EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT

COMMUNICATION

FROM

THE ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS), THE DEPARTMENT OF THE ARMY

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PART 2 OF 2

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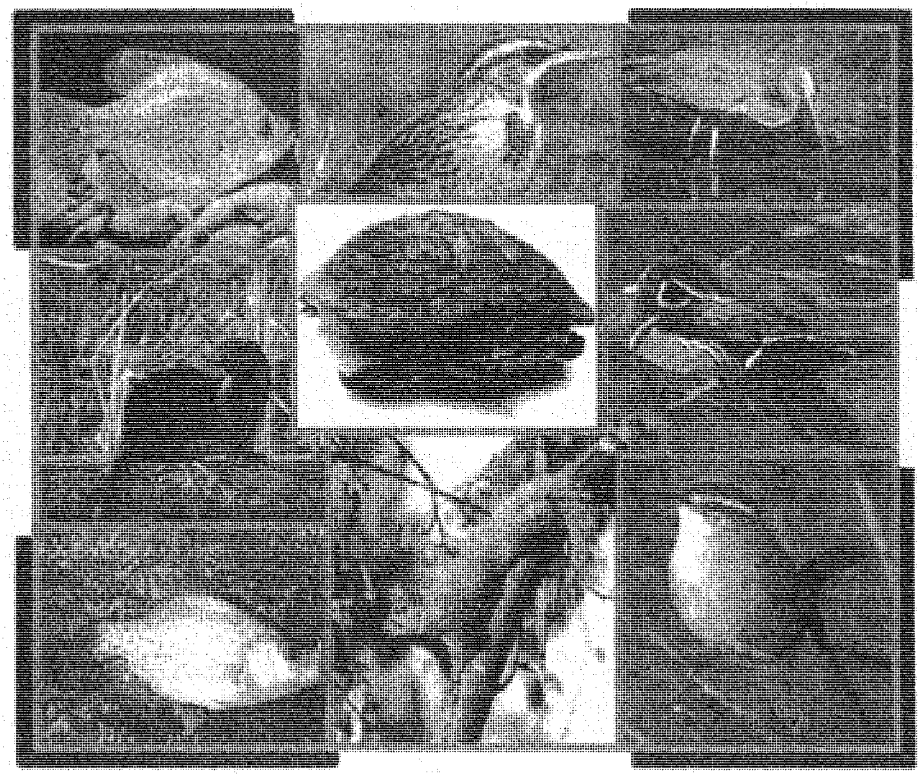
General Reevaluation Final Report with Integrated Environmental Impact Statement



US Army Corps
of Engineers ®
St Louis District

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East St. Louis and Vicinity, Illinois
Ecosystem Restoration And Flood Damage Reduction Project

General Reevaluation Final Report with Integrated Environmental Impact Statement (EIS)

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EAST ST. LOUIS AND VICINITY, ILLINOIS, ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION

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Appendix B – Environmental

Table B.1 ILCD or Illinois Land Cover (IDNR 1996a) data for study area, in acres, arranged by major landform and watershