat area downwind.
iii. Keep boom or spray as low as possible to reduce wind effects.
iv. Increase spray droplet size whenever possible by decreasing spray pressure, using high flow rate nozzles, using water diluents instead of oil, and adding thickening agents.
v. Do not apply herbicides during temperature inversions, or when ground temperatures exceed 80 degrees Fahrenheit.
vi. Wind and other weather data will be monitored and reported for all broadcast applications.

q. Rain. Do not apply herbicides when the soil is saturated or when a precipitation event likely to produce direct runoff to salmon bearing waters from the treated area is forecasted by the NOAA National Weather Service or other similar forecasting service within 48 hours following application. Soil-activated herbicides may follow label instructions. Do not conduct hack-squirt/injection applications during periods of heavy rainfall.

r. Herbicide buffer distances. Observe the following no-application buffers, measured in feet and are based on herbicide formula, stream type, and application method, during herbicide applications (Table 10). Use the most conservative buffer for any herbicide included in a combination of approved herbicides. Buffer widths are in feet, measured as map distance perpendicular to the bankfull elevation for streams, the upland boundary for wetlands, or the upper bank for roadside ditches. Before herbicide application begins, flag or mark the upland boundary of each applicable herbicide buffer to ensure that all buffers are in place and functional during treatment.

Table 10. Herbicide buffer distances by herbicide formula, stream type, and application method.

Herbicide	No Application Buffer Width (feet)					
	Streams and Roadside Ditches with flowing or standing water present and Wetlands			Dry Streams, Roadside Ditches, and Wetlands		
	Broadcast Spraying	Spot Spraying	Hand Selective	Broadcast Spraying	Spot Spraying	Hand Selective
Labeled for Aquatic Use						
Aquatic Glyphosate	100	waterline	waterline	50	None	None
Aquatic Imazapyr	100	15	waterline	50	None	None
Aquatic Triclopyr-TEA	Not Allowed	15	waterline	Not Allowed	None	None
Low Risk to Aquatic Organisms						
Imazapic	100	15	bankfull elevation	50	None	None
Clopyralid	100	15	bankfull elevation	50	None	None
Metsulfuron-methyl	100	15	bankfull elevation	50	None	None
Moderate Risk to Aquatic Organisms						
Imazapyr	100	50	bankfull elevation	50	15	bankfull elevation
Sulfometuron-methyl	100	50	5	50	15	bankfull elevation
Chlorsulfuron	100	50	bankfull elevation	50	15	bankfull elevation
High Risk to Aquatic Organisms						
Picloram	100	50	50	100	50	50
Sethoxydim	100	50	50	100	50	50

18. Fish passage restoration: culvert replacement.
    a. This consultation does not include structures that use gabion baskets, sheet pile, concrete, articulated concrete block, cable anchors, or structures perpendicular to the channel, which disperse flows and can cause channel widening and thus structure "flanking" (erosion around the ends of the structure).
    b. When a permanent stream crossing is replaced to provide fish passage, the new crossing must provide for a fully functional floodplain as follows:
        i. Maintain a clear unobstructed opening above the general scour prism; streambank and channel stabilization may be applied below the general scour elevation.
        ii. For a single span structure, including culverts, the necessary opening is presumed to be 1.5 times the active channel width[5], or wider.

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[5] Active channel width means the stream width measured perpendicular to stream flow between the ordinary high water lines, or at the channel bankfull elevation if the ordinary high water lines are indeterminate. This width includes the cumulative active channel width of all individual side- and off-channel components of channels with braided and meandering forms, and measure outside the area influence of any existing stream crossing, *e.g.*, five to seven channel widths upstream and downstream.

    iii. Entrenched Streams: If a stream is entrenched (entrenchment ratio of less than 1.4), the culvert must be greater in width than the bankfull channel width, allow sufficient vertical clearance to allow ease of construction and maintenance activities, provide adequate room for the construction of natural channel banks, and be reviewed by NMFS for consistency with (NMFS 2011e).
    iv. For a multiple span structure, the necessary opening is presumed to be 2.2 times the active channel width, or wider, except for piers or interior bents.
    v. Install relief conduits, as necessary, within existing road fill at potential flood flow pathways based on analysis of flow patterns or floodplain topography.
    vi. Remove all other artificial constrictions within the functional floodplain that are not otherwise a component of the final design:
        1. Remove vacant bridge supports below total scour depth, unless the vacant support is part of the rehabilitated or replacement stream crossing.
        2. Remove existing roadway fill, embankment fill, approach fill, or other fill.
  c. Reshape exposed floodplains and streambanks to match upstream and downstream conditions.

19. Large wood placement.[6]
  a. Place large wood in areas where it would naturally occur and in a manner that closely mimic natural accumulations for that particular stream type.
  b. Stabilizing or key pieces of large wood that will be relied on to provide streambank stability or redirect flows must be intact, hard, and undecayed to partly decaying, and should have untrimmed root wads to provide functional refugia habitat for fish.
  c. Use of decayed or fragmented wood found lying on the ground or partially sunken in the ground is not acceptable.
  d. Anchoring alternatives may be used in preferential order: 1) use of adequate sized wood sufficient for stability; 2) orient and place wood in such a way that movement is limited; 3) ballast (gravel and/or rock) to increase the mass of the structure to resist movement; 4) use large boulders as anchor points for the large wood.

20. Off- or side-channel habitat restoration.[7]
  a. The Corps will provide preliminary and final designs for off- or side-channel habitat restoration to NMFS for review and assurance that they are consistent with the safe egress and other parameters identified in the NMFS "Anadromous Fish Passage Criteria" (NMFS 2008, or most recent version) and verify that the

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[6] For additional information on selection of large wood for restoration actions, see stream slope and width dimensions and minimum large wood piece diameters described in Figure 1 in the most recent version of ODF and ODFW (1995), and for anchoring and placement, see Cramer *et al.* (2003).

[7] For additional information on methods and design considerations for off- and side-channel habitat restoration, see "side channel/off-channel habitat restoration" in Cramer (2012).

assumptions used to determine the amount or extent of take to ESA-listed species remain valid.

b. Reconnection of historical off- and side-channels habitats that have been blocked includes the removal of plugs, which impede water movement through off- and side-channels, and excavation within historical channels that does not exceed the thalweg depth in the main channel. The purpose of the additional sediment removal is to provide unimpeded flow through the side-channel to minimize fish entrapment.

c. Excavated material removed from off- or side-channels shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.

21. Gravel pit connection.
    a. The Corps will provide preliminary and final designs for gravel pit reconnection to NMFS for review and assurance that they are consistent with the safe egress and other parameters identified in the NMFS "Anadromous Fish Passage Criteria" (NMFS 2008, or most recent version) and verify that the assumptions used to determine the amount or extent of take to ESA-listed species remain valid.
    b. It is recommended that the Corps manage flows from upstream dams along with the timing of inundation in the pits to avoid incision, undercutting banks, and channel widening by determining the rate of fill in the smaller pits proposed for near term connection during different flow events and designing future pit reconnections to minimize the trapping effect, using onsite material and natural fluvial processes timeframes to restrict large scale disruption of upstream and downstream functional habitat features.

22. Set-back existing berm, dike, or levee.[8]
    a. To the greatest degree possible, non-native fill material, originating from outside the floodplain of the action area will be removed from the floodplain to an upland site.
    b. Where it is not possible to remove or set-back all portions of dikes and berms, or in areas where existing berms, dikes, and levees support abundant riparian vegetation, openings will be created with breaches.
        i. Breaches shall be equal to or greater than the active channel width.
        ii. In addition to other breaches, the berm, dike, or levee shall always be breached at the downstream end of the project and/or at the lowest elevation of the floodplain to ensure the flows will naturally recede back into the main channel, thus minimizing fish entrapment.
        iii. When necessary, loosen compacted soils once overburden material is removed.
    c. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain to create set-back dikes and fill anthropogenic holes provided that does not impede floodplain function.

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[8] For additional information on methods and design considerations for levee removal and modification, see "levee removal and modification" in Cramer (2012).

23. Streambank restoration.[9]
   a. Without changing the location of the bank toe, restore damaged streambanks to a natural slope, pattern, and profile suitable for establishment of permanent woody vegetation.
   b. Complete all soil reinforcement earthwork and excavation in the dry. Use soil layers or lifts that are strengthened with biodegradable fabrics and penetrable by plant roots.
   c. Include large wood in each streambank restoration action to the maximum extent feasible. Large wood must be intact, hard, and undecayed to partly decaying, and should have untrimmed root wads to provide functional refugia habitat for fish. Use of decayed or fragmented wood found lying on the ground or partially sunken in the ground is not acceptable. Wood that is already within the stream or suspended over the stream may be repositioned to allow for greater interaction with the stream.
   d. Rock may not be used for streambank restoration, except as ballast to stabilize large wood.
   e. Use of a diverse assemblage of species native to the action area or region, including trees, shrubs, and herbaceous species. Do not use noxious or invasive species.
   f. Do not apply surface fertilizer within 50 feet of any stream.
   g. Install fencing as necessary to prevent access to revegetated sites by unauthorized persons.

24. Wetland restoration.
   a. The Corps will include these applicable general construction measures and PDC for specific types of actions as applicable to ensure that all adverse effects to fish and their designated critical habitats are within the range of effects considered in this opinion.
   b. The Corps will also complete and record the following water quality observations to ensure that any increase in turbidity is not exceeding this limit:
      i. Take a turbidity sample using an appropriately and regularly calibrated turbidimeter, or a visual turbidity observation, every four hours when work is being completed, or more often as necessary to ensure that the in-water work area is not contributing visible sediment to water, at a relatively undisturbed area approximately 100 feet upstream from the project area, or 300 feet from the project area if subject to tidal or coastal scour. Record the observation, location, and time before monitoring at the downstream point.
      ii. Take a second visual observation, immediately after each upstream observation, approximately 50 feet downstream from the project area in streams that are 30 feet wide or less, 100 feet from the project area for streams between 30 and 100 feet wide, 200 feet from the discharge point or nonpoint source for streams greater than 100 feet wide, and 300 feet from the discharge

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[9] For additional information on methods and design for bank shaping; installation of coir logs and soil reinforcements; anchoring and placement of large wood; woody plantings; and herbaceous cover, see Cramer *et al.* (2003), and "riparian restoration and management" in Cramer (2012).

point or nonpoint source for areas subject to tidal or coastal scour. Record the downstream observation, location, and time.

iii. Compare the upstream and downstream observations - if more turbidity or pollutants are visible downstream than upstream, the activity must be modified to reduce pollution and continue to monitor every four hours, or more often as necessary.

iv. If the exceedance continues after the second monitoring interval, the activity must stop until the pollutant level returns to background.

v. If monitoring or inspections show that the pollution controls are ineffective, immediately mobilize work crews to repair, replace, or reinforce controls as necessary.

To implement reasonable and prudent measure #2 (NMFS involvement in the pre-construction, engineering, and design phase), the Corps shall:

1. Notify NMFS within 90 days of execution of the pre-construction, engineering, and design phase (PED) agreement and invite NMFS staff to participate in design development.
2. As part of design development, the Corps and NMFS will mutually agree on:
   a. Frequency and timing of involvement in development of project designs.
   b. Timing of delivery and review of draft project designs related to NMFS fish passage criteria (NMFS 2011).
3. For all projects undertaken pursuant to the proposed action, the Corps will provide (at least 60 days before construction) site plans and other pertinent information to NMFS for review and concurrence as to the consistency of the action with this Opinion. NMFS will provide their concurrence or non-concurrence within 30 days of receipt of the Corps site plans and other information.

To implement reasonable and prudent measure #3 (monitoring and reporting), the Corps shall prepare and submit the following information to NMFS:

1. A fish salvage report within 10-days of completion of fish salvage operations with the following information:
   a. Date(s) and time(s) of fish salvage operations
   b. Water and air temperature(s)
   c. Name, address, and telephone number of supervisory fish biologist
   d. Description of methods used to isolate the work area and remove fish
   e. Number of individual fish, by species, that were handled, injured, or killed
2. A Project Completion report (within 60 days of completion) that includes the following information:
   a. Start and end dates for in-water work
   b. Actual linear feet of riparian and/or channel modification
   c. Actual acreage of herbicide treatment and type(s) of herbicide used
   d. Results of turbidity monitoring and sampling
   e. Photos of habitat conditions before, during, and after action completion
   f. A summary of the results of pollution and erosion control inspections, including any erosion control failure, contaminant release, and corrective effort

   g. Records of turbidity monitoring (visual or by turbidimeter) including dates, times, and locations of monitoring. Include any exceedances and steps taken to reduce turbidity observed.
3. To submit monitoring reports or to reinitiate consultation contact:

   Oregon State Habitat Office
   National Marine Fisheries Service
   Attn: NWR-2012-9318
   1201 NE Lloyd Blvd., #1100
   Portland, OR 97232-2182

2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). The following conservation recommendation is a discretionary measure that NMFS believes is consistent with this obligation and therefore should be carried out by the Corps:

1. The effectiveness of some types of stream restoration actions are not well documented, partly because decisions about which restoration actions deserve support do not always address the underlying processes that led to habitat loss. NMFS recommends that the Corps encourage cost-share partners to use species' recovery plans to help ensure that their actions will address those underlying processes that limit fish recovery.
2. It is recommended that the Corps monitor reconnected gravel pits for a minimum of five years to determine:
   a. Seasonal habitat dynamics within the reconnected pits
   b. The size and growth rate of juvenile salmon
   c. The risk of juvenile salmon becoming stranded or isolated
   d. The vulnerability of juvenile salmon to predation
   e. Predator consumption rates of salmon
   f. Seasonal predator population dynamics, (i.e., which predator species occur where and when, and primary prey in those locations);
   g. The overlap between predator population dynamics and salmon life history
   h. Whether the benefit to salmon population growth provided by the off-channel habitat is outweighed by the increased predation risk from warm water predators that will also occur in those habitats.
3. The Corps should manage flows from upstream dams along with the timing of inundation in the pits to avoid incision, undercutting banks, and channel widening by determining the rate of fill in the smaller pits proposed for near term connection during different flow events and designing future pit reconnections to minimize the trapping effect, using onsite material and natural fluvial processes timeframes to restrict large scale disruption of upstream and downstream functional habitat features

Please notify NMFS if the Corps carries out these recommendations so that we will be kept informed of actions that minimize or avoid adverse effects and those that benefit the listed species or their designated critical habitats.

2.10 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to NMFS No.:
NWR-2012-9318

June 19, 2013

Joyce Casey, Chief
Environmental Resources Branch
Planning, Programs and Project Management Division
U.S. Army Corps of Engineers, Portland District
Attn: CENWP-PM-E/Greg Smith
P.O. Box 2946
Portland, Oregon 97208-2946

Re: Endangered Species Act Section 7 Programmatic Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the US Army Corps of Engineers Willamette River Floodplain Restoration Study, Coast and Middle Fork Willamette Rivers (HUCs 170900011003 and 1709000205), Lane County, Oregon (Corps No.: NWP-PM-E-13-05).

Dear Ms. Casey:

The enclosed document contains a biological opinion (opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the proposal by the U.S. Army Corps of Engineers to authorize actions in the Willamette River Floodplain Restoration Study under the Water Resources Development Act.

In this opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Upper Willamette River (UWR) spring-run Chinook salmon (*Oncorhynchus tshawytscha*) or result in the destruction or adverse modification of critical habitat designated for this species.

As required by section 7 of the ESA, NMFS is providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements, that the Federal action agency must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes three conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. One of these conservation recommendations is identical to the ESA take statement's terms and conditions.

Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations. If the response is inconsistent with the EFH conservation recommendations, the Federal action agency must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

Please direct questions regarding this opinion to Anne Mullan, in the Oregon State Habitat Office at (503) 231-6267.

Sincerely,

William W. Stelle, Jr.
Regional Administrator

cc: Teena Monical, USACE

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation

US Army Corps of Engineers
Willamette River Floodplain Restoration Study
Coast and Middle Fork Willamette Rivers
(HUCs 170900011003 and 170900020405)
Lane County, Oregon
Corps No.: NWP-PM-E-13-05).

NMFS Consultation Number: NWR-2012-9318

Action Agency: U.S. Army Corps of Engineers

Affected Species and Determinations:

<table>
<tr><th>ESA-Listed Species</th><th>Status</th><th>Is Action Likely to Adversely Affect Species or Critical Habitat?</th><th>Is Action Likely To Jeopardize the Species?</th><th>Is Action Likely To Destroy or Adversely Modify Critical Habitat?</th></tr>
<tr><td>Upper Willamette River Chinook salmon (<i>Oncorhynchus tshawytscha</i>)</td><td>Threatened</td><td>Yes</td><td>No</td><td>No</td></tr>
<tr><th>Fishery Management Plan That Describes EFH in the Project Area</th><th colspan="2">Does Action Have an Adverse Effect on EFH?</th><th colspan="2">Are EFH Conservation Recommendations Provided?</th></tr>
<tr><td>Pacific Coast Salmon</td><td colspan="2">Yes</td><td colspan="2">Yes</td></tr>
</table>

Consultation Conducted By: National Marine Fisheries Service, Northwest Region

Issued By:

William W. Stelle, Jr.
Regional Administrator

Date: June 19, 2013

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation

US Army Corps of Engineers
Willamette River Floodplain Restoration Study
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LIST OF ACRONYMS

BA	Biological Assessment
BMP	Best Management Practice
CFR	Code of Federal Regulations
CHART	Critical Habitat Analytical Review Team
EFH	Essential Fish Habitat
ELJ	Engineered log jam
ESA	Endangered Species Act
FR	Federal Register
HUC	Hydraulic Unit Code
LCR	Lower Columbia River
MSA	Magnuson Stevens Act
NMFS	National Marine Fisheries Service
OHW	Ordinary High Water
PCE	Primary constituent element
RM	River Mile
RPM	Reasonable and prudent measure
TRT	Technical Review Team
U.S.C.	United States Code
UWR	Upper Willamette River
VSP	Viable Salmonid Population
WLC	Willamette/Lower Columbia

1. INTRODUCTION

This Introduction Section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, *et seq.*), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801, *et seq.*) and implementing regulations at 50 CFR 600.

The opinion and EFH conservation recommendations are each in compliance with the Data Quality Act (44 U.S.C. 3504(d)(1) *et seq.*) and they underwent pre-dissemination review.

1.2 Consultation History

Early coordination and pre-consultation with NMFS and other agencies included review of the draft Willamette River Floodplain Restoration Study beginning in 2010. NMFS met with Chris Budai (U.S. Army Corps of Engineers (Corps)) to provide comments on the draft in January, 2011. On October 22, 2012, NMFS received a request for ESA section 7 and MSA section 305(b) consultation from the Corps to authorize the Willamette River Floodplain Restoration Study under section 905b of the Water Resources Development Act (WRDA). On March 11, 2013, NMFS received the December 2012 revised BA with the final sites selected for the Willamette River Floodplain Restoration Study, a Draft Monitoring and Adaptive Management Plan, and the Hydraulic/Geomorphic Sections from the Draft Feasibility Study. Final designs for the actions will be provided after authorization.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. For purposes of this consultation, the proposed action is a plan to restore natural floodplain functions and fish and wildlife habitats along the Lower Coast and Middle Forks of the Willamette River. The proposed action location includes five floodplain restoration project sites totaling approximately 570 acres, located within the 100-year floodplains of the Coast and Middle Forks of the Willamette River (Figure 1).The Corps is proposing to use the Willamette River Floodplain Restoration Study to authorize design and implementation of seven categories of actions related to aquatic habitat restoration. Those categories are:

1. Fish Passage
2. Set-Back or Remove Existing Berms, Dikes and Levees
3. Gravel Pit Connection
4. Channel Reconstruction/Relocation
5. Large Wood and Gravel Placement
6. Road Obliteration and Pathways Modification
7. Monitoring and Adaptive Management

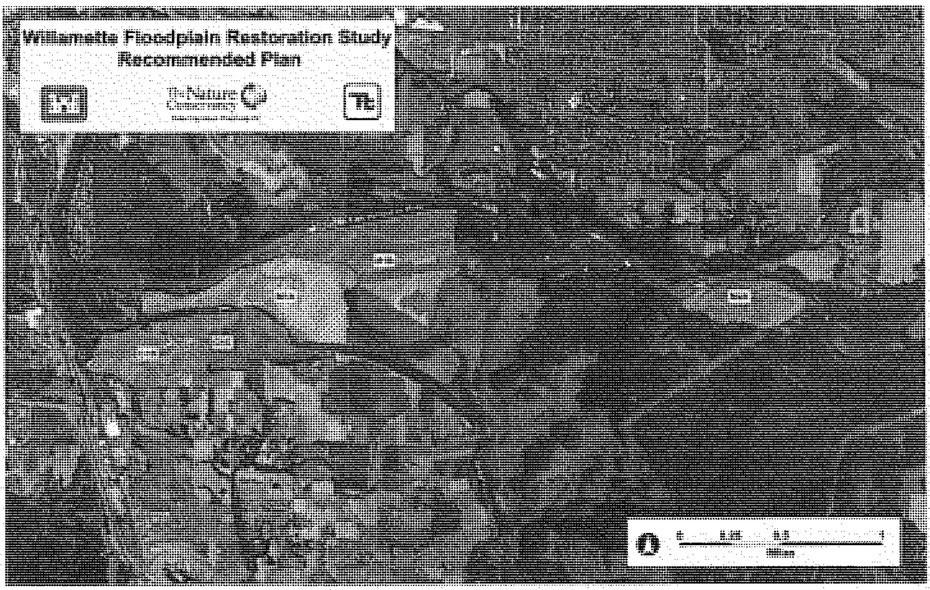

Figure 1 Floodplain restoration areas proposed for Coast Fork (labeled C1B and C1C) and Middle Fork (labeled M1A, M1B, M2A) near the confluence with the Willamette River.

Following WRDA authorization, the Corps will develop final designs for the projects. The individual projects could include elements from the following list (as per the Corps):

1. **Fish Passage**
   a. Using NMFS's fish passage criteria (NMFS 2011a) for Stream Simulation Culvert and Bridge Projects, provide passage for any adult or juvenile fish

likely to be present in the action area after construction for the life of any structure. If stream isolation and dewatering is required during project implementation, provide passage for any adult or juvenile fish likely to be present in the action area, unless passage did not exist before construction, or where the reach is naturally impassible at the time of construction.

b. Design culverts to pass 100 year events without a hydraulic drop through the culvert.
c. Open bottom culverts will be sized to provide room for the channel to meander.
d. NMFS fish passage review and approval – If the structure width is determined to be less than the established width criteria as defined above, a variance will be requested from NMFS for consistency with criteria.

2. **Set-back or Removal of Existing Berms, Dikes, and Levees** will reconnect historic stream channels with floodplains, augment low flows, allow sediment and debris deposition, and develop side channels and alcoves.
    a. Design actions to restore floodplain characteristics—elevation, width, gradient, length, and roughness—in a manner that closely mimics, to the extent possible, those that would naturally occur.
        i. Where it is not possible to remove or set-back all portions of dikes and berms, openings will be created with breaches. In addition to other breaches, the berm, dike, or levee shall always be breached at the downstream end of the project or at the lowest elevation of the floodplain to ensure the flows will naturally recede back into the main channel thus minimizing fish entrapment.
        ii. Elevations of dike/levee replacements shall not exceed the elevation of removed structures.
        iii. When necessary, loosen compacted soils once overburden material is removed. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain to create set-back dikes provided that floodplain function is not impeded.
    b. Equipment such as excavators, bulldozers, dump trucks, and front-end loaders, will be used to implement projects.

3. **Connect gravel pits/ ponds** where appropriate following completed designs which demonstrate limited risk to infrastructure, riparian areas, and fluvial processes providing habitat elements in the existing channel.
    a. Bank reshaping by excavating the upper portion to a 5:1 (Horizontal:Vertical) or less steep slope.
    b. Bank material and other regraded material will be pushed into the ponds to create shallow water and wetland habitats.
    c. For one existing large revetment of concrete debris and rock, which separates the largest mined pond from the river, partially remove and replace with wood and rock. Remove existing concrete and debris using

excavators, dump trucks, small equipment and hand labor. Dispose of concrete or recycle off-site.

- d. Provide sufficient grade control at the entry points to avoid headcutting.
- e. Provide fish assemblage and temperature data for review process to determine appropriate methods and locations for reconnection.

4. **Side channel construction**
    - a. Channel bed material, bank stabilization, streambank vegetation restoration, and riparian vegetation restoration will be used to stabilize new channels.
    - b. Bed material, a well graded mix of fine material and gravel and cobbles, will either be imported from off-site sources or from suitable material on-site.
    - c. Channel invert grades will be designed to provide a backwater connection during the typical winter/spring flows (November to June) to avoid grade control measures.
    - d. Bank stabilization will use vegetation, large woody debris and root wads, and fabric as necessary. Plant native vegetation species. Hydraulic excavators, dozers, front end loaders and dump trucks will excavate materials to be placed on-site where beneficial, or disposed of at off-site locations. Excavations that are in or adjacent to water will require individual design review, and use of temporary coffer dams and in some cases, pumping water around construction.

5. **Place large wood (LW) and construct engineered log jams (ELJs)**
    - a. Stabilizing or key pieces of LW must be intact, hard, with little decay, and generally have root wads (untrimmed) to provide functional refugia habitat for fish. Orient key pieces such that the hydraulic forces upon the LW increases stability
    - b. Anchoring LW – Anchoring alternatives may be used in preferential order:[1]
        1. Use of adequate sized wood sufficient for stability
        2. Orient and place wood in such a way that movement is limited
        3. Ballast (gravel or rock) to increase the mass of the structure to resist movement
        4. Use of large boulders as anchor points for the LW
        5. Pinning may be used to anchor the wood to piles.
    - c. Excavate to install key ELJ pieces and drive wooden piles for support.
    - d. Install LW during low flows (within in-water work windows) using excavators, cranes, helicopters, and hand labor, as appropriate. Isolate the work sites as much as feasible using coffer dams and/or silt curtains and dewatered if feasible to facilitate construction. Provide access to islands by temporary bridges or dewatering of side channels via coffer dams and pumping.

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[1] Anchoring LW with cables is not included in this opinion.

- e. Large wood placed in vegetated floodplain areas will not be anchored, and will be installed in well vegetated areas, particularly floodplain forested areas.
- f. Rootwads and large woody debris, cut to specified dimensions, will be obtained from a local source. The rootwads will be placed using an excavator, dump truck, small equipment, and hand labor. Large woody debris will be placed using small equipment and hand labor.

6. **Modify paths and decommission roads**
   - a. Pedestrian Bridges are proposed to be designed only where needed to maintain the existing pedestrian access at two sites, and will use prefabricated pedestrian bridges to cross current or newly constructed channels.
   - b. Use front end loaders and dump trucks to excavating road surface compacted rock, and ripping the soil to facilitate planting of native vegetation in its place. The road bed will be replaced with topsoil using dump trucks and front end loaders, and will be revegetated.

7. **Monitor channel change, temperature and fish assemblages**
   - a. Sampling will occur during the connection period. All fish species collected will be identified and measured for length.
   - b. Researchers will employ hoop traps, seines, and/or backpack electrofishers to document stranding of ESA listed fish species at different flows. This information will be used to aid in the design, construction, maintenance, and operation of the restoration habitats.
   - c. To minimize take, any traps used will be checked daily to avoid overcrowding, predation, or elevated stress in the species present. Equipment will be placed into habitat to avoid injuring fish species. Captured fish will be immediately replaced into suitable habitat after processing. Monitoring will be conducted by trained individuals or under the supervision of experts. Sampling gear will be well maintained.
   - d. Install recording temperature gages in all locations where fish are surveyed to document water quality conditions and potential suitability of habitat for native fish use. Maintain year-round for first ten years following construction.
   - e. Following the Monitoring and Adaptive Management draft plan (Tetra Tech 2013), extensions of the above restoration actions will be reviewed for effectiveness (e.g. installation of large wood to promote scour or reduce channel velocities via increased roughness, additional excavation if frequency targets are not met).

Conservation Measures

As specified in the Biological Assessment (BA), the SLOPES Biological Opinion construction design criteria will be followed:

> All restoration actions implemented as part of this plan will be conducted using appropriate conservation measures and best management practices (BMPs) to avoid and minimize any adverse effects during construction. There are likely to be temporary adverse effects during construction, thus conservation measures including appropriate provisions of the Standard Local Operating Procedures for Endangered Species to Administer Stream Restoration and Fish Passage Improvement Actions Authorized or Carried out by the U.S. Army Corps of Engineers in Oregon (SLOPES IV Restoration) have been proposed to avoid and minimize effects.

1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

For this consultation, the action area includes a portion of Coast and Middle Forks of the Willamette River, specifically from river miles 188 to 191.5 on the Middle Fork, and river miles 0.5 to 1.5 on the Coast Fork. Five floodplain project sites where restoration actions are proposed are shown in Figure 1 as C1B, C1C, M1A, M1B, and M2A, and below in the overview map from the BA (Figure 2).

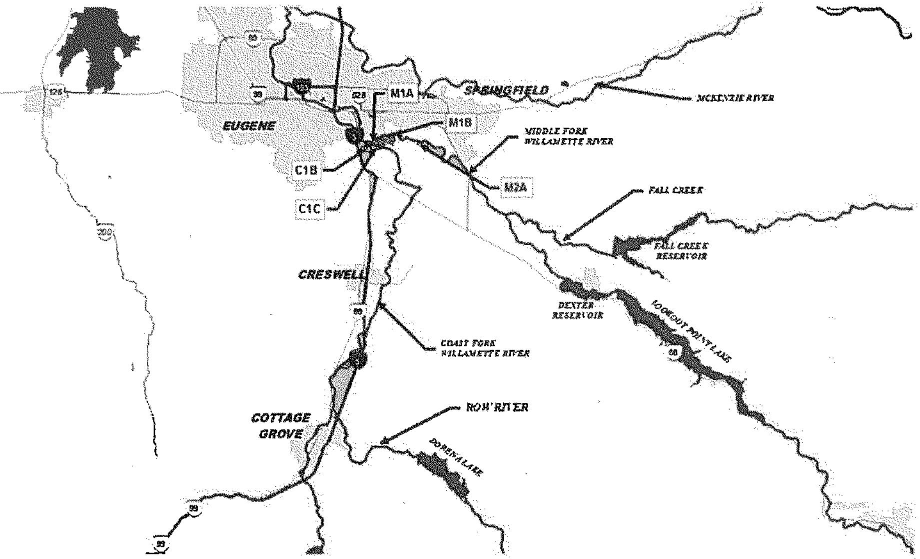

Figure 2. Project Area Map.

Excerpts of the individual proposed restoration area descriptions from the BA follow. For all but the first (C1B), the property was owned by the Wildish Gravel Mining company. As part of the Bonneville Power Association implementation of the Willamette Project Biological Opinion RPA 7.1.3 (NMFS 2008a, BPA 2010), The Nature Conservancy was deeded the parcels in 2010. BPA holds the permanent conservation easement on these parcels.

Site C1B. This site is located on the south bank of the Coast Fork Willamette River near river mile (RM) 0.5 and encompasses 90 acres. The site has been gravel mined in the past but is not currently mined and is used informally for public access and use. The site is within the 100-year floodplain and the majority of the site is within the designated floodway. The site has been highly disturbed and left fallow.

Site C1C. This site is located on the south bank of the Coast Fork Willamette River near RM 1.2 and encompasses 80 acres. There is existing gravel road access to the site from Seavey Loop Road and multiple gravel roads all over the site. The majority of the site is within the 100-year floodplain and the designated floodway. Much of the upland area is bare ground in gravel roads and access routes for gravel mining. Riprap and debris such as used concrete is present along the river bank in many areas. The gravel mined ponds are typically fairly shallow on this site (less than 10 feet deep), with steep banks dominated by invasive species. Numerous aquatic plants are also present. Several high flow channels are present on this site that allow connections between some of the ponds and the Coast Fork on an approximately annual basis.

Site M1A. This site is located between the Coast Fork and the Middle Fork of the Willamette River near RM 188, and encompasses 150 acres. Access is available to the site via a gravel road from Seavey Loop Road and Site C1C. The property was owned by Wildish Land Company and used for gravel mining in the past. Riprap and debris such as concrete is present along the river bank in many areas. The gravel mined ponds are typically fairly shallow on this site, with steep banks dominated by invasive species. Numerous aquatic plants are also present.

Site M1B. This site is located on the left bank of the Middle Fork Willamette River near RM 189 and encompasses 174 acres. The site is accessible via gravel roads from Seavey Loop Road (via Site C1C) or from the Buford Access Road through Buford/Mt. Pisgah County Recreation Area. The majority of the site is within the 100-year floodplain and the designated floodway. This site has two very large gravel ponds, including one that extends for nearly one mile parallel with the Middle Fork. This pond was formerly part of the river channel, but was separated via a pushed up gravel/rock berm as restrictions on mining in the river became effective in the 1970s and 1980s. The ponds on this site are the deepest, up to around 20 feet depth. Much of the upland area is bare ground in gravel roads and access routes for gravel mining. Riprap and debris such as used concrete is present along the river bank in many areas. Few aquatic plants are present due to the depth and steepness of the pond banks.

Site M2A. This site is located on the left bank of the Middle Fork Willamette River near RM 191 and encompasses 78 acres. The site is accessible via gravel roads from Buford Access Road through Site M1B. The majority of the site is within the 100-year floodplain and the designated floodway. This site is primarily forested and has shallower ponds with connection to Pudding Creek and occasional river backwatering. Salmonids can access Pudding Creek during winter when the river or creek levels are high enough to connect over the roadway (more frequent than annual connection). An existing culvert intended to pass Pudding Creek under the gravel roadway on the site does not really pass flow or fish, and the creek typically flows out over the road.

2. ENDANGERED SPECIES ACT: BIOLOGICAL AND CONFERENCE OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with the United States Fish and Wildlife Service, NMFS, or both, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. Section 7(b)(3) requires that at the conclusion of consultation, the Service provide an opinion stating how the agencies' actions will affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires the consulting agency to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes reasonable and prudent measures to minimize such impacts.

2.1 Approach to the Analysis

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. The jeopardy analysis considers both survival and recovery of the species. The adverse modification analysis considers the impacts on the conservation value of designated critical habitat.

"To jeopardize the continued existence of a listed species" means to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02).

This opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[2]

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[2] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources,

We will use the following approach to determine whether the proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.
- If necessary, define a reasonable and prudent alternative to the proposed action.

2.2`Rangewide Status of the Species and Critical Habitat

One factor affecting the status of salmonid fishes and aquatic habitat at large is climate change. Climate change is likely to play an increasingly important role in determining the abundance of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. Areas with elevations high enough to maintain temperatures well below freezing for most of the winter and early-spring will be less affected. Low-elevation areas are likely to be more affected.

During the last century, average regional air temperatures increased by 1.5°F, and increased up to 4°F in some areas. Warming is likely to continue during the next century as average temperatures increase another 3 to 10°F. Overall, about one-third of the current cold-water fish habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (USGCRP 2009).

Precipitation trends during the next century are less certain than for temperature but more precipitation is likely to occur during October through March and less during summer months, and more of the winter precipitation is likely to fall as rain rather than snow (ISAB 2007; USGCRP 2009). Where snow occurs, a warmer climate will cause earlier runoff so stream flows in late spring, summer, and fall will be lower and water temperatures will be warmer (ISAB 2007; USGCRP 2009).

Higher winter stream flows increase the risk that winter floods in sensitive watersheds will damage spawning redds and wash away incubating eggs. Earlier peak stream flows will also flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and the risk of predation. Lower stream flows and warmer water temperatures during summer will degrade summer rearing conditions, in part by increasing the prevalence and virulence of fish diseases and parasites (USGCRP 2009). Other adverse effects are likely to include altered migration patterns, accelerated

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NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

embryo development, premature emergence of fry, variation in quality and quantity of tributary rearing habitat, and increased competition and predation risk from warm-water, non-native species (ISAB 2007).

The earth's oceans are also warming, with considerable interannual and inter-decadal variability superimposed on the longer-term trend (Bindoff *et al.* 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances (Scheuerell and Williams 2005; USGCRP 2009; Zabel *et al.* 2006). Ocean conditions adverse to salmon and steelhead may be more likely under a warming climate (Zabel *et al.* 2006).

2.2.1 Status of Listed Species

For Pacific salmon, and other relevant species NMFS commonly uses four parameters to assess the viability of the populations that, together, constitute the species: spatial structure, diversity, abundance, and productivity (McElhany *et al.* 2000). These "viable salmonid population" (VSP) criteria therefore encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout a species' entire life cycle, and these characteristics, in turn, are influenced by habitat and other environmental conditions.

"Spatial structure" refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends fundamentally on habitat quality and spatial configuration and the dynamics and dispersal characteristics of individuals in the population.

"Diversity" refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation at single genes to complex life history traits (McElhany *et al.* 2000).

"Abundance" generally refers to the number of naturally-produced adults (*i.e.*, the progeny of naturally-spawning parents) in the natural environment (*e.g.*, on spawning grounds).

"Productivity," as applied to viability factors, refers to the entire life cycle; *i.e.*, the number of naturally-spawning adults produced per parent. When progeny replace or exceed the number of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany *et al.* (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance," which is the manifestation of long-term population growth rate.

For species with multiple populations, once the biological status of a species' populations has been determined, NMFS assesses the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance documents from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany *et al.* 2000).

The summaries that follow describe the status of the ESA-listed species, and their designated critical habitats, that occur within the geographic area of this proposed action and are considered in this opinion. More detailed information on the status and trends of these listed resources, and their biology and ecology, are in the listing regulations and critical habitat designations published in the Federal Register (Table 1).

Table 1. Listing status, status of critical habitat designations and protective regulations, and relevant Federal Register (FR) decision notices for ESA-listed species considered in this opinion. Listing status: 'T' means listed as threatened under the ESA.

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon *(Oncorhynchus tshawytscha)*			
Upper Willamette River spring-run	T 6/28/05; 70 FR 37160	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

For each recovery domain, a technical review team (TRT) appointed by NMFS has developed, or is developing, criteria necessary to identify independent populations within each species, recommended viability criteria for those species, and descriptions of factors that limit species survival. Viability criteria are prescriptions of the biological conditions for populations, biogeographic strata, and evolutionarily significant units (ESU) that, if met, would indicate that an ESU will have a negligible risk of extinction over a 100-year time frame.[3]

Although the TRTs operated from the common set of biological principals described in McElhany *et al.* (2000), they worked semi-independently from each other and developed

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[3] For Pacific salmon, NMFS uses its 1991 ESU policy, that states that a population or group of populations will be considered a Distinct Population Segment if it is an Evolutionarily Significant Unit. An ESU represents a distinct population segment of Pacific salmon under the Endangered Species Act that 1) is substantially reproductively isolated from conspecific populations and 2) represents an important component of the evolutionary legacy of the species. The species *O. mykiss* is under the joint jurisdiction of NMFS and the Fish and Wildlife Service, so in making its listing January, 2006 determinations NMFS elected to use the 1996 joint FWS-NMFS DPS policy for this species.

criteria suitable to the species and conditions found in their specific recovery domains. All of the criteria have qualitative as well as quantitative aspects. The diversity of salmonid species and populations makes it impossible to set narrow quantitative guidelines that will fit all populations in all situations. For this and other reasons, viability criteria vary among species, mainly in the number and type of metrics and the scales at which the metrics apply (*i.e.*, population, major population group (MPG), or ESU) (Busch *et al.* 2008).

The A&P score considers the TRT's estimate of a populations' minimum threshold population, natural spawning abundance and the productivity of the population. Productivity over the entire life cycle and factors that affect population growth rate provide information on how well a population is "performing" in the habitats it occupies during the life cycle. Estimates of population growth rate that indicate a population is consistently failing to replace itself are an indicator of increased extinction risk. The four metrics (abundance, productivity, spatial structure, and diversity) are not independent of one another and their relationship to sustainability depends on a variety of interdependent ecological processes (Wainwright *et al.* 2008).

Integrated SS/D risk combines risk for likely, future environmental conditions, and diversity (Ford 2011; McElhany *et al.* 2007; McElhany *et al.* 2000). Diversity factors include:

- Life history traits: Distribution of major life history strategies within a population, variability of traits, mean value of traits, and loss of traits.
- Effective population size: One of the indirect measures of diversity is effective population size. A population at chronic low abundance or experiencing even a single episode of low abundance is at a higher extinction risk because of loss of genetic variability, inbreeding and the expression of inbreeding depression, or the effects of mutation accumulation.
- Impact of hatchery fish: Interbreeding of wild populations and hatchery origin fish are a significant risk factor to the diversity of wild populations if the proportion of hatchery fish in the spawning population is high and their genetic similarity to the wild population is low.
- Anthropogenic mortality: The susceptibility to mortality from harvest or habitat alterations will differ depending on size, age, run timing, disease resistance or other traits.
- Habitat diversity: Habitat characteristics have clear selective effects on populations, and changes in habitat characteristics are likely to eventually lead to genetic changes through selection for locally adapted traits. In assessing risk associated with altered habitat diversity, historical diversity is used as a reference point.

Overall viability risk scores (high to low) and population persistence scores are based on combined ratings for the abundance and productivity (A&P) and spatial structure and diversity[4] (SS/D) metrics (Table 2) (McElhany *et al.* 2006). Persistence probabilities,

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[4] The WLC-TRT provided ratings for diversity and spatial structure risks. The IC-TRT provided spatial

which are provided here for Lower Columbia River salmon and steelhead, are the complement of a population's extinction risk (*i.e.*, persistence probability = 1 – extinction risk)(NMFS 2012). The IC-TRT has provided viability criteria that are based on McElhany (2000) and McElhany *et al.* (2006), as well as the results of previous applications in other TRTs and a review of specific information available relative to listed IC ESU populations (Ford 2011; IC-TRT 2007).

Table 2. Population persistence categories from McElhany *et al.* (2006). A low or negligible risk of extinction is considered "viable" (Ford 2011). Population persistence categories correspond to: 4 = very low (VL), 3 = low (L), 2 = moderate (M), 1 = high (H), and 0 = very high (VH) in Oregon populations, which corresponds to "extirpated or nearly so" (E) in Washington populations (Ford 2011).

Population Persistence Category	Probability of population persistence in 100 years	Probability of population extinction in 100 years	Description
0	0-40%	60-100%	Either extinct or "high" risk of extinction
1	40-75%	25-60%	Relatively "high" risk of extinction in 100 years
2	75-95%	5-25%	"Moderate" risk of extinction in 100 years
3	95-99%	1-5%	"Low" (negligible) risk of extinction in 100 years
4	>99%	<1%	"Very low" risk of extinction in 100 years

The boundaries of each population were defined using a combination of genetic information, geography, life-history traits, morphological traits, and population dynamics that indicate the extent of reproductive isolation among spawning groups. To date, the TRTs have divided the 19 species of salmon and steelhead considered in this opinion into a total of 304 populations, although the population structure of PS steelhead has yet to be resolved. The overall viability of a species is a function of the VSP attributes of its constituent populations. Until a viability analysis of a species is completed, the VSP guidelines recommend that all populations should be managed to retain the potential to achieve viable status to ensure a rapid start along the road to recovery, and that no significant parts of the species are lost before a full recovery plan is implemented (McElhany *et al.* 2000).

The size and distribution of the populations considered in this opinion generally have declined over the last few decades due to natural phenomena and human activity, including climate change (as described in Section 2.2), the operation of hydropower

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structure and diversity ratings combined as an integrated SS/D risk.

systems, over-harvest, effects of hatcheries, and habitat degradation. Enlarged populations of terns, seals, California sea lions, and other aquatic predators in the Pacific Northwest may be limiting the productivity of some Pacific salmon and steelhead populations (Ford 2011).

Viability status or probability or population persistence is described below for each of the populations considered in this opinion.

Willamette-Lower Columbia Recovery Domain. Species in the Willamette-Lower Columbia (WLC) recovery domain include LCR Chinook salmon, UWR Chinook salmon, CR chum salmon, LCR coho salmon, LCR steelhead, UWR steelhead, southern DPS green sturgeon, and eulachon. The WLC-TRT has identified 107 demographically independent populations of Pacific salmon and steelhead (Table 3). These populations were further aggregated into strata, groupings above the population level that are connected by some degree of migration, based on ecological subregions. All 107 populations use parts of the mainstem of the Columbia River and the Columbia River estuary for migration, rearing, and smoltification.

Table 3. Populations in the WLC recovery domain. Combined extinction risks for salmon and steelhead based on an analysis of Oregon populations.

Species	Populations
LCR Chinook salmon	32
UWR Chinook salmon	7
CR chum salmon	17
LCR coho salmon	24
LCR steelhead	23
UWR steelhead	4

Status of UWR Chinook Salmon

Spatial Structure and Diversity. This species includes all naturally spawned populations of spring-run Chinook salmon in the Clackamas River; in the Willamette River and its tributaries above Willamette Falls, Oregon; and progeny of seven artificial propagation programs. Only one of the historical populations of UWR Chinook salmon identified by the WLC-TRT occur within the action area which is contained within a single ecological subregion, the western Cascade Range (Table 4). The McKenzie River population currently characterized as at a "low" risk of extinction and the Clackamas population has a "moderate" risk. (Ford 2011). Consideration of data collected since the last status review in 2005 has confirmed the high fraction of hatchery origin fish in all of the populations of this species (even the Clackamas and McKenzie rivers have hatchery fractions above WLC-TRT viability thresholds). All of the UWR Chinook salmon populations have "moderate" or "high" risk ratings for diversity. Clackamas River Chinook salmon have a "low" risk rating for spatial structure (Ford 2011). The Middle Fork Willamette River is characterized as at a "very high" risk of extinction. The Coast

Fork population is not considered to be demographically independent, and as such is not part of the recovery domain.

Abundance and Productivity. The Clackamas and McKenzie river populations currently have the best risk ratings for A&P, spatial structure, and diversity. Data collected since the BRT status update in 2005 highlighted the substantial risks associated with pre-spawning mortality. Although recovery plans are targeting key limiting factors for future actions, there have been no significant on-the-ground-actions since the last status review to resolve the lack of access to historical habitat above dams nor have there been substantial actions removing hatchery fish from the spawning grounds. Overall, the new information does not indicate a change in the biological risk category since the last status review (Ford 2011).

Limiting Factors include (NOAA Fisheries 2011b; ODFW and NMFS 2011):

- Significantly reduced access to spawning and rearing habitat because of tributary dams
- Degraded freshwater habitat, especially floodplain connectivity and function, channel structure and complexity, and riparian areas and large wood recruitment as a result of cumulative impacts of agriculture, forestry, and development
- Degraded water quality and altered temperature as a result of both tributary dams and the cumulative impacts of agriculture, forestry, and urban development
- Hatchery-related effects
- Anthropogenic introductions of non-native species and out-of-ESU races of salmon or steelhead have increased predation on, and competition with, native UWR Chinook salmon
- Ocean harvest rates of approximately 30%

Table 4. Scores for the key elements (A&P, diversity, and spatial structure) used to determine current overall viability risk for UWR Chinook salmon (ODFW and NMFS 2011). All populations are in the Western Cascade Range ecological subregion. Risk ratings range from very low (VL), low (L), moderate (M), high (H), to very high (VH).

Population (Watershed)	A&P	Diversity	Spatial Structure	Overall Extinction Risk
Clackamas River	M	M	L	M
Molalla River	VH	H	H	VH
North Santiam River	VH	H	H	VH
South Santiam River	VH	M	M	VH
Calapooia River	VH	H	VH	VH
McKenzie River	VL	M	M	L
Middle Fork Willamette River	VH	H	H	VH

2.2.2 Status of Critical Habitat

We review the status of designated critical habitat affected by the proposed action by examining the condition and trends of essential physical and biological features throughout the designated area. These features are essential to the conservation of the listed species because they support one or more of the species' life stages (*e.g.*, sites with conditions that support spawning, rearing, migration and foraging).

For salmon and steelhead, NMFS ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code (HUC5) in terms of the conservation value they provide to each listed species they support;[5] the conservation rankings are high, medium, or low. To determine the conservation value of each watershed to species viability, NMFS' critical habitat analytical review teams (CHARTs; NOAA Fisheries 2005) evaluated the quantity and quality of habitat features (for example, spawning gravels, wood and water condition, side channels), the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area. Thus, even a location that has poor quality of habitat could be ranked with a high conservation value if it were essential due to factors such as limited availability (*e.g.*, one of a very few spawning areas), a unique contribution of the population it served (*e.g.*, a population at the extreme end of geographic distribution), or the fact that it serves another important role (*e.g.*, obligate area for migration to upstream spawning areas).

The physical or biological features of freshwater spawning and incubation sites include water flow, quality and temperature conditions and suitable substrate for spawning and incubation, as well as migratory access for adults and juveniles (Table 5). These features are essential to conservation because without them the species cannot successfully spawn and produce offspring. The physical or biological features of freshwater migration corridors associated with spawning and incubation sites include water flow, quality and temperature conditions supporting larval and adult mobility, abundant prey items supporting larval feeding after yolk sac depletion, and free passage (no obstructions) for adults and juveniles. These features are essential to conservation because they allow adult fish to swim upstream to reach spawning areas and they allow larval fish to proceed downstream and reach the ocean.

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[5] The conservation value of a site depends upon "(1) the importance of the populations associated with a site to the ESU [or DPS] conservation, and (2) the contribution of that site to the conservation of the population through demonstrated or potential productivity of the area" (NOAA Fisheries 2005).

Table 5. PCEs of critical habitats designated or proposed for ESA-listed salmon species considered in the opinion and corresponding species life history events.

Primary Constituent Elements		**Species Life History Event**
Site Type	**Site Attribute**	
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin growth and development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence from gravel Fry/parr/smolt growth and development
Freshwater migration	Free of artificial obstruction Natural cover Water quantity	Adult sexual maturation Adult upstream migration and holding Fry/parr/smolt growth, development, and seaward migration

CHART Salmon Critical Habitat Assessments. The CHART for each recovery domain assessed biological information pertaining to areas under consideration for designation as critical habitat to identify the areas occupied by listed salmon and steelhead, determine whether those areas contained PCEs essential for the conservation of those species and whether unoccupied areas existed within the historical range of the listed salmon and steelhead that are also essential for conservation. The CHARTs assigned a 0 to 3 point score for the PCEs in each HUC_5 watershed for:

Factor 1. Quantity,
Factor 2. Quality – Current Condition,
Factor 3. Quality – Potential Condition,
Factor 4. Support of Rarity Importance,
Factor 5. Support of Abundant Populations, and
Factor 6. Support of Spawning/Rearing.

Thus, the quality of habitat in a given watershed was characterized by the scores for Factor 2 (quality – current condition), which considers the existing condition of the quality of PCEs in the HUC_5 watershed; and Factor 3 (quality – potential condition), which considers the likelihood of achieving PCE potential in the HUC_5 watershed, either naturally or through active conservation/restoration, given known limiting factors, likely biophysical responses, and feasibility.

Willamette-Lower Columbia Recovery Domain. Critical habitat was designated in the WLC recovery domain for UWR spring-run Chinook salmon, LCR Chinook salmon, LCR steelhead, UWR steelhead, CR chum salmon, southern green sturgeon, and eulachon, and proposed for LCR coho salmon. In addition to the Willamette and Columbia River mainstems, important tributaries on the Oregon side of the WLC include Youngs Bay, Big Creek, Clatskanie River, and Scappoose River in the Oregon Coast subbasin; Hood River in the Gorge; and the Sandy, Clackamas, Molalla, North and South Santiam, Calapooia, McKenzie, and Middle Fork Willamette rivers in the West Cascades subbasin.

Land management activities have severely degraded stream habitat conditions in the Willamette River mainstem above Willamette Falls and associated subbasins. In the Willamette River mainstem and lower sub-basin mainstem reaches, high density urban development and widespread agricultural effects have reduced aquatic and riparian habitat quality and complexity, and altered sediment and water quality and quantity, and watershed processes. The Willamette River, once a highly braided river system, has been dramatically simplified through channelization, dredging, and other activities that have reduced rearing habitat by as much as 75%. In addition, the construction of 37 dams in the basin blocked access to more than 435 miles of stream and river spawning habitat. The dams alter the temperature regime of the Willamette River and its tributaries, affecting the timing and development of naturally-spawned eggs and fry. Logging in the Cascade and Coast Ranges, and agriculture, urbanization, and gravel mining on valley floors have contributed to increased erosion and sediment loads throughout the WLC domain.

The mainstem Willamette River has been channelized and stripped of large wood. Development began to encroach on the riparian forest beginning in the 1870s (Sedell and Froggatt 1984). Gregory (2002a) calculated that the total mainstem Willamette River channel area decreased from 41,000 to 23,000 acres between 1895 and 1995. They noted that the lower reach, from the mouth of the river to Newberg (RM 50), is confined within a basaltic trench, and that due to this geomorphic constraint, less channel area has been lost than in upstream areas. The middle reach from Newberg to Albany (RM 50 to 120) incurred losses of 12% primary channel area, 16% side channels, 33% alcoves, and 9% islands. Even greater changes occurred in the upper reach, from Albany to Eugene (RM 187). There, approximately 40% of both channel length and channel area were lost, along with 21% of the primary channel, 41% of side channels, 74% of alcoves, and 80% of island areas.

The banks of the Willamette River have more than 96 miles of revetments; approximately half were constructed by the ACOE. Generally, the revetments were placed in the vicinity of roads or on the outside bank of river bends, so that while only 26% of the total length is revetted, 65% of the meander bends are revetted (Gregory *et al.* 2002b). The majority of dynamic sections have been armored, reducing adjustments in channel bed and sediment storage by the river, and thereby diminishing both the complexity and productivity of aquatic habitats (Gregory *et al.* 2002b).

Riparian forests have diminished considerably in the lower reaches of the Willamette River (Gregory *et al.* 2002c). Sedell and Froggatt (1984) noted that agriculture and cutting of streamside trees were major agents of change for riparian vegetation, along with snagging of large wood in the channel. The reduced shoreline, fewer and smaller snags, and reduced riparian forest comprise large functional losses to the river, reducing structural features, organic inputs from litter fall, entrained allochthonous materials, and flood flow filtering capacity. Extensive changes began before the major dams were built, with navigational and agricultural demands dominating the early use of the river. The once expansive forests of the Willamette River floodplain provided valuable nutrients and organic matter during flood pulses, food sources for macroinvertebrates, and slow-water refugia for fish during flood events. These forests also cooled river temperatures as the river flowed through its many channels.

Gregory *et al.* (2002c) described the changes in riparian vegetation in river reaches from the mouth to Newberg, from Newberg to Albany, and from Albany to Eugene. They noted that the riparian forests were formerly a mosaic of brush, marsh, and ash tree openings maintained by annual flood inundation. Below the City of Newberg, the most noticeable change was that conifers were almost eliminated. Above Newberg, the formerly hardwood-dominated riparian forests along with mixed forest made up less than half of the riparian vegetation by 1990, while agriculture dominated. This conversion has reduced river shading and the potential for recruitment of wood to the river, reducing channel complexity and the quality of rearing, migration and spawning habitats.

Hyporheic flow in the Willamette River has been examined through discharge measurements and found to be significant in some areas, particularly those with gravel deposits (Fernald *et al.* 2001; Wentz *et al.* 1998). The loss of channel complexity and meandering that fosters creations of gravel deposits decreases the potential for hyporheic flows, as does gravel mining. Hyporheic flow processes water and affects its quality on reemerging into the main channel, stabilizing variations in physical and chemical water characteristics. Hyporheic flow is important for ecological functions, some aspects of water quality (such as temperature and dissolved oxygen), and some benthic invertebrate life stages. Alcove habitat, which has been limited by channelization, combines low hydraulic stress and high food availability with the potential for hyporheic flows across the steep hydraulic gradients in the gravel separating them from the main channel (Fernald *et al.* 2001).

Habitat and food-web changes within the Willamette River (miles below Willamette Falls) and Columbia River estuaries, and other factors affecting salmon population structure and life histories, have altered the estuary's capacity to support juvenile salmon (Bottom *et al.* 2005; Fresh *et al.* 2005; NMFS 2011c; NMFS 2012). Diking and filling activities have reduced the tidal prism and eliminate emergent and forested wetlands and floodplain habitats. These changes have likely reduced the estuary's salmon-rearing capacity. Moreover, water and sediment in the Lower Columbia River and its tributaries have toxic contaminants that are harmful to aquatic resources (LCREP 2007). Contaminants of concern include dioxins and furans, heavy metals, polychlorinated biphenyls (PCBs) and organochlorine pesticides such as DDT. Simplification of the population structure and life-history diversity of salmon possibly is yet another important factor affecting juvenile salmon viability. Restoration of estuarine habitats, particularly diked emergent and forested wetlands, reduction of avian predation by terns, and flow manipulations to restore historical flow patterns have likely begun to enhance the estuary's productive capacity for salmon, although historical changes in population structure and salmon life histories may prevent salmon from making full use of the productive capacity of estuarine habitats.

The WLC recovery domain CHART determined that most HUC_5 watersheds with PCEs for salmon or steelhead are in fair-to-poor or fair-to-good condition. However, most of these watersheds have some or a high potential for improvement. Only watersheds in the upper McKenzie River and its tributaries are in good to excellent condition with no potential for improvement (Table 6). In the Coast Fork, the CHART concluded that the four occupied HUC5 watersheds in this subbasin were of low conservation value to the ESU as they were not supporting a demographically independent population and had limited habitat. Hence, this river was not listed as critical habitat. For the Middle Fork, the CHART concluded that the occupied HUC5 watersheds in this subbasin were of either high or medium conservation value to the ESU. While the Lower Middle Fork had medium conservation value, the CHART also concluded that it has a high value as a rearing and migration corridor connecting high value upstream watersheds with downstream reaches and the ocean.

Table 6. Willamette-Lower Columbia Recovery Domain: Current and potential quality of HUC_5 watersheds identified as supporting historically independent populations of ESA-listed Chinook salmon (NOAA Fisheries 2005). Watersheds are ranked primarily by "current quality" and secondly by their "potential for restoration."

Current PCE Condition	Potential PCE Condition
3 = good to excellent	3 = highly functioning, at historical potential
2 = fair to good	2 = high potential for improvement
1 = fair to poor	1 = some potential for improvement
0 = poor	0 = little or no potential for improvement

Watershed Name(s) and HUC_5 Code(s)	Listed Species	Current Quality	Restoration Potential
Upper Willamette River 170900011003 and 170900020405			
Upper Willamette River – Lower Coast Fork	Chinook	1	0
Upper Willamette River – Lower Middle Fork	Chinook	1	1

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The BA (Tetra Tech 2012) provided an evaluation of environmental baseline conditions in the action area. Key elements are summarized here, and Figure 1 shows relevant locations.

For the Middle Fork Willamette River:
"The river is 84 miles long and joins the Coast Fork Willamette River near Eugene to form the mainstem Willamette River. About 94% of the Middle Fork subbasin is in Lane County, with the remainder of its southern extremity in Douglas County. About 75% of the land in the upper subbasin (above Dexter Dam) is publicly owned, most of which is managed by the U.S. Forest Service (Forest Service). The majority of the land below Dexter is privately owned, although there are a few large publicly owned sites, including Elijah Bristow State Park and Howard Buford Regional Recreation Area. The Lookout Point/Dexter dam projects divide the Middle Fork subbasin, limiting upstream fish passage and greatly influencing downstream hydrologic regimes, temperature patterns, sediment and bedload transport, and large wood delivery to the lower reaches. Below Dexter Dam, the Middle Fork Willamette River flows into the wide, alluvial Willamette Valley. Below Dexter, the river is very low gradient (less than 0.2%) and flows through a relatively wide valley with an extensive floodplain.

Flood control operations at the dams have substantially decreased the magnitude and frequency of extreme high flow events in the lower Middle Fork Willamette River. Additionally, the dams have decreased the magnitude of channel forming flood events (USACE 2000). In general, dam construction resulted in higher summer and fall flows, and lower spring flows. Similar to the Coast Fork, the dams have changed the types and distribution of geomorphic features in the Middle Fork with a significant reduction in islands and in-channel bars (Dykaar 2005). Historic photos of Reaches 1 and 2 on the Middle Fork show substantial meandering of the river with numerous bars and islands versus the existing condition where the channel is single threaded with minimal bars."

For the Coast Fork Willamette River:
"The mainstem river is 40 miles long. About 96% of the Coast Fork subbasin is in Lane County, with the remainder of its southern extremity in Douglas County. About 64% of land in the subbasin is privately owned with the remainder under federal ownership. Ninety percent of the subbasin is forested. Two dams divide the Coast Fork subbasin, Cottage Grove on the Coast Fork Willamette and Dorena on the Row River. These dams limit upstream fish passage and control downstream hydrologic regimes, temperature patterns, sediment and bedload transport, and large wood delivery to the lower reaches. Flows in the lower Coast Fork Willamette River have been controlled by Dorena and Cottage Grove dams since1949 and 1943, respectively. The dams have substantially decreased the magnitude and frequency of extreme high flow events in the Coast Fork Willamette and Row Rivers. Additionally, the dams have decreased the magnitude of lower return period channel forming flood events (USACE 2000).

In the Coast Fork subbasin, the release of warm water from Cottage Grove and Dorena reservoirs appreciably reduces the value of the lower Coast Fork and Row River for salmonid production (USACE 2000a). Temperatures in excess of 26 °C have been measured downstream of the dams (Thompson *et al.*, 1966). Warm water species are much more abundant than salmonids, indicating an unfavorable temperature regime for native species (USACE 2000a). Limited wood in the river limits the formation of pools, thus reducing hiding areas for adult fish and restricting the quality and quantity of juvenile rearing habitat (NPCC 2004).

The lower Coast Fork subbasin contains extensive agricultural, urban, and residential development that has limited the extent and composition of riparian vegetation. Further loss of riparian vegetation and function was caused by the construction of levees and revetments along the banks of the lower Coast Fork Willamette River to protect agricultural development from flooding and erosion. The construction of Interstate 5 also reduced riparian vegetation along significant portions of the lower 25 miles of the Coast Fork Willamette River (NPCC 2004). Backwater habitats, including pool margins, side channels, and alcoves, have been reduced from historical levels in the Coast Fork subbasin (NPCC 2004)."

However, improvements in the flow regime have occurred in the past 20 years, as described below (Tetra Tech 2012):

"Since the 1999 listing of salmon and steelhead as threatened under the ESA, the Corps has made significant adjustments in the operation of the Willamette Projects to better meet the needs of aquatic species. In particular, the initiation of mainstem Willamette River springtime (April-June) flow augmentation targets have resulted in significant changes in the timing and volume of storage in the reservoirs and downstream releases. The Corps is continuing to work with state and Federal fish management agencies to adjust the operational regime of all of the dams within the Willamette Project."

And in the Draft Integrated Feasibility Report/Environmental Assessment (Tetra Tech 2013), a specific program for flow changes is described:

> "The Corps is cooperating with The Nature Conservancy (TNC) and other entities to implement the Sustainable Rivers Program (SRP) on the McKenzie and Middle Fork Willamette Rivers. The goal of the SRP is to restore pre-dam riverine functions with the specific objectives to: 1) Allow more winter flows to reach bankfull; 2) provide spring and fall flows that mimic natural hydrograph from rain events; and 3) provide lower and steadier summer and early fall flows that mimic more natural conditions (Scullion and Tackley 2011). The SRP flows have been on-going since 2008 and initial monitoring indicates the higher winter flows are allowing reconnections of existing side-channels, movement of large wood, and recruitment of gravel. It is likely that these types of flows will be implemented for both the Middle Fork and the Coast Fork in the future. Flows will still be controlled to the bankfull maximum, as feasible, but pulsed flows that coincide with rain events will occur as feasible."

2.4 Effects of the Action on Species and Designated Critical Habitat

"Effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline

(50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

Collectively, the Floodplain Restoration Study actions proposed for WRDA authorization have a beneficial effect on the abundance and productivity of affected salmon populations. Restoration actions may have short term adverse effects, but likely will result in long-term improvements to habitat condition and population abundance, productivity, and spatial structure.

The full design for each restoration project is not yet known, and limited information about fish presence is available, such that the conservation value of each site can only be partially described. Therefore, to complete the jeopardy and destruction or adverse modification of critical habitat analyses in this consultation, NMFS made the following assumptions regarding the environmental baseline in each area that will eventually be chosen to support an action:

1. The purpose of the proposed program is to implement habitat restoration and fish passage improvements for the benefit of UWR Chinook.

2. Restoration projects will occur at sites where the biological requirements of individual fish of ESA-listed species are not being fully met due, in part, to the presence of impaired fish passage, floodplain fill, or degraded channel or riparian conditions.

Construction of each action will begin after the Corps' receives WRDA authorization and funding for detailed designs and implementation in the designated areas (Figure 1). The discussion of the direct physical and chemical effects of this part of the action on the environment will vary depending on the type of restoration or fish passage action being performed, but will all be based on a common set of effects related to construction. Actions involving fish passage restoration, off- or side channel reconstruction, set-back of an existing berm, dike or levee, or reconnection of gravel pits are likely to have all of the following effects; actions that only involve placement of boulders, gravel or wood will only have a subset of those effects, or will express those effects to a lesser degree.

The physical, chemical, and biotic effects of each individual project the Corps receives authorization for under WRDA will vary according to the number and type of project elements present, although each element will share, in relevant part, a common set of effects related to pre-construction and construction (Darnell 1976; Spence *et al.* 1996), site restoration (Cramer *et al.* 2003; Cramer 2012), and operation and maintenance. NMFS assumes that every individual project will share some the effects described here in proportion to the project's complexity, but that no action will have effects that are greater than the full range of effects described here. Construction duration required to complete most projects will normally be less than one year, although significant excavation or fish passage projects may require additional in-water work or upland work to complete.

The Corps will also provide final designs for review under the existing SLOPES Biological Opinions (NMFS 2013, or most recent versions) when proposed projects involve (a) Fish passage restoration; (b) off- and side-channel habitat restoration; or (c) set-back of a berm, dike or levee. For those that fit the existing SLOPES Biological Opinion, the Corps will notify NMFS and request approval (where required) before each project begins construction. Shortly (within 60 days) after inwater work for a project is completed, the Corps will submit the completion report portion of the implementation form, along with any pertinent information needed, to ensure that a completed project matches its proposed design. If the final design results in any project have elements that do not fit under the existing SLOPES Biological Opinions, or for any that will have a substantial effect on flow, geomorphology or sediment transport, with characteristics that require NMFS's special expertise to provide an incidental take statement beyond the SLOPES Restoration or Transportation Biological Opinions (2013, or most recent versions), the Corps will initiate individual consultation on those projects.

Preconstruction. Some restoration projects have little or even no construction footprint in the riparian zone, riparian area, or in the active channel. For example, piling removal and invasive or non-native plant control have little ground disturbance. Other project footprints extend far into the active channel, such as fish passage restoration and water control structure removal, and may require activities like work area isolation, fish capture, and relocation.

Each construction footprint that extends into a riparian or instream area is likely to have short-term adverse effects due to the physical and chemical consequences of altering those environments, and to have long-term adverse effects due to the impact of maintaining the built environment's encroachment on aquatic habitats. Conversely, under the action as proposed, each project is also likely to have long-term positive effects through application of design criteria that reduce pre-existing impacts by, for example, improving floodplain connectivity, water quality, or fish passage.

Preconstruction activities for proposed restoration projects include minor vegetation clearing, opening access roads, and establishing vehicle and material staging areas. Surveying, mapping, and the placement of stakes and flagging entail minor movements of machines and personnel over the action area with minimal direct effects but important indirect effects by establishing geographic boundaries that will limit the environmental impact of subsequent activities. The Corps will ensure that work area limits are marked to preserve vegetation and reduce soil disturbance as a fundamental and effective management practice that will to avoid and reduce the impact of all subsequent construction actions.

The Corps will ensure that a suite of erosion and pollution control measures will be applied to any project that involves soil disturbance. Those measures will constrain the use and disposal of all hazardous products, the disposal of construction debris, and secure the site against erosion and inundation during high flow events. Although the size of areas likely to be adversely affected by actions proposed to be authorized under this opinion are small, and those effects are likely to be short-term (weeks or months), even small denuded areas will lose organic matter and dissolved minerals, such as nitrates and phosphates. The microclimate at each action site where vegetation is removed is likely to become drier and warmer, with a corresponding increase in wind speed, and soil and water temperature. Water tables and spring flow in the immediate area may be temporarily reduced. Loose soil will temporarily accumulate in the construction area. In dry weather, part of this soil is dispersed as dust and in wet weather part is transported to streams by erosion and runoff, particularly in steep areas. Erosion and runoff increase the supply of sediment to lowland drainage areas and eventually to aquatic habitats, where they increase total suspended solids and sedimentation.

Construction. Use of heavy equipment for vegetation removal and earthwork compact the soil, thus reducing permeability and infiltration. Use of heavy equipment, including stationary equipment like generators and cranes, also creates a risk that accidental spills of fuel, lubricants, hydraulic fluid, coolants, and other contaminants may occur. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain PAHs, which are acutely toxic to salmon, steelhead, and other fish and aquatic organisms at high levels of exposure and cause sublethal adverse effects on aquatic organisms at lower concentrations (Heintz *et al.* 2000; Heintz *et al.* 1999; Incardona *et al.* 2005; Incardona *et al.* 2004; Incardona *et al.* 2006).

The Corps will require that heavy-duty equipment and vehicles for each project be selected with care and attention to features that minimize adverse environmental effects (*e.g.*, minimal size, temporary mats or plates within wet areas or sensitive soils). The Corps will also require use of staging areas at least 150 feet from surface waters, and regular inspection and cleaning before operation to ensure that vehicles remain free of external oil, grease, mud, and other visible contaminants. Also, as noted above, to reduce the likelihood that sediment or pollutants will be carried away from project construction sites, the Corps will ensure that clearing areas are limited and that a suite of erosion and pollution control measures will be applied to any project upon authorization.

If any juvenile fish are likely to be present in the work isolation area, the Corps will require that they be captured and released. While adults are unlikely to be present, most salmon in the vicinity are of a size that allows them to easily escape during isolation of the proposed project areas. Capturing and handling fish causes them stress, though they typically recover fairly rapidly from the process and therefore the overall effects of the procedure are generally short-lived (NMFS 2002). The primary contributing factors to stress and death from handling are differences in water temperature between the river where the fish are captured and wherever the fish are held, dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma. Stress on fish increases rapidly from handling if the water temperature exceeds 64°F or dissolved oxygen is below saturation.

The Corps' conservation measures are the same as those in the SLOPES Biological Opinion (NMFS 2013) regarding fish capture and release, and fish passage around the isolation area, and are based on standard NMFS guidance to reduce the adverse effects of these activities (NMFS 2011a). Moreover, the Corps will notify each project manager that injured, sick, or dead ESA-listed fish must be delivered to NMFS so that the cause of death for any dead specimen can be analyzed. If it is determined that carrying out the project had any unanticipated role in the death of an ESA-listed fish, that information will be reviewed by the Corps and NMFS to decide whether it is necessary to modify the project or the program to further reduce impacts.

Direct habitat loss may occur in the short term, and refers to displacement of native streambed material and diversity by the installation of rock or other hard structures within the functional floodplain. The habitat features of concern include water velocity, depth, substrate size, gradient, accessibility and space that are suitable for salmon and steelhead rearing. In spawning areas, rock and other hard structures are often used to replace spawning gravels, realign channels to eliminate natural meanders, bends, spawning riffles and other habitat elements. Riffles and gravel bars downstream are scoured when flow velocity is increased.

As in the SLOPES Biological Opinion –Restoration (NMFS 2013), rock is not proposed in preliminary designs except as ballast to stabilize large wood. Rock and other hard structures within the functional floodplain reduce water quality by reducing or eliminating riparian vegetation that regulates the quantity and quality of runoff and, together with channel complexity, help to maintain and reduce stream temperatures.

Some of these adverse effects will abate almost immediately, such as increased total suspended solids caused by boulder or large wood restoration. Others will be long-term conditions that may decline quickly but persist at some level for weeks, months, or years, until riparian and floodplain vegetation are fully reestablished. Failure to complete site restoration, or to prevent disturbance of newly restored areas by livestock or unauthorized persons will delay or prevent recovery of processes that form and maintain productive fish habitats.

All of the activities are designed to have long term beneficial effects to critical habitat. However, as noted above, the long-term effectiveness of habitat restoration actions, in general, have not been well documented. In part, this is because they often concentrate on instream habitat without addressing the processes that led to the loss of the habitat (Cederholm *et al.* 1997; Doyle and Shields 2012; Fox 1992; Roper *et al.* 1997; Simenstad and Thom 1996; Zedler 1996). Nevertheless, the proposed actions are reasonably certain to lead to some degree of ecological recovery within each action area, including the establishment or restoration of environmental conditions associated with functional habitat and high conservation value.

The effects on the environment of reconnecting stream channels with historical river floodplain swales, abandoned side channels, and floodplain channels are likely to include relatively intense construction effects, as discussed above. Off- and side-channel habitat restoration to reconnect stream channels with historical river floodplain swales, abandoned side channels, and floodplain channels, and setting back existing berms, dikes and levees, are likely to have similar but significantly greater positive indirect effects on habitat diversity and complexity by affecting a larger habitat area (Cramer 2012).

These effects include greater channel complexity and/or increased shoreline length; increased floodplain functionality; reduction of chronic bank erosion and channel instability due to sediment deposition; and increased width of riparian corridors. Increased riparian functions are likely to include increased shade and hence moderated water temperatures and microclimate; increased abundance and retention of wood; increased organic material supply; water quality improvement; filtering of sediment and nutrient inputs; more efficient nutrient cycling; and restoration of flood-flow refuge for ESA-listed fish (Cramer 2012).

The effects of stream bank restoration are likely to include the construction effects discussed above, and reestablishment of native riparian forests or other appropriate native riparian plant communities, which will provide increased cover (large wood, boulders, vegetation, and bank protection structures) and a long-term source of all sizes of instream wood, reduce fine sediment supply, increase shade, moderate microclimate effects, and provide more normative channel migration over time.

Project features that require individual review under SLOPES Biological Opinions (NMFS 2008b, NMFS 2013 or most recent versions) will be considered individually as the final designs are available, following WRDA authorization and Federal or partner funding. As noted in the BA (Tetra Tech 2012), further effects may occur in the areas where final design is expected to follow more in-depth analysis:

> Connecting previously mined gravel ponds to the Coast or Middle Forks is a relatively new restoration design concept. Gravel mined ponds further upstream on the Middle Fork did capture the river in the 1996 flood event, but now provide a highly braided channel system and a few deep pools to the river. None of the ponds proposed in this project are deeper than 25 feet, and are typically 6-15 feet in depth. No frequent flow-through channels are included; some high-flow connection channels will be excavated to allow connections above a 2-year event. These channels will include roughness features to slow velocities and minimize the potential for river capture.
>
> The proposed action will provide regular connections to these ponds, which will likely reduce water temperatures by providing more flushing, increase groundwater recharge and provide extensive off-channel areas for refuge and rearing. There are non-native species within many of the ponds, but they are also all present in the Coast and Middle Forks. Providing more natural flooding and connections may reduce the suitability of the habitat for non-native warm water species by reducing water temperatures and reducing depths. There is also the potential that these ponds could trap coarse sediments from the rivers and reduce the transport of sediment to downstream areas. This potential will be significantly reduced by the design which connects most ponds only via backwater channels.

Further, to avoid excessive use of rock the BA notes:

> Riprap may be used, only as necessary, to protect culvert footings, as part of a bioengineered bank with installed wood and vegetation to protect the toe of the existing berm at site M1B and the flow-through notches from hydraulic scour and potential avulsions. It will only be used as necessary, particularly on the M1B site where erosive forces could be high and where there could be the potential for the large gravel pits to "capture" the river.

Certain projects may be outside of the SLOPES Restoration Biological Opinion. The Corps proposes to design these projects within the guidelines of the SLOPES Transportation Biological Opinion (NMFS 2008b or most recent version) as appropriate. The Corps proposes to provide final design for those projects which do not fit the SLOPES Biological Opinions, and consultation will proceed on those at that time. Similarly, the initial project proposes installation of prefabricated pedestrian bridges to cross existing channels, with material and design parameters to vary by location, along with minor grading to match the bridge approaches. Following detailed hydraulic modeling, appropriate bridge spans will be designed to meet fish passage requirements, with review by NMFS.

2.4.1 Effects of the Action on Species

The intensity of the effects, in terms of changes in the condition of individual fish and the number of individuals affected, and severity of these effects will also vary somewhat between projects because of differences at each site in the scope of work area isolation and construction, the particular life history stages present, the baseline condition of each fish present, and factors responsible for those conditions. However, no project will have effects on fish that are beyond the full range of effects described here. The effects of the proposed actions are also reasonably certain to result in some degree of ecological recovery at each project site.

Most fry and fingerling rear in the lower reaches of spawning tributaries and in the Willamette River mainstem in late winter and early spring (Schroeder *et al.* 2005, 2007). Some fish grow quickly in this area and migrate as subyearling smolts out of the Willamette River basin, beginning in early to mid-May for the larger fish and continuing into mid-July in most years. Fall migration, influenced by dam releases, can be quite large with the average size of these fish larger than those migrating the following spring as yearling smolts. The yearlings migrate from March through May during their second spring and generally move fairly quickly through the Willamette River mainstem and over Willamette Falls (ODFW and NMFS 2011). Any of these diverse juvenile life history types could be present during excavation of side- and off-channel habitat, either rearing in or migrating past the action area. Their growth rates and survival may be affected by changes in forage or water quality.

Except for fish that are captured during work area isolation, or injured or killed during boulder and large wood placement, individual fish whose condition or behavior is impaired by the effects of a project authorized or completed under this opinion are likely to suffer primarily from ephemeral or short-term sublethal effects during construction, including diminished rearing and migration as described below. Projects that will require two or more years to complete are also likely to adversely affect more fish because their duration will be longer, but those effects are also likely to be less intense during each subsequent year as a result of work area isolation that will only be completed once per work area.

Any construction impacts to stream margins are likely to be most important to fish because those areas often provide shallow, low-flow conditions, may have a slow mixing rate with mainstem waters, and may also be the site at which subsurface runoff is introduced. Juvenile salmon and steelhead, particularly recently emerged fry, often use low-flow areas along stream margins. Wild Chinook salmon rear near stream margins until they reach about 60 mm in length (Bottom *et al.* 2005; Fresh *et al.* 2005). As juveniles grow, they migrate away from stream margins and occupy habitats with progressively higher flow velocities. Nonetheless, stream margins continue to be used by larger salmon and steelhead for a variety of reasons, including nocturnal resting, summer and winter thermal refuge, predator avoidance, and flow refuge.

In-channel activities limited to the later part of the ODFW in-water work period, June 1 to October 15, are least likely to harm adult spring Chinook salmon migrating upstream (Table 7). Project operations will most likely encounter subyearling juvenile UWR Chinook salmon, as these smaller fish leave following the first summer after they emerge from the gravel, and rear in the shallow areas along the shoreline and above partially submerged bars. Juveniles rear in the Willamette mainstem all year; the peak outmigration for the affected McKenzie River and Middle Fork Willamette River populations are from November through June (ODFW 2010 timing charts).

Salmon are generally able to avoid adverse conditions if those conditions are limited to areas that are small or local compared to the total habitat area, and if the aquatic system can recover before the next disturbance. This means juvenile and adult salmon will, to the maximum extent possible, readily move out of a construction area to obtain a more favorable position within their range of tolerance along a complex gradient of temperature, turbidity, flow, noise, contaminants, and other environmental features. The degree and effectiveness of the avoidance response varies with life stage, season and the frequency and duration of exposure to the unfavorable condition, and the ability of the individual to balance other behavioral needs for feeding, growth, migration, and territory.

Table 7. UWR spring-run Chinook salmon life history timing for Middle Fork River. Light shading represents lower abundance, dark shading represents peak abundance (after USACE *et al.* 2000, and updates from ODFW 2003).

Stage / Month	J	F	M	A	M	J	J	A	S	O	N	D
Upstream Adult Migration	▨	▨	▨	▨	■	■	■	▨	■	▨		
Spawning in Tributaries								▨	■	■	▨	
Intragravel Egg Development	■	■	■	■	■	▨		▨	■	■	■	■
Juvenile Rearing	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Juvenile Out-migration	■	■	■	■	▨	▨	▨	▨	▨	■	■	■

Excavation of channels at the project sites will cause elevated turbidity in the action area. Exposure duration is a critical determinant of the occurrence and magnitude of turbidity-caused physical or behavioral effects (Newcombe and Jensen 1996). Salmonids have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with flood events, and are adapted to such high pulse exposures. Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments; salmonids have been observed moving laterally and downstream to avoid turbid plumes (Sigler 1988, Lloyd 1987, Servizi and Martens 1991). At moderate levels, turbidity has the potential to adversely affect primary and secondary productivity, and at high levels, has the potential to injure and kill adult and juvenile fish (Newcombe and Jensen 1996). Turbidity might also interfere with feeding (Spence *et al.* 1996). Other behavioral effects on fish, such as gill flaring and feeding changes, have been observed in response to pulses of suspended sediment (Berg and Northcote 1985). Localized increases of turbidity during in-water work will likely displace fish in the project area and disrupt normal behavior.

There is a low probability of direct mortality from turbidity associated with proposed activities because the turbidity should be infrequent, localized, and take place when adult fish are least likely to be present. The most likely effects from turbidity will be behavioral, as juveniles move away from the suspended sediments, potentially leading to greater exposure to predators.

UWR Chinook salmon adults potentially encountering the action area are moving upstream and will likely swim past the operation at greater depths and closer to midstream. Salmon migration rates range up to a few miles per hour, allowing for movement through the action area in less than a day. Adult salmonids will typically be in the main river channel at depths of 10 to 20 feet below the water surface. Therefore, it is unlikely that adult UWR Chinook salmon will be exposed to the effects of the proposed action.

The level and nature of the prey disturbance is not unlike natural processes that continually move river bottom sediments burying or eroding benthic habitat. Recolonization of the benthic habitat is rapid – within weeks to months. Long-term loss of forage will occur where frequency and duration of the project operations delay natural recolonization. The proposed action will cause a limited loss of productivity but it is not likely to reduce available forage for rearing salmonids in sufficient quantities to reduce survival of individual fish. Due to the small area affected, only a few individual fish will experience a reduction of food or foraging opportunities. Food is not known to be limited in the action area for the ESA-listed fish. Benthic habitat disturbance is limited in extent, and temporary in nature. Yet, even limited reduction in food availability will require alternative feeding areas.

Invasive and non-native plant control actions, including manual, mechanical, and herbicidal treatment, are commonly employed as part of streambank restoration, set-back of existing berms, dikes and levees, and stream crossing replacement projects. Manual and mechanical treatments are likely to produce at least minor damage to riparian soil and vegetation over a defined area. In some cases, this will decrease stream shade, increase suspended sediment and temperature in the water column, reduce organic inputs (*e.g.*, insects, leaves, woody material), and alter streambanks and the composition of stream substrates. However, these changes are only likely to occur with invasive plant treatments of monocultures on small stream channels. The effects would vary depending on site aspect, elevation, and amount of topographic shading, but are likely to decrease over time as shade from native vegetation is reestablished.

Although the Corps will limit the use of herbicides to specific formulas chosen for having ingredients that pose low direct risks to fish, those substances are still likely to have at least short-term sublethal effects when they enter aquatic habitats where they can alter fish behavior in ways that are likely to impact survival, and through adverse impacts on aquatic habitats, such as reduction in cover and the abundance of food organisms (NMFS 2005). Herbicides can also pose risks when they combine with other pesticides and contaminants already in the water in ways that make them more toxic to fish.

Surface water contamination with herbicides occurs when herbicides are applied intentionally or accidentally into ditches, irrigation channels or other bodies of water, or when soil-applied herbicides are carried away in runoff to surface waters.
Direct application into water sources is generally used for control of aquatic species. Accidental contamination of surface waters can occur when irrigation ditches are sprayed with herbicides or when buffer zones around water sources are not wide enough.
In these situations, use of hand application methods will greatly reduce the risk of surface water contamination.

Spray and vapor drift are additional, important pathways for herbicide entry into aquatic habitats. Many factors influence herbicide drift, including spray droplet size, wind and air stability, humidity and temperature, physical properties of herbicides and their formulations, and method of application. For example, the amount of herbicide lost from the target area and the distance the herbicide moves both increase as wind velocity increases. Under inversion conditions, when cool air is near the surface under a layer of warm air, little vertical mixing of air occurs. Spray drift is most severe under these conditions, since small spray droplets will fall slowly and move to adjoining areas even with very little wind. Low relative humidity and high temperature cause more rapid evaporation of spray droplets between sprayer and target. This reduces droplet size, resulting in increased potential for spray drift. Vapor drift can occur when herbicides volatilize. The formulation and volatility of a compound will determine its vapor drift potential. The potential for vapor drift is greatest under high air temperatures and with ester formulations. For example, ester formulations such as triclopyr are very susceptible to vapor drift, particularly at temperatures above 80°F.

When herbicides are applied with a sprayer, nozzle height controls the distance a droplet must fall before reaching the weeds or soil. Less distance means less travel time and less drift. Wind velocity is often greater as height above ground increases, so droplets from nozzles close to the ground would be exposed to lower wind speed. The higher that an application is made above the ground, the more likely it is to be above an inversion layer that will not allow herbicides to mix with lower air layers and will increase long distance drift. The Corps will avoid or minimize drift impacts by ensuring that herbicide treatments will be made using ground equipment or by hand, under calm conditions, preferably when humidity is high and temperatures are relatively low. Ground-based equipment reduces the risk of drift, and hand equipment nearly eliminates it.

The contribution from runoff will vary depending on site and application variables, although the highest pollutant concentrations generally occur early in the storm runoff period when the greatest amount of herbicide is available for dissolution. Lower exposures are likely when herbicide is applied to smaller areas, when intermittent stream channel or ditches are not completely treated, or when rainfall occurs more than 24 hours after application. Under the proposed program, some formulas of herbicide may be applied within the bankfull elevation of streams, in some cases up to the water's edge. Any juvenile fish in the margins of those streams are more likely to be exposed to herbicides as a result of overspray, inundation of treatment sites, percolation, surface runoff, or a combination of these factors.

Groundwater contamination is another important pathway. Most herbicide groundwater contamination is caused by "point sources," such as spills or leaks at storage and handling facilities, improperly discarded containers, and rinses of equipment in loading and handling areas, often into adjacent drainage ditches. Point sources are discrete, identifiable locations that discharge relatively high local concentrations. The Corps will minimize these impacts by ensuing proper calibration, mixing, and cleaning of equipment. Non-point source groundwater contamination of herbicides is relatively uncommon but can occur when a mobile herbicide is applied in areas with a shallow water table. The Corps will minimize these impacts by restricting the formulas used, and the time, place and manner of their application to minimize offsite movement.

In summary, the Corps will limit the use of herbicide formulas, application methods, and the time and place of application to greatly reduce the likelihood that herbicide will be transported to aquatic habitats, although some herbicides are still likely to enter streams through aerial drift, in association with eroded sediment in runoff, and dissolved in runoff, including runoff from intermittent streams and ditches. The indirect effects or beneficial consequences of invasive, non-native plant control will depend on the long-term progression of climatic factors and the success of follow-up management actions to exclude undesirable species from the action area, provide early detection and rapid response before such species establish a secure position in the plant community, eradicate incipient populations, and control existing populations.

Most direct, lethal effects of authorizing and carrying out the proposed actions are likely to be caused by the isolation of in-water work areas, even though lethal and sublethal effects would be greater without isolation. Any individual fish present in the work isolation area will be captured and released. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in traps, if the traps are not emptied on a regular basis. Stress and death from handling occur because of differences in water temperature and dissolved oxygen between the river and transfer buckets, as well as physical trauma and the amount of time that fish are held out of the water. Stress on salmon increases rapidly from handling if the water temperature exceeds 64°F, or if dissolved oxygen is below saturation. Debris buildup and predation within minnow traps can also kill or injure listed fish if they are not monitored and cleared on a regular basis. Design criteria related to the capture and release of fish during work area isolation will avoid most of these consequences, and ensure that most of the resulting stress is short-lived (NMFS 2002).

Given the small reduction in the growth and survival of fish that will be directly affected by individual projects, primarily at the fry, parr, and smolts life stages, and the relatively low intensity and severity of the that reduction, any adverse effects to fish growth and survival are likely to be inconsequential. Moreover, projects completed under the proposed program are also reasonably certain to lead to some degree of species recovery within each action area, including more normal growth and development, improved survival, and improved spawning success. Projects that improve fish passage through culverts or create better longitudinal connectivity (up and downstream), habitat complexity, and ecological connectivity between streams and floodplains will likely have long-term beneficial effects on population structure.

2.4.2 Effects of the Action on Designated Critical Habitat

Each individual project, completed as proposed, including full application of the design criteria for restoration, is likely to have effects on critical habitat PCEs. These effects will vary somewhat in degree between actions because of differences in the scope of construction at each, and in the current condition of PCEs and the factors responsible for those conditions. Since these are restoration actions, all the effects to PCEs should be ephemeral, of short duration and beneficial in the long term. This assumption is based on the fact that all of the actions are based on the same set of underlying restoration actions, and the PCEs and conservation needs identified for the species are also essentially the same. In general, ephemeral effects are likely to last for hours or days and short-term effects are likely to last for weeks. The intensity of each effect, in terms of change in the PCE from baseline condition, and severity of each effect, measured as recovery time, will vary somewhat between projects because of differences in the scope of the work. However, no individual restoration project is likely to have any effect on PCEs that is greater than the full range of effects summarized above.

2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The surrounding area is primarily park land, with an urban area upstream. Urban growth will continue in the area, but will be buffered by the park land. Thus, NMFS is unaware of any cumulative effects at this time.

2.6 Integration and Synthesis

The Integration and Synthesis Section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we will add the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5) to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species and critical habitat (Section 2.2).

The Coast Fork and Middle Fork Willamette River spring Chinook populations will be affected by the action. The Middle Fork is considered in the very high risk category for extinction (Ford *et al.* 2011). The reaches upstream and downstream of the action area have been simplified and found to have passage and water quality problems as described in the Environmental Baseline above. The nearby urban area has shown dramatic growth in the past decade, and may continue to do so with increasing demands for land and water. Due to the relatively small scale of the proposed action, few juvenile UWR Chinook salmon will be killed by the proposed actions. The number of these fish is too small to cause any measurable effect to population abundance or productivity. The proposed action will have no effect on population spatial structure or diversity.

Adult upstream migrating ESA-listed salmonids are present primarily from early spring through autumn. The adult fish are generally migrating in the upper 10 feet of the water. Shallow water habitats are an important rearing habitat for juvenile salmon and steelhead, and access to these elements will be enhanced by the floodplain restoration in most cases. Restoration projects will have short term impacts due to construction, but long-term will contribute to reducing many of the factors limiting the recovery of these species including fish passage, floodplain connectivity and function, channel structure and complexity, and riparian vegetation and bank conditions.

In summary, projects completed under the proposed Floodplain Study program will result in relatively intense but brief disturbances to small areas distributed throughout the Middle and Coast Fork confluence, but these disturbances will not appreciably reduce or prevent the increase of abundance or productivity of the populations addressed by this consultation. This is because: (1) Effects from construction related activities are short-term and temporary, (2) a very small portion of the total number of fish will be exposed to the adverse effects of the proposed action, and (3) the geographic extent of the adverse effects is small when compared to the size of the watershed. Similarly, projects completed under the proposed program will not affect the diversity of any populations or species because the effects of the action will not impact factors that primarily influence population diversity such as management of hatchery fish or selective harvest practices. Projects that improve fish passage may improve population spatial structure. By contributing to improved habitat conditions that will, over the long term, support populations with higher abundance and productivity, projects completed under the proposed program are consistent with the recovery strategies of increasing productivity and spatial diversity, a critical step toward recovery of these species as whole.

Critical habitat for UWR Chinook salmon has been degraded by upstream dams, development, and number of land management activities. Critical habitat within the action area has medium conservation value, but has been degraded to some degree. Critical habitat elements in the action area include forage, floodplain connectivity, water quality and refugia. The adverse effects of the action impact only a very small portion of the Willamette River for limited time periods. This habitat is primarily used for migration and some rearing.

The proposed action will not impede the ability of this critical habitat to play its conservation role for migrating adults and juveniles and for rearing juveniles. The projects completed under the proposed program will have minor short-term effects on the quality and function of critical habitat PCEs. The full set of management measures proposed by the Corps will ensure that these short-term effects to PCEs remain minimal. As restoration projects accumulate over time, habitat conditions will improve and critical habitat will be able to better serve its intended conservation role, supporting viable populations of ESA-listed salmon, steelhead, and eulachon.

Thus, the proposed program is not likely to result in appreciable reductions in the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or reduce the value of designated critical habitat for the conservation of the species.

2.7 Conclusion

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent actions, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of UWR spring-run Chinook salmon (*Oncorhynchus tshawytscha*) or result in the destruction or adverse modification of its designated critical habitat.

2.8. Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. For purposes of this consultation, we interpret "harass" to mean an intentional or negligent action that has the potential to injure an animal or disrupt its normal behaviors to a point where such behaviors are abandoned or significantly altered.[6] Section 7(b)(4) and Section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, if that action is performed in compliance with the terms and conditions of this incidental take statement.

2.8.1 Amount or Extent of Take

Based on the above effects analysis, we anticipate the following forms of incidental take from the seven categories of actions provided by the proposed action within the action area: (1) Entrapment of juvenile UWR Chinook salmon resulting in injury or death during the in-water work window period of June 1 to October 15; 2) displacement of juvenile fish during construction activities along the bankline, disrupting normal juvenile behavior, potentially leading to greater exposure to predators; growth rates and survival affected by changes in forage or water quality; 3) displacement of fish from increased turbidity during in-water work, disrupting normal juvenile behavior and potentially leading to greater exposure to predators; and, 4) use of herbicides resulting in short-term sublethal effects altering fish behavior in ways that are likely to impact survival, and through adverse impacts on aquatic habitats, such as reduction in cover and the abundance of food organisms.

In this instance, the proposed action is programmatic in nature and does not itself authorize any individual projects to proceed. Additionally, while the general areas within the Coast Fork and Middle Fork Willamette River are known as the seven general categories of restoration actions, most of the other specifics associated with individual projects under the proposed action remain unknown. As a result, it is not practicable to provide a traditional amount or extent of take associated with the proposed action (e.g., number of fish killed or acres of habitat altered), and attempts to identify a specific

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[6] NMFS has not adopted a regulatory definition of harassment under the ESA. The World English Dictionary defines harass as "to trouble, torment, or confuse by continual persistent attacks, questions, etc." The U.S. Fish and Wildlife Service defines "harass" in its regulations as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering," 50 CFR 17.3. The interpretation we adopt in this consultation is consistent with our understanding of the dictionary definition of harass and is consistent with the U.S. Fish and Wildlife interpretation of the term.

amount or extent of incidental take would be speculative and unlikely to provide an accurate and reliable trigger for reinitiation of consultation. Additionally, once an individual project is identified, it will be subject to a second round of consultation, either by proceeding under the requirements of the SLOPES IV Restoration Biological Opinion, SLOPES Transportation Biological Opinion, or through a subsequent site-specific consultation. As such, incidental take coverage for the individual projects will be provided through either the ITS of the SLOPES Biological Opinions or the site-specific biological opinion.

For purposes of this programmatic action, this incidental take statement exempts the above-described incidental take at the programmatic level, subject to a subsequent consultation and ITS for the site-specific projects that will proceed under the proposed action. In lieu of a traditional amount or extent of take, we adopt terms and conditions 1.b., 2, and 3.b. as the reinitiation triggers for this consultation. In essence, these terms and conditions require the Corps to proceed with individual projects under the provisions of either the SLOPES Restoration or Transportation Biological Opinions, or a site-specific consultation and report such projects to NMFS in a timely manner. These terms and conditions serve as valid reinitiation triggers at the programmatic level because (1) due to lack of project specific information (and lack of historical precedent upon which to base reliable assumptions), it is not possible to quantify the actual number of fish anticipated to be taken under the programmatic proposed action as explained above, nor identify a meaningful habitat surrogate, (2) a failure to consult on any particular site specific project would be inconsistent with the process anticipated in the effects analysis of the programmatic biological opinion and this ITS and thereby ensure that reinitiation occurred before the programmatic action was complete, and (3) the terms and conditions provide clear standards for when reinitiation of formal consultation is required.

2.8.2 Effect of the Take

In the accompanying biological opinion, NMFS determined that the take anticipated as a result of the proposed action is not likely to result in jeopardy to the species or adverse modification to designated critical habitat.

2.8.3 Reasonable and Prudent Measures and Terms and Conditions

"Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02). "Terms and conditions" implement the reasonable and prudent measures (50 CFR 402.14). These must be carried out for the exemption in section 7(o)(2) to apply. The Corps shall:

1. Strive to ensure that site-specific projects are designed consistent with the applicable conservation measures of the SLOPES IV Restoration Biological Opinion or SLOPES Transportation Biological Opinion (2013, or most recent version).

2. For any projects that are not consistent with the SLOPES IV Restoration Biological Opinion or SLOPES Transportation Biological Opinion, initiate individual site-specific consultation with NMFS.

3. Provide notice to NMFS of projects carried out under the terms of the proposed action.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps, or any other party affected by these terms and conditions must comply with them to implement the reasonable and prudent measures (50 CFR 402.14). The Corps has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14). If the following terms and conditions are not complied with, the protective coverage of section 7(o)(2) will likely lapse.

1) To implement reasonable and prudent measure #1 (conservation measures for restoration projects), the Corps shall ensure that:
   a) Whenever practicable, actions funded or carried out under this opinion will be administered by the Corps consistent with Standard Local Operating Procedures analyzed in the SLOPES IV Restoration Biological Opinion or SLOPES Transportation Biological Opinion.
   b) Actions that are consistent with the SLOPES Biological Opinions shall be submitted for review by and approval by NMFS per the requirements of those Opinions.

2) To implement reasonable and prudent measure #2 (individual review), the Corps shall ensure that for all actions funded or carried out under this opinion that are not consistent with the SLOPES Biological Opinions, the Corps shall submit a biological assessment and request individual site-specific consultation with NMFS.

3) To implement reasonable and prudent measure #3 (notice), the Corps shall ensure that
   a) For projects undertaken pursuant to the proposed action, the SLOPES notifications and reports are submitted electronically to NMFS at slopes.nwr@noaa.gov.
      i) Project notification within 60-days before start of construction (Part 1).
      ii) Project completion within 60-days of end of construction (Part 1 with Part 2 completed).
      iii) Fish salvage within 60 -days of work area isolation with fish capture (Part 1 with Part 3 completed).
   b) It provides NMFS with an annual report (due each year on the date of this opinion) detailing the projects undertaken pursuant to the proposed action, indicating for each whether it was approved under the SLOPES IV Restoration Biological Opinion procedures, the SLOPES Transportation Biological Opinion, or whether it was the subject of an individual consultation request to NMFS.

2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). The following conservation recommendation is a discretionary measure that NMFS believes is consistent with this obligation and therefore should be carried out by the Corps:

- The effectiveness of some types of stream restoration actions are not well documented, partly because decisions about which restoration actions deserve support do not always address the underlying processes that led to habitat loss. NMFS recommends that the Corps encourage cost-share partners to use species' recovery plans to help ensure that their actions will address those underlying processes that limit fish recovery.

Please notify NMFS if the Corps carries out these recommendations so that we will be kept informed of actions that minimize or avoid adverse effects and those that benefit the listed species or their designated critical habitats.

2.10 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

For purposes of this consultation, the amount or extent of incidental take is considered exceeded in the event the Corps fails to comply with terms and conditions 1.b., 2. or 3.b.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

The consultation requirement of section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effects occur when EFH quality or quantity is reduced by a direct or indirect physical, chemical, or biological alteration of the waters or substrate, or by the loss of (or injury to) benthic organisms, prey species and their habitat, or other ecosystem components. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific coast salmon (PFMC 1999) contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The Pacific Fishery Management Council (PFMC) described and identified EFH for Chinook salmon and coho salmon (PFMC 1999). The proposed action and action area for this consultation are described in the Introduction to this document. The action area includes areas designated as EFH for various life-history stages of Chinook and coho salmon.

3.2 Adverse Effects on Essential Fish Habitat

Based on information provided in the BA and the analysis of effects presented in the ESA portion of this document, NMFS concludes that proposed action will have the following adverse effects on EFH designated for Chinook and coho salmon:

1. Freshwater EFH quantity will be reduced due to short-term construction needs, reduced riparian permeability, and increased riparian runoff. There will be a slight longer-term increase in EFH quantity based on improved riparian function and floodplain connectivity.

2. Freshwater EFH quality will be reduced due to a short-term increase in turbidity, dissolved oxygen demand, and temperature due to riparian and channel disturbance. There will be a longer-term improvement in EFH quality due to improved riparian function and floodplain connectivity.

3. Tributary substrate will have a short-term reduction in quality due to increased compaction and sedimentation, and a long-term increase in quality due to gravel placement, and increased sediment storage from boulders and large wood.

4. Floodplain connectivity will have a short-term decrease due to increased compaction and riparian disturbance during construction, and a long-term improvement due to off- and side channel habitat restoration, set-back of existing berms, dikes, and levees, and removal of water control structures.

5. Forage will have a short-term decrease in availability due to riparian and channel disturbance, and a long-term improvement due to improved habitat diversity and complexity, and improved riparian function and floodplain connectivity.

6. Natural cover will have short-term decrease due to riparian and channel disturbance, and a long-term increase due to improved habitat diversity and complexity, improved riparian function and floodplain connectivity, and off- and side channel habitat restoration.

7. Fish passage will be impaired in the short-term due to decreased water quality and in-water work area isolation, and improved over the long-term due to improved water quantity and quality, habitat diversity and complexity, forage, and natural cover.

3.3 Essential Fish Habitat Conservation Recommendations

The following two conservation recommendations are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH. One of these conservation recommendations is identical to the ESA terms and conditions:

1. Implement term and condition 1, 2 and 3 of the biological opinion.

2. The effectiveness of stream restoration actions is not well documented, partly because decisions about which restoration actions deserve support do not always address the underlying processes that led to habitat loss. NMFS recommends that the Corps encourage applicants to use species' recovery plans to help ensure that their actions will address those underlying processes that limit fish recovery.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the Corps must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The DQA specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended user of this opinion is the U.S. Army Corps of Engineers. Other interested users could include organizations throughout the state that are engaged in fish habitat restoration. Individual copies of this opinion were provided to the Corps. This opinion will be posted on the NMFS Northwest Region web site (http://www.nwr.noaa.gov). The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01, et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References Section. The analyses in this opinion and EFH response contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with Northwest Region ESA quality control and assurance processes.

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USFWS Biological Opinion

Amendment 2 – August 14, 2013

Amendment 1 – July 24, 2013

Biological Opinion – June 13, 2013

United States Department of the Interior

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Ms. Joyce Casey
Chief, Environmental Resources Branch
Portland District, Corps of Engineers
P.O. Box 2946
Portland, Oregon 97208-2946

Subject: Revised Biological Opinion for Consultation on the Willamette River Floodplain Restoration Study

Dear Ms. Casey:

This letter transmits the U.S. Fish and Wildlife Service's (Service) revision to the Addendum to the Biological opinion (BO), originally issued June 13, 2013, for the subject Project, as requested by the U.S. Army Corps of Engineers (Corps) in a letter dated August 12, 2013. The revision is implemented via the attached Revised Addendum to the BO. The attached Revised Addendum supersedes the previous addendum (dated July 24, 2013, and provided by the Service in response to an earlier request from the Corps on that same date) and is hereby incorporated into the BO.

If you have questions, please contact Rollie White or Joe Zisa at (503) 231-6179.

Sincerely,

Paul Henson, PhD
State Supervisor

Revised Addendum to Biological Opinion on Willamette River Floodplain Restoration Study: Lower Coast and Middle Forks Willamette River Subbasins

Date: 12 August 2013

This document is intended to be incorporated into and revise the Biological Opinion on Willamette River Floodplain Restoration Study (File Number: 01EOFW00-2013-F-0136 and Tails Number: 01EOFW00-2013-F-0136), originally issued by the Service on June 13, 2013. The Incidental Take Statement (section 9.0) of the Biological Opinion is amended as described below.

9.1 Amount or Extent of Take

The effects described above could potentially rise to the level of incidental take for the Oregon chub associated with future restoration actions prepared under the Willamette River Floodplain Restoration Study, Draft Integrated Feasibility Report / Environmental Assessment, Phase 2 Plan. The Service anticipates take of Oregon chub in the form of harm, injury, or harassment to up to one individual of the species through September 30, 2018.

9.2 Effect of the Take

In this BO, the Service has determined that the effects underlying the incidental take would not result in jeopardy to Oregon chub.

9.3 Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize and monitor take of Oregon chub pursuant to 50 CFR 402.14(i).

1. Minimize incidental take of Oregon chub by conducting pre-construction surveys.
2. Ensure the Service is involved in the pre-construction, engineering, and design (PED) phase of the project

9.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps will implement the following non-discretionary terms and conditions related to the reasonable and prudent measures described above:

A. To implement reasonable and prudent measure 1, the Corps will conduct adequate sampling and other data inventory methods prior to on-ground Project activities to determine whether Oregon chub may be present or otherwise affected by the activities; and results of the fish survey will be shared with the Service to verify the potential level of incidental take resulting from construction of the Willamette Floodplain Restoration Project.

B. To implement reasonable and prudent measure 2, the Corps will provide preliminary and final designs for off- or side-channel habitat restoration to the Service for review and assurance they are consistent with previously provided conservation measures and verify that the assumptions used to determine the amount or extent of take to ESA-listed species remain valid.

Approved by: ______________________________ Date: 14 Aug 13
State Supervisor

United States Department of the Interior

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Ms. Joyce Casey
Chief, Environmental Resources Branch
Portland District, Corps of Engineers
P.O. Box 2946
Portland, Oregon 97208-2946

Subject: Revised Biological Opinion for Consultation on the Willamette River Floodplain Restoration Study

Dear Ms. Casey:

This letter transmits the U.S. Fish and Wildlife Service's (Service) revision to the biological opinion (BO), originally issued June 13, 2013, for the subject Project. The revision is implemented via the attached addendum to the BO.

In the original BO, the Service determined that information available at the current Feasibility Study stage of the Project does not allow for quantification of potential incidental take, but does allow for a conclusion that the Project, as currently described, would not jeopardize the continued existence of Oregon chub or destroy or adversely modify designated critical habitat. The Service also determined such conclusions were sufficient to satisfy the U.S. Army Corps of Engineers (Corps) obligations pursuant to section 7(a)(2) of the Endangered Species Act (Act) for the Feasibility Study stage of the Project.

On July 24, 2013, the Corps requested that the Service develop an Incidental Take Statement and associated Terms and Conditions for impacts to Oregon chub (*Oregonichthys crameri*). The Service continues to believe these items are not required to meet consultation obligations for this stage of the Project and cannot be very effectively developed based on information in the Biological Assessment. In most such situations the Service would conclude it could not appropriately satisfy the Corps' request. However, in the case of the Project, three relatively unique factors are applicable:

- Even while the information in the Biological Assessment does not allow for specific quantification of incidental take, the expert judgment of Service and Oregon Department of Fish and Wildlife Biologists is that the presence of Oregon chub in the Project action area (and therefore incidental take) is extremely unlikely;

- The Project is specifically designed to have long-term beneficial effects on Oregon chub that could contribute towards the recovery of the species; and,

- Development of a work plan by the Corps for the Service's formal involvement in the pre-construction, engineering, and design (PED) phases of the Project.

In consideration of and in conformance with these unique factors, the Service has developed a limited Incidental Take Statement and associated Terms and Conditions for impacts to Oregon chub. These are included in the attached addendum to the BO. The addendum is hereby incorporated into the BO dated June 13, 2013.

In conjunction with this action and consistent with other recent discussions between our agencies, the Service also strongly encourages the Corps to reevaluate its project development and coordination procedures so that future requests for consultation under the Act and review under the Fish and Wildlife Coordination Act can be accommodated more efficiently and effectively than for the Feasibility Study stage of the Willamette River Floodplain Restoration Study.

If you have questions, please contact Rollie White or Joe Zisa at (503) 231-6179.

Sincerely,

for Paul Henson, PhD
State Supervisor

Addendum to Biological Opinion On Willamette River Floodplain Restoratio Study: Lower Coast and Middle Forks Willamette River Subbasins

Date: 24 July 2013

This document is intended to be incorporated into and revise the Biological Opinion on Willamette River Floodplain Restoration Study (File Number: 01EOFW00-2013-F-0136 and Tails Number: 01EOFW00-2013-F-0136), originally issued by the Service on June 13, 2013.

The Incidental Take Statement (section 9.0) of the Biological Opinion is amended as described below.

9.1 Amount or Extent of Take

The effects described above could potentially rise to the level of incidental take for the Oregon chub associated with future restoration actions prepared under the Willamette River Floodplain Restoration Study, Draft Integrated Feasibility Report / Environmental Assessment, Phase 2 Plan. The Service anticipates take of Oregon chub in the form of harm, injury, or harassment to up to one individual of the species during the period of July 24, 2013 through September 30, 2016.

9.2 Effect of the Take

In this BO, the Service has determined that the effects underlying the incidental take would not result in jeopardy to Oregon chub.

9.2 Reasonable and Prudent Measures

All conservation measures described in the proposed action, and in the Service's April 29, 2013, review of the Project under the Fish and Wildlife Coordination Act, are hereby incorporated by reference as reasonable and prudent measures pursuant to 50 CFR 402.14(i). These measures minimize adverse effects to Oregon chub.

9.3 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps will implement the following non-discretionary terms and conditions related to the reasonable and prudent measures described above:

A. The Corps will conduct adequate sampling and other data inventory methods prior to on-ground Project activities to determine whether Oregon chub may be present or otherwise affected by the activities; and

B. The Corps will develop and reach agreement with the Service on a work plan to enable the Service's formal involvement in the pre-construction, engineering, and design (PED) phases of the Project, including issues and actions related to the Act or the Fish and

Wildlife Coordination Act that the Service determines appropriate for ensuring conformance with the level of incidental take described above and for minimizing adverse effects of the Project. The work plan will include funding mechanisms that may be necessary to support the Service's efforts. This work plan will be drafted by December 31, 2013 and finalized prior to the initiation of the PED phases of the Project.

Approved by:______________________________ Date: 24 July 13

for State Supervisor

United States Department of the Interior

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JUN 13 2013

Ms. Joyce Casey
Chief, Environmental Resources Branch
Portland District, Corps of Engineers
P.O. Box 2946
Portland, Oregon 97208-2946

Subject: Consultation on the Willamette River Floodplain Restoration Study, Draft Integrated Feasibility Report / Environmental Assessment, Phase 2, lower Coast and Middle Forks of the Willamette River, Lane County, Oregon (Township 18 South, Range 3 West, Sections 1, 8, 11, and 12).

Dear Ms. Casey:

This enclosed document contains letters of concurrence and biological opinion (BO) prepared by the U.S. Fish and Wildlife Service (Service) pursuant to section 7(a)(2) of the Endangered Species Act on the proposed suite of five restoration actions in Oregon. In this biological opinion, the Service concludes that the proposed action is not likely to jeopardize the continued existence of the Oregon chub (*Oregonichthys crameri*).

The U.S. Army Corps of Engineers (Corps) has evaluated the feasibility of carrying out restoration activities at a five specific locations within the Coast and Middle Forks of the Willamette River and design concepts to improve ecosystem functions. The proposed restoration work identified in the biological assessment (BA) would include historic side channel reconnection, invasive species removal, placement of large wood, construction of engineered log jams, and modification of flows through existing, abandoned commercial gravel pits, as well as other activities.

There is some potential for adverse biological effects that could rise to the level of incidental take for Oregon chub. However, we are unable to determine, from the BA, the likelihood or quantity of such effects that may conform to the regulatory definition of take. Therefore, any incidental take will be addressed at a later time in future project-specific consultations.

In your initiation letter from April 3, 2013 you also request concurrence with the effect determinations of "may affect, but not likely to adversely affect" for bull trout (*Salvelinus* *confluentus*) and critical habitat, and Bradshaw's desert parsley (*Lomatium bradshawii*). This document includes the Service's letter of concurrence for these species.

If you have questions regarding this consultation, please contact Kathy Roberts or Joe Zisa, in our OFWO office at (503) 231-6179.

Sincerely,

for Paul Henson, PhD
State Supervisor

BIOLOGICAL OPINION

On

Willamette River Floodplain Restoration Study
Lower Coast and Middle Forks Willamette River Subbasins

As Implemented by:

U.S. Army Corps of Engineers

Prepared by:
U.S. Fish and Wildlife Service
Oregon Fish and Wildlife Office

File Number: 01EOFW00-2013-F-0136
Tails Number: 01EOFW00-2013-F-0136

Approved by: ______________________ Date: 13 June 13
for State Supervisor

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1.0 CONSULTATION HISTORY

The Corps has worked with an interagency stakeholder group during the study to solicit input and feedback on the identification and evaluation of specific project locations, restoration alternatives, and the development of site-specific design elements. The Service participated in meetings on August 3, 2006, March 10, 2008, March 20, 2009, and September 16, 2010, and provided additional information and recommendations following these meetings. These meetings included information sharing on current Oregon chub (*Oregonichthys crameri*) locations and potential project effects.

We received the Biological Assessment (BA) on April 5, 2013. On April 30, 2013 the Corps met with the Service at the OFWO to discuss the timeframes and content of this consultation. Due to the needs of the Corps, we agreed to complete this consultation by June 30, 2013. At this time we discussed issuing a BO without incidental take for Oregon Chub, pending approval of the Civil Works Review Board.

2.0 PROPOSED ACTION

The proposed restoration plan includes five floodplain restoration project sites totaling approximately 585 acres. The five sites are all located within the 100-year floodplains (and typically floodways) of the Coast and Middle Forks and include riparian and wetland habitats. Below are the locations and land ownership for each site. In addition, a brief summary of the key restoration elements proposed at each site is provided (Table 1).

Table 1. Project Site Descriptions

Project ID	Landowner	Location	Section/ Township / Range	Acres	Project Description
C1B	Lane County	Left bank of the CF at the confluence of CF and MF	T18S, R3W, S11	90	Enhance and reconnect gravel pits on south bank of Coast Fork near confluence. Grade banks to lessen slopes, regrade onsite material into ponds to reduce depths, remove invasive species, revegetate, excavate connections between ponds and connect to river, place large wood in ponds and floodplain, install one ELJ in river.
M1A	TNC	Between MF and CF at MF RM 188	T18S, R3W, S11 and 12	150	Enhance and reconnect downstream TNC gravel pits at confluence of CF and MF. Grade banks to lessen slopes, remove invasive species, revegetate, excavate connections between ponds and connect to both rivers (backwater to MF, high-flow only to CF), place wood in ponds and floodplain, install 2 ELJs to promote scour at channel openings.
M1B	TNC	Left bank of MF at RM 189	T18S, R3W, S1 and 12	174	Restore large TNC gravel pits along MF. Remove and rebuild levee along MF to make as overflow terrace, regrade fill in floodplain into pits to provide diverse shorelines and reduce water depths, remove invasive species, revegetate, excavate connections between ponds and connect to MF, place wood in ponds.
C1C	TNC	Left bank of CF at RM 1.2	T18S, R3W, S11	80	Enhance and reconnect TNC ponds on south side of CF, excavate upstream and downstream connections, grade banks to lessen slopes, remove invasive species, revegetate, install 2 ELJs at upper end to maintain channel openings and promote channel migration.
M2A	TNC	Left bank of MF at RM 191	T18S, R3W, S8	78	Enhance and reconnect TNC ponds on back side of Mt. Pisgah to MF, excavate upstream (high-flow) and downstream (backwater) connections, grade banks to lessen slopes, remove invasive species, revegetate, install 4 ELJs to maintain channel openings and promote

Project ID	Landowner	Location	Section/ Township / Range	Acres	Project Description
					channel migration.

The proposed habitat restoration plan consists of the following project design elements at the proposed project sites. Each restoration site includes a combination of design features and quantities, but the primary intent at all sites are to restore and connect off-channel habitats to allow fish refuge and rearing, to install in-channel wood and/or place wood in floodplains, and off-channel areas to provide cover and aquatic habitat diversity, and to restore diverse floodplain, riparian and wetland plant communities on the sites. Since all of the sites included in the recommended restoration plan have had some gravel mining occur in the past, they all have varying approaches to the same intent. The design features are detailed below. The proposed design features generally fit within the following three categories of stream restoration and fish passage that are included in the biological opinion prepared for Standard Local Operating Procedures for Endangered Species to Administer Stream Restoration and Fish Passage Improvement Actions (SLOPES IV Restoration, NMFS 2008): 1) large wood restoration; 2) off- and side-channel habitat restoration; and 3) streambank restoration. The exception is restoration and connections of gravel-mined ponds, which are not included in the SLOPES biological opinion.

2.1 Clearing

Clearing includes the removal of large rocks, boulders and debris from land for access and in advance of vegetative restoration. This item does not include removal of invasive vegetation. Clearing will be accomplished by hydraulic excavators, dozers, front end loaders, and dump trucks. Unusable rocks and debris will be removed to an off-site landfill or reuse site.

2.2 Removal of Invasive Vegetation

While it is unlikely that all invasive species can be permanently removed, the removal of these species will be to the level that planted native vegetation can more readily compete to establish a dominant community in subsequent growing seasons. Hand labor and small equipment will be used to cut and/or pull to remove invasive vegetation. Spot application of herbicide is appropriate after cutting to kill or reduce the vigor of the invasive plant stems, while also minimizing any potential for spills or over-application. The removed vegetation will be disposed of off-site, such as at a compost facility, or chipped and composted on-site. It is expected that this would occur prior to planting, and then maintenance to continue to cut and/or apply herbicide to the invasive species would be conducted for three years following construction.

2.3 Excavation

Excavation is the removal of earth for the development of side channels and pond connections and/or to regrade bank slopes or disturbed floodplain areas to provide a better planting surface. Excavation limits are determined by the design details at each restoration site. Two sites – M1A and M1B – include excavation and regrading or reuse of previously-placed piles of fill or debris in the floodplain (these piles include windrows of top soil removed prior to gravel mining operations as well as piles of cobbles and other material excavated during the gravel mining operations).

Excavation will be accomplished by hydraulic excavators, dozers, front end loaders and dump trucks. Excavated materials will be placed at both on-site and off-site disposal locations. Care and diversion of water will be needed for excavations that are in or adjacent to water. This will be accomplished by placement and maintenance of temporary coffer dams and pumps. Best management practices for erosion control will be placed and maintained to avoid excessive turbidity in adjacent waterways. Work will generally be accomplished isolated from the rivers, with final connections made during the allowed in-water work windows (coordination with ODFW will be required to determine site-specific in-water work windows).

2.4 Construction of High Flow Side Channels and Pond Connections

Side channel construction involves the placement of one or more of the following: channel bed material, bank stabilization measures, streambank vegetation restoration, and riparian vegetation restoration. Bed material is typically a well graded mix of fine material and gravel and cobbles either imported from off-site sources or from suitable material on-site. Channel invert grades are designed to provide a backwater connection during the typical winter/spring flows (November to June) at the channel outlets, so grade control measures are unnecessary. Bank stabilization is accomplished using vegetation, large woody debris and root wads, and fabric as necessary. Bank and riparian restoration will include the planting of local, native vegetation species.

Connecting previously mined gravel ponds to the Coast or Middle Forks is a relatively new restoration design concept. Some stakeholders are concerned about the potential for the ponds to "capture" the river if the ponds are very deep (i.e. 50 feet and greater). Gravel mined ponds further upstream on the Middle Fork did capture the river in the 1996 flood event, but now provide a highly braided channel system and a few deep pools to the river. None of the ponds proposed in this project are deeper than 25 feet, and are typically 6-15 feet in depth.

Pond connections include the elements of side channel construction, but are typically shorter because they will be designed to achieve a backwater connection or connections between ponds using existing topographic features (following overflow channels or other existing channels), and may not typically include riparian restoration features if an existing overflow channel is simply widened and/or deepened. No frequent flow-through channels are included; some high-flow connection channels will be excavated to allow connections above a 2-year event. These channels will include roughness features to slow velocities and minimize the potential for river capture. All of the proposed pond connections will connect ponds that are within the 100-year floodplain to their respective rivers. These sites were all inundated during the 1996 flood event, but did not experience avulsions. Some sites already have partial connections below the 2-year flow, including C1C and M2A. These existing connections will be enhanced for frequent accessibility by fish.

Construction of the side channel and pond connection habitat elements will be staged to follow clearing and excavation. Bed material will be placed with excavators, front end loaders, and dump trucks. Large woody debris, root wads, and native rock materials will be placed by using a combination of machines and hand labor. Streambank and riparian vegetative plantings will be accomplished using hand labor during the fall after other construction activities are complete.

2.5 Concrete and Debris Removal

In its existing state, Site M1B includes a berm that is protected on its river-side by a privately installed revetment of miscellaneous debris and rock. This berm was created to separate a large gravel mined pond from the river during the mining operations. The M1B design includes partial removal of this private (non-Corps) revetment and replacement with wood and rock, as appropriate. Debris present on M1A and M1B would be removed as appropriate. The existing concrete and debris will be removed using excavators, dump trucks, small equipment and hand labor. The debris will be disposed of or recycled off-site.

2.6 Engineered Log Jam Construction

Engineered log jams (ELJs) are large wood structures designed to withstand 100-year flows and provide fairly long-term (i.e. 25 years or more) stable elements of habitat in otherwise more uniform channels. Their presence will trap and store additional wood that drifts down the rivers. The construction of engineered log jams requires excavation to install key pieces and driving of wooden piles to support the structures. Chains may be used to temporarily anchor the wood to the piles until sufficient sediment or additional wood has racked up on the ELJs to stabilize the structure. Cables will not be used. Ballast of river cobbles/gravel or large rock may also be used as necessary.

Large wood would be installed during low flows (within in-water work windows) using excavators, cranes, helicopters, and hand labor, as appropriate. The work sites would be isolated as much as feasible using coffer dams and/or silt curtains and dewatered if feasible to facilitate construction. Access to islands would be provided by temporary bridges or dewatering of side channels via coffer dams and pumping.

2.7 Riprap Installation

Riprap may be used, only as necessary, to protect culvert footings, as part of a bioengineered bank with installed wood and vegetation to protect the toe of the existing berm at site M1B and the flow-through notches from hydraulic scour and potential avulsions. It will only be used as necessary, particularly on the M1B site where erosive forces could be high and where there could be the potential for the large gravel pits to "capture" the river. All connection channels to gravel mined ponds are designed to either function as backwater connections with low velocities, or to connect above the 2-year flow event when water spreads out on many floodplain areas and velocities are reduced in the roughened floodplain. Riprap will only be used following the guidelines in the NMFS SLOPES IV Roads, Culverts, and Bridges Biological Opinion (NMFS 2008). Riprap will be placed using a hydraulic excavator.

2.8 Culvert Installation

In a few locations, new side channels and pond connections cross existing roads or trails that will be preserved. In these cases, the channels will be passed under the road in three-sided culverts that, in addition to providing hydraulic capacity, provide a natural bottom and room for the channel to meander slightly. The culvert size will be determined with hydraulic design calculations and will meet the State of Oregon's requirements for fish passage. Culvert construction will be staged to occur during the construction of the affected side channels or pond connections. Culvert installation will be conducted with mechanized equipment, and when necessary will include the pouring of concrete footings below the soil surface.

2.9 Reshaping Pond Banks

The ponds that currently exist in the floodplain of the project sites are mostly remnants of historical gravel mining activities, and thus have typically steep banks. The steep banks provide little habitat for fish, insects, aquatic and riparian plants, and primary production. Regrading and reshaping the pond banks to a much gentler slope will create shallow water habitat, wetland areas, and a much larger and more extensive riparian zone. It will also allow reptiles and other species better access to and from the ponds.

Pond bank reshaping consists of excavating the upper portion of the bank back to a 5:1 (H:V) slope or gentler and then pushing that bank material and other regraded material into the ponds to create shallow water and wetland habitats. High ground above the pond will be graded to a design slope by excavation using a front end loader or an excavator. The excavated material will be deposited below the water line inside the pond banks to create the shallow water habitat. The disturbed areas will be restored with bank and riparian vegetative plantings using a combination of machines and hand labor.

2.10 Constructing Foot Path Bridges

Footpath trails intersect new side channels at two sites, so in order to maintain the existing pedestrian access, pedestrian bridges will be installed. The design includes the installation of prefabricated pedestrian bridges to cross these channels. The bridge material and design parameters will vary from location to location, but will be either wooden or aluminum/steel prefabricated bridge with concrete abutments on the banks. The trails may need minor grading to match the bridge approaches. Hydraulic modeling will be performed to set the bridge low chord elevation and determine appropriate bridge spans to meet fish passage requirements. The bridges will be constructed using excavators and a crane.

2.11 Gravel Road Obliteration

Site C1C features the removal of a small, little-used gravel road that parallels the Coast Fork Willamette River bank. In order to maximize the efficacy of a restored riparian corridor, the road will be excavated down to remove compacted rock and the soil will be ripped to facilitate planting of native vegetation in its place. A nearby road will be preserved to allow access to this area of the site. The gravel road will be obliterated by excavating the surface material and subgrade using front end loaders and dump trucks. The material will be disposed of off-site. The road bed will be replaced with topsoil using dump trucks and front end loaders, and will be revegetated.

2.12 Vegetative Plantings

Native vegetation species will be planted at all sites. The primary plant community that will be planted will be the riparian community, dominated by black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), Oregon ash (*Fraxinus latifolia*), incense cedar (*Calocedrus decurrens*), Douglas-fir (*Pseudosuga menziesii*), and a variety of shrub species. At sites with extensive tree cover, currently, the invasive understory will be removed and then replanted with appropriate riparian underplantings of shrub and conifer species. At sites with gravel pits, the shallow water and wetland zones will be planted with emergent wetland vegetation.

2.13 Conservation Measures

This proposed action plans to comply with relevant conservation measures included in the SLOPES IV Restoration Biological Opinion (NMFS 2008). These conservation measures include those listed below:

1. Flagging Sensitive Areas. Sensitive resources that should not be disturbed during construction will be flagged and protected during construction.
2. Temporary Erosion Controls. Temporary erosion controls will be installed, as appropriate, before any significant alteration of the action site occurs.
3. Temporary Access Roads. Temporary access roads will not be built on steep slopes, where grade, soil, or other features suggest a likelihood of excessive erosion or failure. For the most part, existing access roads are present, and only limited additional access would be required.
4. Fish Passage. Fish passage will be provided for any adult or juvenile fish present in the action area during construction, or will be salvaged and removed. All reconnection channels and passageways will meet NMFS fish passage criteria.
5. In-water Work Period. All work below the ordinary high water line will occur during the designated ODFW in-water work periods for the Lower Coast and Middle Forks of the Willamette River, as appropriate. These in-water work periods are generally listed in the Oregon Guidelines for Timing of In-water Work to Protect Fish and Wildlife Resources (ODFW 2008, or most recent version), but are then more specifically determined by coordination with ODFW staff, and coordination with ODFW will happen accordingly for this project. For work in the off-channel gravel ponds, coordination with ODFW will occur to determine if these waters can be considered "isolated" and whether work within these isolated work areas can be allowed outside of the normal fish windows.
6. Work Area Isolation. Any work within the wetted channel will be isolated from the Coast or Middle Forks and any upstream tributaries by installation of coffer dams and other measures, as appropriate. A work area isolation and fish salvage plan will be prepared for each site for approval by ODFW and NMFS and carried out with a Scientific Collection Permit. Fish and wildlife will be salvaged and removed from the work area. Any pumps used outside of isolated areas will be screened per ODFW requirements. Any groundwater present in the excavation area will be pumped and treated via

infiltration or other methods (such as Baker tanks) prior to discharge back to either the river or wetlands.

7. Fish Capture and Release. Any fish that may be trapped within the isolated work area will be captured and released using a trap, seine, electrofishing, or other methods as prudent to minimize the risk of injury, then released at a safe release site. A scientific collection permit will be obtained to conduct this work, with approval of the fish salvage plan from NMFS and ODFW. Capture and release will be supervised by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of fish. If electrofishing is used, the NMFS electrofishing guidelines will be followed (NMFS 2000).
8. Fish Screens. It is not likely that the proposed work will require any pumping in excess of 3 cfs or diversion of any waterbodies aside from Pudding Creek. Any diversions required will have a fish screen that is installed, operated, and maintained that meets NMFS fish screen criteria (NMFS 2008, or most recent version).
9. Erosion and Pollution Control Plan. An erosion and pollution control plan will be prepared for each individual project site and carried out, commensurate with the scope of the action that includes the following information: (a) the name, phone number, and address of the person responsible for accomplishing the plan; (b) best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action; (c) best management practices to confine, remove, and dispose of construction waste, including debris, discharge water, concrete, cement, grout, washout facility, petroleum product, or other hazardous materials generated, used, or stored on-site; (d) procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities; and (e) steps to cease work under high flows, except for efforts to avoid or minimize resource damage.
10. Choice of Equipment. Heavy equipment will be limited to that with the least adverse effects on the environment.
11. Staging Area. Preference for staging areas to be located more than 150 feet from rivers or wetlands; however since the project sites include many waterbodies (gravel ponds), this may not be feasible. If the staging area(s) will be located within 150 feet of the river or the wetlands, they will be fenced and contained to prevent the runoff of sediment or pollutant laden stormwater into the river or wetlands. Vehicles and equipment will be inspected daily for fluid leaks before leaving the staging area when operating within 50 feet of any stream, waterbody, or wetland and the equipment will be steam cleaned before operation below the ordinary high water or as necessary to remain grease free. Biodegradable lubricants and fuels will be used as available.
12. Work from Top of Bank. To the extent feasible, heavy equipment will work from the top of the bank.
13. Site Restoration. Any temporary access routes constructed will be removed in their entirety and the locations will be restored via mulching and hydroseeding and then planting of native shrub and tree species. Any fill placed in wetlands for temporary construction purposes will be removed and the area will be restored. Any large wood, native vegetation, topsoil and native channel material displaced by construction will be stockpiled for reuse on-site during restoration, as feasible. When construction is

complete, all disturbed areas will be restored as necessary to renew ecosystem processes. Fencing will be installed as necessary to prevent damage to newly revegetated sites by livestock or unauthorized persons.

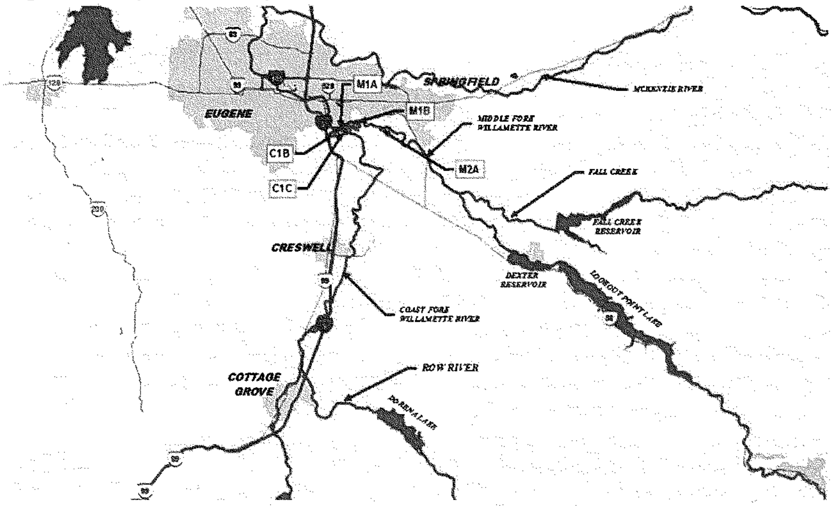
14. Large Wood Condition/Use. Key pieces of large wood that will be relied upon to provide streambank stability or redirect flows will be intact, hard, undecayed logs of the specified engineering design length and diameter with untrimmed rootwads.
15. Streambank Shaping. Streambank shaping will occur to restore regraded banks to a more natural or stable slope suitable for establishment of permanent woody vegetation without changing the location of the bank toe. Rock riprap will only be used when absolutely necessary to prevent catastrophic avulsion or erosion conditions or for the stabilization of large wood structures.
16. Soil Reinforcement. Soil reinforcement earthwork will occur in the dry with the use of biodegradable fabrics that are penetrable by plant roots.
17. Planting or Installing Vegetation. A diverse mix of native species adapted to the site conditions will be used for all revegetation efforts. Non-native or invasive species will not be included. Existing non-native or invasive species will be controlled as feasible on the site to promote native vegetation growth and dominance.
18. Monitoring and Adaptive Management. A monitoring plan to track the success of the restoration features will be developed.

2.14 Description of the Project Area and Action Area

The proposed project area includes the five floodplain project sites where restoration actions are proposed: Sites C1B, C1C, M1A, M1B, and M2A (see Figure 1), and the adjacent Coast and Middle Forks channels along those sites. The action area includes the Coast and Middle Forks from RM 18 down to the confluence, and RM 192 down to the confluence, respectively. This action area encompasses the river channels along and downstream of the project sites to the confluence and the likely fish species and aquatic habitats associated with the respective channels.

Site C1B. This site is located on the south bank of the Coast Fork Willamette River near Rivermile (RM) 0.5 and encompasses 90 acres. Public access is available to the site from Seavey Loop Road with a semi-developed point of ingress/egress for pedestrians and bicyclists. The site has been gravel mined in the past but is not currently mined and is used informally for public access and use. The site is within the 100-year floodplain and the majority of the site is within the designated floodway. The site has been highly disturbed and then left fallow. Along the riverbank, numerous willows, with dogwood and young Oregon ash, dominate the shoreline providing overhanging vegetation and cover along the shoreline. On the uplands surrounding the ponds, the dominant vegetation is Himalayan blackberry. Numerous other invasive species are present including reed canary grass and pennyroyal. Riprap is present along the river bank to a limited extent. Large woody debris is sparse.

Figure 1. Project Area Map



Site C1C. This site is located on the south bank of the Coast Fork Willamette River near RM 1.2 and encompasses 80 acres. There is an existing gravel road access to the site from Seavey Loop Road and multiple gravel roads all over the site. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site and several other Wildish Land Company parcels adjacent to the site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. The majority of the vegetation on the site is disturbed and young aged (less than 20 years), although some older cottonwoods are also present. Numerous invasive species are present including Himalayan blackberry, knotweed, purple loosestrife, pennyroyal, and teasel. Some willows and other native species are sparsely present. Much of the upland areas are bare ground in gravel roads and access routes for gravel mining. Riprap and debris such as used concrete is present along the river bank in many areas. The gravel mined ponds are typically fairly shallow on this site (less than 10 feet deep), with steep banks dominated by invasive species. Numerous aquatic plants are also present. Several high flow channels are present on this site that allow connections between some of the ponds and the Coast Fork on an approximately annual basis.

Site M1A. This site is located between the Coast Fork and the Middle Fork of the Willamette River near RM 2 and 188, respectively and encompasses 150 acres. Access is available to the site via a gravel road from Seavey Loop Road and Site C1C. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site and several other Wildish Land Company parcels adjacent to the site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. Similar to Site C1C, the majority of the vegetation on the site is disturbed and young aged (less than 20 years), although some older cottonwoods are also present. Numerous invasive species are present including Himalayan blackberry, knotweed, purple loosestrife, pennyroyal, and teasel.

Some willows and other native species are sparsely present. Much of the upland areas are bare ground in gravel roads and access routes for gravel mining, with a portion of the site used for cattle grazing and includes weedy pasture grasses and forbs. Riprap and debris such as used concrete is present along the river bank in many areas. The gravel mined ponds are typically fairly shallow on this site, with steep banks dominated by invasive species. Numerous aquatic plants are also present.

Site M1B. This site is located on the left bank of the Middle Fork Willamette River near RM 189 and encompasses 174 acres. The site is accessible via gravel roads from Seavey Loop Road (via Site C1C) or from the Buford Access Road through Buford/Mt. Pisgah County Recreation Area. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site and several other Wildish Land Company parcels adjacent to the site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. This site has two very large gravel ponds, including one that extends for nearly one mile parallel with the Middle Fork. This pond was formerly part of the river channel, but was separated via a pushed up gravel/rock berm as restrictions on mining in the river became effective in the 1970s and 1980s. The ponds on this site are the deepest, up to around 20 feet depth. The majority of the vegetation on the site is disturbed and young aged (less than 20 years), although some older cottonwoods are also present. Numerous invasive species are present including Himalayan blackberry, knotweed, purple loosestrife, pennyroyal, and teasel. Some willows and other native species are sparsely present. Much of the upland areas are bare ground in gravel roads and access routes for gravel mining. Riprap and debris such as used concrete is present along the river bank in many areas. Few aquatic plants are present due to the depth and steepness of the pond banks.

Site M2A. This site is located on the left bank of the Middle Fork Willamette River near RM 191 and encompasses 78 acres. The site is accessible via gravel roads from Buford Access Road through Site M1B. The property was owned by Wildish Land Company and used for gravel mining in the past. The Nature Conservancy purchased this site and several other Wildish Land Company parcels adjacent to the site in 2010. The majority of the site is within the 100-year floodplain and the designated floodway. This site is primarily forested and has shallower ponds with connection to Pudding Creek and occasional river backwatering. Vegetation includes cottonwood, various grasses and rushes and Himalayan blackberry. Oregon chub and red-legged frog are known to be present (TNC recent sampling 2011), and salmonids can access Pudding Creek during winter when the river or creek levels are high enough to connect over the roadway (more frequent than annual connection). An existing culvert intended to pass Pudding Creek under the gravel roadway on the site does not really pass flow or fish, and the creek typically flows out over the road.

3.0 CONCURRENCE

The BA provided by the Corps included potential effects to Bull Trout (*Salvelinus confluentus*) and Bradshaw's desert parsley (*Lomatium bradshawii*). According to the BA, the Corps concluded that the proposed project, "may affect, but is not likely to adversely affect" bull trout and designated critical habitat and Bradshaw's desert parsley. The Service concurs with the Corps' determination that the proposed action will not adversely affect bull trout and Bradshaw's desert parsley. Therefore, the Service will not analyze the effects of the proposed action to these species further in this biological opinion. The Service's concurrence is based upon the following findings:

Bull Trout

1. Bull trout are unlikely to be in the action area;

2. The primary constituent elements of critical habitat are not likely to be degraded to an extent that is measureable or permanent.

Bradshaw's desert parsley

1. Field surveys will be conducted within suitable habitat prior to activities during the growing season prior to construction activities. If it is found to be present, the individual plants and/or areas of occurrence will be protected during construction by signage and flagging/fencing to keep equipment and personnel out of the area.

4.0 STATUS OF THE SPECIES-OREGON CHUB

4.1 Species Description

The Oregon chub was first described in scientific literature in 1908 (Snyder 1908), however it was not identified as a unique species until 1991 (Markle et al. 1991). The Oregon chub is a small minnow (Family: Cyprinidae) with an olive-colored back grading to silver on the sides and white on the belly. Scales are relatively large with fewer than forty occurring along the lateral line and scales near the back are outlined with dark pigment (Markle et al. 1991). While young of the year range in length from 7 to 32 millimeters (mm) (0.3 to 1.3 inches), adults can be up to 90 mm (3.5 inches) in length (Pearsons 1989). The species is distinguished from its closest relative, the Umpqua chub (*Oregonichthys kalawatseti*), by Oregon chub's longer caudal peduncle (the narrow part of a fish's body to which the tail is attached), mostly scaled breast, and more terminal mouth position (Markle et al. 1991).

The Service listed the Oregon chub as an endangered species in 1993 (Fish and Wildlife Service 1993) and a final recovery plan for the Oregon chub was published in 1998 (Fish and Wildlife Service 1998). The Oregon chub recovery plan established the following criteria for downlisting the species from endangered to threatened status:

> Establish and manage 10 populations of at least 500 adults each; (2) All of these populations must exhibit a stable or increasing trend for 5 years; and (3) At least three populations must be located in each of the three sub-basins of the Willamette River identified in the plan (Mainstem Willamette River, Middle Fork, and Santiam River).

The recovery plan established the following criteria for delisting (i.e., removing the species from the List of Endangered and Threatened Wildlife):

> Establish and manage 20 populations of at least 500 adults each; (2) All of these populations must exhibit a stable or increasing trend for 7 years; (3) At least four populations must be located in each of the three sub-basins (Mainstem Willamette River, Middle Fork, and Santiam River); and (4) Management of these populations must be guaranteed in perpetuity.

In 2008, the Service completed a 5-year review of the Oregon chub, concluding that downlisting criteria had been met and the species should be downlisted to threatened status (Fish and Wildlife Service 2008a). The final rule designating critical habitat (Fish and Wildlife Service 2010a, b) and the final rule to downlist Oregon chub were published in 2010 (Fish and Wildlife Service 2010c). The Service recently announced the initiation of another 5-year review of the status of Oregon chub (Fish and Wildlife Service 2013).

Critical Habitat Description

Critical habitat was designated for Oregon chub in 2010 (Fish and Wildlife Service 2010b, c). In the final rule, the Service determined that 25 units totaling approximately 53.5 hectares (ha) (132.1 acres) in Benton, Lane, Linn and Marion Counties met the proposed definition of critical habitat (Figure 1). Land ownership of the proposed critical habitat is as follows: 13.3 ha (32.9 acres) private, 12.2 ha (30.11 acres) state, 26.8 ha (66.3 acres) Federal and 1.2 ha (2.8 acres) other public lands.

The Primary Constituent Elements (PCEs) of Oregon chub critical habitat are the habitat components that provide the following:

1. Off-channel water bodies such as beaver ponds, oxbows, side-channels, stable backwater sloughs, low-gradient tributaries, and flooded marshes, including at least 500 continuous square meters (m^2) (0.12 acres) of aquatic surface area at depths between approximately 0.5 and 2.0 meters (m) (1.6 and 6.6 feet)
2. Aquatic vegetation covering a minimum of 250 m^2 (0.06 acres) (or between approximately 25 and 100 percent) of the total surface area of the habitat. This vegetation is primarily submergent for purposes of spawning, but also includes emergent and floating vegetation, and algae, which are important for cover throughout the year. Areas with sufficient vegetation are likely to also have the following characteristics.
    a. Gradient less than 2.5 percent;
    b. No or very low water velocity in late spring and summer;
    c. Silty, organic substrate; and
    d. Abundant minute organisms such as rotifers, copepods, cladocerans, and chironomid larvae.
3. Late spring and summer subsurface water temperatures between 15 and 25 °C (59 and 78 °F), with natural diurnal and seasonal variation.
4. No or negligible levels of non-native aquatic predatory or competitive species. Negligible is defined for the purpose of this rule as a minimal level of non-native species that will still allow the Oregon chub to continue to survive and recover.

4.2 Life History

Oregon chub reach maturity at about 2 years of age (Scheerer and McDonald 2003, p. 78) and in wild populations can live up to 9 years. Most individuals over 5 years old are females (Scheerer and McDonald 2003, p. 68). Oregon chub spawn from May through August; individuals are not known to spawn more than once a year. Spawning activity has only been observed at water temperatures exceeding 16 °C (61 °F). Males over 35 mm (1.4 inches) have been observed exhibiting spawning behavior (Pearsons 1989, p. 4). Egg masses have been found to contain 147-671 eggs (Pearsons 1989, p.17).

Oregon chub are found in slack water off-channel habitats such as beaver (*Castor Canadensis*) ponds, oxbows, side channels, backwater sloughs, low gradient tributaries, and flooded marshes. These habitats usually have little or no water flow, are dominated by silty and organic substrate, and contain considerable aquatic vegetation providing cover for hiding and spawning (Pearsons 1989, p. 27; Markle *et al.* 1991, p. 289; Scheerer and McDonald 2000, p. 1). The average depth of habitat utilized by Oregon chub is less than 1.8 m (6 ft), and summer water temperatures typically exceed 16 °C (61 °F).

Adult chub seek dense vegetation for cover and frequently travel in the mid-water column in beaver channels or along the margins of aquatic plant beds. Larval chub congregate in shallow near-shore areas in the upper layers of the water column, whereas juveniles venture farther from shore into deeper areas of the water column (Pearsons 1989, p. 16). In the winter months, Oregon chub can be found buried in the detritus or concealed in aquatic vegetation (Pearsons 1989, p. 16). Fish of similar size school and feed together. In the early spring, Oregon chub are most active in the warmer, shallow areas of the ponds.

Oregon chub are obligatory sight feeders (Davis and Miller 1967, p. 32). They feed throughout the day and stop feeding after dusk (Pearsons 1989, p. 23). Chub feed mostly on water column fauna. The diet of Oregon chub adults collected in a May sample consisted primarily of minute crustaceans including copepods, cladocerans, and chironomid larvae (Markle *et al.* 1991, p. 288). The diet of juvenile chub also consists of minute organisms such as rotifers and cladocerans (Pearsons 1989, p. 2).

Of the known Oregon chub populations, the sites with the highest diversity of native fish, amphibian, and reptile species have the largest populations of Oregon chub (Scheerer and McDonald 2000, p. 24). Beavers appear to be especially important in creating and maintaining habitats that support these diverse native species assemblages (Scheerer and Apke 1998, p. 45).

4.3 Status

Distribution

The Oregon chub is endemic to the Willamette River drainage of western Oregon. Historical records show Oregon chub were found as far downstream as Oregon City and as far upstream as Oakridge. At the time of listing in 1993, there were only eight known populations of Oregon chub. These locations represented a small fraction (estimated as two percent based on stream miles) of the species' formerly extensive distribution within the Willamette River drainage.

Since the time of listing, several Oregon chub populations have been extirpated, a number of new populations have been discovered, and there have been a number of successful introductions

(Bangs *et al.* 2012). In 2012, the ODFW confirmed the continued existence of Oregon chub at 61 locations in the North and South Santiam River, McKenzie River, Middle Fork and Coast Fork Willamette River, and several tributaries to the mainstem Willamette River downstream of the Coast Fork/Middle Fork Willamette River confluence (Bangs *et al.* 2012). These included 42 naturally occurring and 19 introduced populations. Twelve new populations of Oregon chub were also discovered in connected sloughs in the Middle Fork Willamette and Mainstem Willamette drainages (Bangs *et al.* 2012). Thirty-six of these Oregon chub populations have an estimated abundance of over 500 fish; and 20 of these populations have also exhibited a stable or increasing trend over the last seven years (Bangs *et al.* 2012). The current status of Oregon chub populations meets the goals of the recovery plan for delisting. The distribution of these sites is shown in Table 1.

Table 2. Distribution of Oregon chub populations meeting recovery criteria for delisting.

Subbasin	# of populations	# of large populations (>500 fish)	# of large populations with stable/increasing trend	Total chub in subbasin	Size range of populations
Santiam	17	11	5	29,070	10 to 5,730
Mainstem Willamette*	25	9	6	146,509	4 to 82,800
Middle Fork Willamette	33	15	9	44,999	1 to 13,460
Coast Fork Willamette	4	1	0	962	2 to 700

**includes McKenzie River subbasin*

Although certain populations of Oregon chub have remained relatively stable from year to year, substantial fluctuations in population abundance are normal. For instance, the largest known population at Ankeny National Wildlife Refuge had an estimated abundance of 21,790 chub in 2010 and increased to 96,810 chub in 2011.

Threats

Historically, the mainstem of the Willamette River was a braided channel with many side channels, meanders, oxbows, and overflow ponds that provided habitat for the chub. Periodic flooding of the river created new habitat and transported the chub into new areas to create new populations. The construction of flood control projects and dams, however, changed the Willamette River significantly and prevented the formation of chub habitat and the natural dispersal of the species. Other factors responsible for the decline of the chub include habitat alteration; the proliferation of nonnative fishes; desiccation of habitats; sedimentation resulting from timber harvesting in the watershed; and possibly the demographic risks that result from a fragmented distribution of small, isolated populations.

Elevated levels of nutrients and pesticides have been found in some Oregon chub habitats (Materna and Buck 2007, p. 67). The source of the contamination is likely agricultural runoff from adjacent farm fields (Materna and Buck 2007, p. 68). Water quality investigations at sites in the Middle Fork and mainstem Willamette subbasins have found some adverse effects to Oregon chub habitats caused by changes in nutrient levels. Elevated nutrient levels at some Oregon chub locations, particularly increased nitrogen and phosphorus, may result in anoxic (absence of oxygen) conditions unsuitable for chub, or increased plant and algal growth that severely reduce habitat availability because of succession.

Many populations of chub are currently isolated from other chub populations due to the reduced frequency and magnitude of flood events and the presence of migration barriers such as impassible culverts and permanent, high beaver dams. Managing Oregon chub in isolation may have genetic consequences (DeHaan *et al.* 2010, p. 20). Burkey (1989) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth for local populations may be low and probability of extinction high (Burkey 1989, 1995). A genetic analysis completed in 2010 shows that while gene flow is limited among Oregon chub populations, most of the populations in isolated ponds are currently genetically viable and have remained so over several years (1997 to 2005) (DeHaan *et al.* 2010). However, the data were collected over only a 3 to 4-generation time period and it may be too soon to see evidence of negative genetic effects. Additionally, genetic data from historic populations (pre-Willamette project) is not available to compare with these results.

Climate change presents substantial uncertainty regarding the future environmental conditions in the Willamette Basin and is expected to place an added stress on the species and its habitats. The Intergovernmental Panel on Climate Change (IPCC) has concluded that recent warming is already strongly affecting aquatic biological systems; this is evident in increased runoff and earlier spring peak discharge in many glacier- and snow-fed rivers (IPCC 2007, p. 8). Projections for climate change in North America include decreased snowpack, more winter flooding, and reduced summer flows (IPCC 2007, p. 14). Projections for climate change in the Willamette Valley in the next century include higher air temperatures that will lead to lower soil moisture and increased evaporation from streams and lakes (Climate Leadership Initiative (CLI) and the National Center for Conservation Science and Policy 2009, p. 9). While there is high uncertainty in the total precipitation projections for the region, effective precipitation (precipitation that contributes to runoff) may be reduced significantly even if there is no decline in total precipitation (CLI and the National Center for Conservation Science and Policy 2009, p. 9).

Although climate change is almost certain to affect aquatic habitats in the Willamette Basin (CLI 2009, p. 1), there is great uncertainty about the specific effects of climate change on the Oregon chub. The Service has developed a strategic plan to address the threat of climate change to vulnerable species and ecosystems; goals of this plan include maintaining ecosystem integrity by protecting and restoring key ecological processes such as nutrient cycling, natural disturbance cycles, and predator-prey relationships (U.S. Fish and Wildlife Service 2010d; p. 23). The Oregon chub recovery program will strive to achieve these goals by working to establish conditions that allow populations of Oregon chub to be resilient to changing environmental conditions and to persist as viable populations into the future. Our recovery program for the species focuses on maintaining large populations distributed across the species' entire historical range in a variety of ecological settings (e.g., across a range of elevations). This approach is consistent with the general principles of conservation biology. In their review of minimum population viability literature, Traill et al. (2009, p. 3) found that maintenance of large populations across a range of ecological settings increases the likelihood of species persistence under the pressures of environmental variation and facilitates the retention of important adaptive traits through the maintenance of genetic diversity. Maintaining multiple populations across a range of ecological settings, as described in the recovery plan, will also increase the likelihood that at least some of these populations persist under the stresses of a changing climate.

4.4 Conservation

Needs

In the past, the recovery strategy focused on improving Oregon chub habitats in isolation due to the loss and fragmentation of suitable habitats and the threats posed by non-native fishes. Increasing the abundance and distribution of Oregon chub in isolation has proven to be effective at halting the decline of Oregon chub populations and in meeting the recovery criteria for downlisting. However, managing Oregon chub in isolation does not allow genetic transfer between populations and may have future genetic consequences. Floodplain connectivity at many sites near mainstem rivers is not well understood. Recent hydrological data were collected by ODFW at sites that are influenced by the operation of dams in the Willamette Basin to determine the point of connectivity at each site and the duration of floodplain connection. They found that several sites connect to the river more frequently or for longer periods than previously known. Additionally, in 2012, ODFW detected upstream movement of two marked Oregon chub between habitats in the Middle Fork Willamette River. This is the first documentation of upstream movement of Oregon chub. Although, it is not known how frequently Oregon chub are moving between habitats, the connectivity study shows that the mechanism for dispersal does exist. Future studies will include monitoring for movement of Oregon chub between connected populations in other subbasins. Genetic studies are also needed to determine whether the populations in these periodically connected sites are operating as a metapopulation.

Additionally, some populations are persisting even in the presence of nonnatives, although many of these populations are less abundant than populations without nonnatives present. Understanding what habitat characteristics allow Oregon chub to coexist with nonnatives in these connected habitats will be useful in determining whether chub can be reintroduced in connected habitats.

Current Actions

The Oregon Chub Working Group was formed in 1991 and has been proactive in conserving and restoring habitat for the Oregon chub and raising public awareness of the species since before the Federal listing in 1993 (Fish and Wildlife Service 2008a, p. 11).

In 1992, an interagency Conservation Agreement for the Oregon Chub in the Willamette Valley, Oregon was completed and signed by the Service, the U.S. Forest Service, the Bureau of Land Management, the ODFW, and Oregon Parks and Recreation Department (Fish and Wildlife Service 1998). The purpose of the coordinated plan was to facilitate Oregon chub protection and recovery and to serve as a guide for all agencies to follow as they conduct their missions.

In February 1997, a Memorandum of Understanding was signed by the Service and the City of Salem to protect and enhance the population of Oregon chub located in the drinking water treatment facility at Geren Island in the North Santiam River.

In 1996, a no-spray agreement with the Oregon Department of Transportation was formalized to protect Oregon chub sites located in the Middle Fork Willamette River drainage adjacent to Highway 58 in Lane County. The agreement prohibits spraying of herbicides in the vicinity of Oregon chub sites and limits vegetation control to mechanical methods if necessary.

The Service has completed three individual safe harbor agreements (SHA) for Oregon chub. To streamline the process for landowners to enter into a SHA in the future, a programmatic SHA was prepared by the Service and ODFW in 2009 (Fish and Wildlife Service 2009). Under a SHA, property owners who undertake management activities that attract listed species onto their property or that increase the numbers or distribution of listed species already present on their property will not incur future property-use restrictions. SHAs provide assurances to the property owner that allow alterations or modifications to enrolled property, even if such action results in the incidental take of the covered listed species or, in the future, returns the species back to an originally agreed-upon baseline condition.

In 2008, the Service signed a biological opinion on the continued operation and maintenance of the Willamette River Basin Project and effects to Oregon chub, bull trout, and bull trout critical habitat (Service 2008b). To address specific terms and conditions outlined in the opinion, ODFW initiated a study in 2009 to determine the current status of chub populations, fish assemblages, and habitat conditions in habitats potentially affected by the operation of Willamette River Basin Project dams. They are assessing relationships between pond bathymetry, pond elevations, pond temperatures, river flow levels, site connectivity, and fish assemblages. Data from this study will be used to provide the USACE with flow management recommendations that will contribute to Oregon chub recovery and minimize incidental take of chub.

The improvement in status of Oregon chub is due largely to the implementation of actions identified in the Oregon chub recovery plan. This includes habitat restoration, the discovery of many new populations as a result of ODFW's surveys of the basin, and the establishment of additional populations via successful reintroductions within the species' historical range. Introduced populations have been established in suitable habitats with low connectivity to other aquatic habitats to reduce the risk of invasion by nonnative fishes.

5.0 ENVIRONMENTAL BASELINE

5.1 Status of the Species in the Action Area

The action area is within the Coast Fork and Middle Fork Willamette River subbasins. Four populations are known to occur in the Coast Fork Willamette River. These include Sprick Pond, Herman Pond, Coast Fork side channels, and Lynx Hollow side channels. In 2012, ODFW noticed a significant increase in Oregon chub at Sprick Pond which is the only population in the Coast Fork Willamette River drainage supporting 500 or more Oregon chub (Bangs *et.al.* 2012). Although Oregon chub are known to occur within the Coast Fork Willamette River subbasin, Oregon chub do not occur near the proposed action.

The ODFW has sampled many potential Oregon chub habitats throughout the Middle Fork Willamette River subbasin since 1992. In 2012, ODFW confirmed the continued existence of Oregon chub at 33 sites within this subbasin; however, the majority of these sites are several kilometers upstream of the proposed action area (Bangs *et al.* 2012). Within the proposed action area, Oregon chub are only found in three locations: a slough near the Springfield millrace channel, the TNC Island Pond, and in one of the gravel ponds at the TNC property. These sites each contain only a few chub and are not likely to support spawning or population growth due to lack of suitable habitat conditions.

Springfield millrace

This site is located across the river from the TNC property and is part of a larger restoration project. In 2009, during construction of a new channel connecting the millrace with the Middle Fork Willamette River, eight adult Oregon chub were discovered in a backwater slough that intersected the new channel. Based on habitat conditions and the presence of predatory, non-native fish in the existing millrace channel, Oregon chub are likely excluded from the millrace and exist only in the backwater slough near the new entrance to the millrace.

TNC Island Pond

This pond is located on an island just downstream of the gravel ponds. The pond is connected to the mainstem Middle Fork Willamette River for most of the year. Two adult Oregon chub were discovered here in 2012. The water temperatures in the pond are cold and had barely reached 15° C when sampling occurred in July; this may be a limiting factor preventing Oregon chub from spawning in this habitat.

TNC Gravel Ponds

One adult Oregon chub was found near the edge of one of the gravel pits at this site. The gravel pits are too deep and lack suitable vegetation to provide spawning habitat for Oregon chub. Pudding Creek, which runs adjacent to the gravel pits, was sampled in 2012 by ODFW. Although the creek contains suitable habitat upstream and contains other native fish, no Oregon chub were found.

6.0 EFFECTS OF THE ACTION

The proposed action will have long-term beneficial effects on Oregon chub. The proposed action will restore a more natural hydrologic connection between the Coast and Middle Forks of the Willamette River and their floodplains, and will provide an increased area of freshwater off-channel habitats. Short-term adverse effects are likely during construction. Potential effects on Oregon chub resulting from the proposed action include temporary reductions in water quality, changes in habitat elements, and potential direct harm during in-water construction activities. In-water work areas will need to be isolated and fish salvage and removal will occur. The following sections describe the expected impacts resulting from the proposed action.

6.1 Effects on Water Quality

Turbidity and Sediment

Construction-related activities may temporarily increase suspended sediment and turbidity during in-water work for minutes to hours following cessation of construction activities at each location. Although turbidity has been linked to a number of behavioral and physiological stress responses in salmonids, available data documenting the effects of turbidity on Oregon chub are limited. Localized turbidity increases are likely to cause some juveniles and adults to seek alternative habitat, which could contain suboptimal cover and forage and cause increases in behavioral stress (*e.g.*, avoidance and displacement), and sub-lethal responses (*e.g.*, increased respiration, reduced feeding success, and reduced growth rates). Turbidity and sediment can also reduce embryo survival and juvenile rearing densities. Excessive sediment can clog the gills of juvenile fish, reduce prey availability, and reduce juvenile success in catching prey. Similar responses, to a lesser magnitude, are expected in chub. Effects of turbidity on fish are influenced by several factors: the duration of turbidity (the quantity of suspended materials, size of sediment particles, and current velocities), and the proximity of fish to the turbid area (Bisson and Bilby 1982).

The effects of turbidity on Oregon chub will be minimized by the limited, temporary nature of disturbance, by conducting fish salvage, and by implementing an erosion control plan. Additionally, work will be conducted only during approved in-water work periods prescribed by ODFW when Oregon chub are least vulnerable (i.e., not spawning) (BA, p. 52). The use of access roads may cause erosion resulting in sediments entering chub habitats. However, the proposed action includes several conservation measures to prevent effects to Oregon chub from use of access roads (BA, p. 18). Existing access roads will be used whenever possible and temporary access roads will not be built on steep slopes or where soil erosion is likely to occur as a result. The implementation of these and other conservation measures described in the proposed action will reduce the likelihood of effects to Oregon chub from the use of access roads.

Chemical Contamination

Chemical contamination is possible when activities involving hazardous materials occur in areas having direct or indirect hydrologic connections to these drainages. These activities are primarily limited to fluid leaks from construction equipment and vehicles during project construction. The proposed action includes conservation measures designed to prevent equipment leaks into aquatic habitats (BA, p. 19).

Accidental spills of construction materials or petroleum products could result in adverse effects to water quality. The timing of such an effect would be instantaneous and unpredictable. The duration of effects from a spill would depend on the severity of the spill and whether the spill occurred inside an isolation/containment area or resulted in releases away from in-water work areas (e.g., a hydraulic fluid leak under pressure). The worst-case scenario could entail the failure of a large piece of equipment and the release of several gallons of petroleum product near or into a waterway. This could result in the death of local aquatic organisms such as fish, waterfowl, macroinvertebrates, and vegetation. Since the proposed action will follow a BMP's developed in a pollution control plan, we anticipate a very low likelihood of spills.

6.2 Effects on Habitat Functions

Changes in flows, temperature, and habitat connectivity

In-water restoration activities may alter the physical features that make downstream habitat suitable for Oregon chub, including flow rates, connectivity, and temperatures. Although restoration activities are intended to restore natural floodplain functions, they may also have the unintended consequence of affecting Oregon chub downstream. Construction projects may also cause long-term changes in sediment deposition patterns downstream. Sedimentation could also reduce the area of affected habitat or the amount of emergent vegetation available for spawning.

This reduction in habitat could cause a decline in survival, growth, or reproductive success in an affected population. Restoration activities within gravel ponds could alter flow patterns downstream (e.g. shifting flows to secondary channels) and result in reductions in the volume of water reaching downstream off-channel habitat occupied by Oregon chub. Decreased water volumes and the resulting increased water temperatures could result in physiological stress and injury or death of individual chub due to decreased dissolved oxygen. Additionally, reproductive losses may occur as vegetated areas where spawning occurs are desiccated. Reduced flows could also reduce habitat connectivity that allows for chub dispersal and reduce genetic diversity due to isolation.

The proposed action could also result in increased flows into Oregon chub habitat reducing the habitat suitability for Oregon chub. For instance, flows may be redirected as a result of restoration projects into historic secondary channels that are now off-channel habitat with no or low velocity. Increased flows could significantly change the habitat conditions, including temperature, vegetation, and substrate deposition which are key elements in Oregon chub habitat.

Effects on Riparian Vegetation

Establishing or improving existing cover of native aquatic and riparian vegetation would have a beneficial effect on Oregon chub by increasing the amount of spawning and refugia habitat. Native riparian and emergent vegetation species will be planted at all sites and existing non-native or invasive species will be controlled using hand labor and spot treatment of herbicides. If planting is done on the banks of gravel ponds containing chub, there would be no effect to chub. Plantings done in the shallow water and wetland zone would be isolated from chub and therefore would likely have negligible to no effect on chub.

6.3 Effects on Work-site Isolation

Fish removed from the isolated work area may be caught in nets, electrofished, and handled, resulting in an elevated risk of harm and harassment, and possible mortality. Oregon chub may also be injured or killed during containment system construction. However, work area isolation and fish salvage will be conducted by experienced biologists using methods approved by the ODFW and NMFS to minimize the potential for these effects.

Containment measures will minimize the potential for direct harm to fish from project construction activities. Work area isolation at each location will result in a minor localized habitat modification in the short term (until containment/isolation measures are removed) that could impair or disrupt behavioral patterns of fish, including feeding and sheltering. However, accomplishing the proposed work within the isolation/containment areas will reduce potential adverse effects to downstream habitat and reduce the probability of direct adverse effects to fish in the project area.

It is not likely that the proposed action will require any pumping in excess of 3 cfs or diversion of any waterbodies aside from Pudding Creek. Any diversions required will have a fish screen that is installed, operated, and maintained that meets NMFS fish screen criteria (NMFS 2008, or most recent version). This should minimize the potential for direct harm to chub.

6.4 Critical Habitat

Critical habitat has been designated for Oregon chub. However, there is no critical habitat within the action area.

7.0 CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The population of the southern Willamette Valley region is projected to nearly double in the next 50 years, from 297,811 to 515,000 in the year 2050. For the most part, these new residents will reside in cities. The urban growth areas of Eugene and Springfield contain the largest share of the region's undeveloped residential land, about 48% and 30%, respectively, followed to a lesser extent by Veneta, Cottage Grove, and Oakridge. New residents also will live on rural residential lands; there are as many as 3,000 undeveloped residential parcels in the region outside of the metro area, based on a tax lot analysis and current zoning (LCOG 2001).

As the population grows, the increased pressure to develop floodplain lands will likely place more infrastructure at risk from flooding. Increased development of tributary watersheds could increase peak flows and volume of runoff to the floodplain areas of the Coast Fork and Middle Fork Willamette, as well as to the floodplain on the mainstem Willamette River. Flood damages would likely increase. Climate change scenarios with increased rainfall predictions could also cause flood damages to increase.

Urban growth also will likely result in significant potential for increased point and non-point water quality impacts. TMDLs have been developed for the subbasins to address the worst water quality problems and it is likely that there will be improvements in water quality, although may not be able to achieve the standards.

Population pressures will increase demand for water for drinking, irrigated agriculture, recreation uses, and other demands affecting flow quantity and therefore quality, particularly during low-flow (summer) periods. At the same time, it is likely that community concern to protect and restore indigenous wildlife habitat, and to be able to enjoy high-quality native landscapes from an aesthetic and recreational viewpoint, would increase.

All of this combined expected development and population growth would likely reduce the availability of habitats for listed species and also contribute to adverse effects on the hydrologic regime and water quality. This would result in the further degradation of the PCEs of critical habitats.

Watershed councils, municipalities, counties, and the State of Oregon are likely to continue to undertake restoration measures to improve habitats for listed species. These effects will result in small improvements to fish population abundance, productivity, and spatial structure and result in some improvement to the condition of critical habitat PCEs. When considered together, these cumulative effects are likely to have essentially a balancing effect on listed species and their critical habitats – some degradation and some improvement.

Cumulative impacts to Oregon chub in the corridor include past and current impacts of agriculture, erosion, and increased inputs of fine sediments, road-building activities, grazing, altered flow regimes, and reduced water quality as a result of human development. These activities and other reasonably foreseeable future actions will continue to affect fish habitat and populations.

8.0 CONCLUSION

After reviewing the current status of Oregon chub, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Oregon chub. No critical habitat for Oregon chub occurs in the action area, thus the action, as proposed, is not likely to destroy or adversely modify designated critical habitat.

This no jeopardy finding is supported by the following:

- The project is intended to have long-term beneficial effects on listed species, including Oregon chub, and will help contribute towards the recovery of these species.
- Only a few Oregon chub have been located within the proposed action area due to limited suitable habitat conditions for spawning and population growth.
- Turbidity/sedimentation increases are expected to be localized, temporary, and minor.
- Proper containment measures and BMPs will be followed to minimize adverse impacts to the aquatic environment.
- Loss of any population or a reduction in distribution of Oregon chub is not anticipated. Although adverse impacts to Oregon chub might occur and cause mortality and injury to individuals from increases in turbidity, fine sediment deposition, and disturbance of individuals during in-stream work, these effects are likely to occur to a small portion of the chub population within one subbasin. These effects will not preclude achievement of the delisting criteria for the species.

9.0 INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by Service regulations to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined by Service regulations as intentional or negligent actions that create the likelihood of injury to listed wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR

17.3). Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement.

9.1 Amount or Extent of Take

The effects described above could potentially rise to the level of incidental take for the Oregon chub associated with future restoration actions prepared under the Willamette River Floodplain Restoration Study, Draft Integrated Feasibility Report / Environmental Assessment, Phase 2 Plan. However, information in the BA does not allow us to determine, at the plan level, the likelihood or quantity of such effects that may conform to the regulatory definition of take. The Corps requested that consultation proceed and that effects relative to jeopardy be assessed even in the absence of an ability to assess incidental take.

10.0 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We encourage the Corps to support the following conservation recommendations:

- At restoration project sites with the potential to be occupied by Oregon chub, pre-project sampling using minnow traps will be conducted by qualified fisheries biologists to determine whether Oregon chub may be present. If Oregon chub are found at the proposed project site during this sampling, a separate individual Section 7 consultation will be initiated for that project; and
- It is possible that a previously unknown population of Oregon chub may be captured at a project site during pre-construction in-water worksite isolation. In the event this occurs, the Service and ODFW will be contacted immediately in order to recommend additional site-specific conservation measures. Additionally, the following conservation measures will be implemented if Oregon chub are captured during in-water worksite isolation:
    1. All live Oregon chub captured shall be released as soon as possible, and as close as possible to the point of capture.
    2. If it is necessary for Oregon chub to be held, a healthy environment for the stressed fish must be provided, and the holding time must be minimized.
    3. Water to water transfers, the use of shaded dark containers, and supplemental oxygen shall all be considered in designing fish handling operations.

11.0 REINITIATION NOTICE

This concludes formal consultation on the Corps Willamette River Floodplain Restoration Study, Draft Integrated Feasibility Report / Environmental Assessment, Phase 2 Plan. Reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (2) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (3) a new species is listed or critical habitat designated that may be affected by the action.

12.0 LITERATURE CITED

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Oregon
John A. Kitzhaber, MD, Governor

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June 25, 2013

Ms. Joyce Casey
USACE
P.O. Box 2946
Portland, OR 97208-2946

RE: SHPO Case No. 11-0497
Willamette Confluence Preserve Proj
FOE/re-contouring, restoration, maintenance
The Nature Conservancy
18S 2W 6, 7, 8, 9, 10, 16 and 18S 3W 11, 12,, Lane County

Dear Ms. Casey:

Our office has recently received a letter from your Dan that attempted to clarify the original intention of the project referenced above. I have read through this letter and would like to inform your office that we concur with the current project's APE. We are aware that the individual components of the project have yet to be defined and that future consultation with our office will take place once more details become known regarding how the various projects within the larger APE are developed. Our office also concurs that the current projects do not affect 35LA95, which lies outside of the project area (thus a No Effect determination), as well as outside of other sites that are in the same general area of the project but outside the current APE (i.e., 35LA1470, 35LA1471). I am sorry that some confusion resulted from our office's review of this project application and we look forward to hearing from you in the future as you discover more about how this project will be developed.

Under federal and state law, archaeological sites, objects, and human remains are protected on both public and private lands in Oregon. If you have any questions or comments regarding this letter, please do not hesitate to contact me at your convenience. In order to help us track your project accurately, please be sure to reference the SHPO case number above in all correspondence.

Sincerely,

Dennis Griffin, Ph.D., RPA
State Archaeologist
(503) 986-0674
dennis.griffin@state.or.us

APPENDIX J: Invasive Species Management

November 2013

Invasive Species Management Summary

The control or removal of invasive species has been a significant component of the study since the earliest considerations during plan formulation. A number of invasive plant, fish, and wildlife species are either known to be present currently on many of the sites included in the recommended plan or may be present. This appendix lists the invasive species currently documented on the project lands or anecdotally reported, and provides information on their general status and distribution in Oregon and preliminary management strategy. During the design phase, specific details on the methods to be used for management of these species during construction and future operation and maintenance will be defined. At this time, the following methods used widely on other sites will be used here. Tree species will be cut to within 1 foot of the ground and herbicide will be applied to the stump. Shrub and woody vine species (i.e. Rubus) will be cut to ground level and herbicide will be wiped on the cut stump. In certain areas of very dense infestation, the use of goats could be employed to eat the species down to the ground, including new sprouts (i.e. *Hedera helix*). Herbaceous species will be locally pulled and/or mowed and herbicide will be spot sprayed on the remaining plant. Aquatic plants will be reduced through a combination of dewatering, raking, and spraying with an approved aquatic herbicide, or raking and removal (including fragments) underwater.

Invasive fish species will be controlled via direct removal (seining or angling) where feasible or dewatering and/or reducing their potential habitat by turning it into seasonal ponded or off-channel habitat. Invasive wildlife species will be controlled via direct removal (trapping, etc.) or reducing their potential habitat by reducing depths (i.e. for bullfrog that require deeper year-round water) or making more seasonal habitats. Invasive invertebrate species are, as yet, unconfirmed, and management measures will be considered, such as pond dewatering and removal, or use of approved aquatic pesticides (only if there are no native species present that may be harmed).

Table J-1. Non-native invasive species that may be present on sites included in the recommended plan.

Species Scientific Name	Species Common Name	Distribution in Oregon	Proposed Management Strategy
PLANTS			
Ailanthus altissima	Tree of heaven	Site-specific	Eradicate from site
Brachypodium sylvaticum	Green false brome	Regionally abundant	Reduce/eliminate from site
Buddleja davidii	Butterfly bush	Abundant	Eradicate from site
Centaurea pratensis	Meadow knapweed	Abundant	Reduce on site
Cirsium arvense	Canada thistle	Abundant	Reduce on site
Clematis vitalba	Old man's beard	Abundant	Reduce on site
Conium maculatum	Poison hemlock	Abundant	Reduce on site
Cotoneaster lacteus	Milkflower cotoneaster	Abundant	Eradicate from site
Cytisus scoparius	Scotch broom	Abundant	Reduce on site
Daphne laureola	Laurel spurge	Site-specific	Eradicate from site
Egeria densa	Brazilian elodea	Abundant	Control spread
Foeniculum vulgare	Fennel	Abundant	Eradicate from site
Hedera helix	English ivy	Abundant	Reduce on site
Ilex aquifolium	Holly	Abundant	Reduce on site
Iris pseudacorus	Yellow-flag iris	Abundant	Eradicate from site
Lythrum salicaria	Purple loosestrife	Abundant	Reduce on site; eradicate if small infestation

Species Scientific Name	**Species Common Name**	**Distribution in Oregon**	**Proposed Management Strategy**
Mentha pulegium	Pennyroyal	Abundant	Control spread
Myriophyllum aquaticum	Brazilian watermilfoil	Abundant	Control spread
Myriophyllum spicatum	Eurasian water milfoil	Abundant	Reduce habitat for it
Phalaris arundinaceae	Reed canary grass	Abundant	Reduce on site
Polygonum cuspidatum	Japanese knotweed	Abundant	Control spread
Robinia pseudoacacia	Black locust	Site-specific	Eradicate from site
Rubus armeniacus	Himalayan blackberry	Abundant	Reduce on site
Rubus laciniatus	Evergreen blackberry	Abundant	Reduce on site
Vinca major	Vinca	Abundant	Reduce on site
FISH			
Ameiurus nebulosus	Brown bullhead	Abundant	Reduce on site
Carassius auratus	Goldfish	Abundant	Reduce on site
Cyprinus carpio	Carp	Abundant	Reduce on site
Fundulus diaphanus	Banded killifish	Abundant	Reduce on site
Gambusia affinis	Western mosquitofish	Abundant	Reduce on site
Lepomis cyanellus	Green sunfish	Abundant	Reduce on site
Lepomis gibbosus	Pumpkinseed	Abundant	Reduce on site
Lepomis gulosus	Warmouth	Abundant	Reduce on site
Lepomis macrochirus	Bluegill	Abundant	Reduce on site
Micropterus dolomieu	Smallmouth bass	Abundant	Reduce on site
Micropterus salmoides	Largemouth bass	Abundant	Reduce on site
Perca flavescens	Yellow perch	Abundant	Reduce on site
Pomoxis annularis	White crappie	Abundant	Reduce on site
Pomoxis nigromaculatus	Black crappie	Abundant	Reduce on site
HERPTILES			
Chelydra serpentina	Snapping turtle[1]	Site-specific	Eradicate on site
Rana catesbiana	Bullfrog	Abundant	Reduce on site
Trachemys scripta elegans	Red eared slider turtle[1]	Abundant	Reduce on site
INVERTEBRATES			
Cipangopaludina chinensis malleata	Chinese mystery snail[1]	Site-specific	Eradicate from site if present

[1] – Unconfirmed, but anecdotally reported.

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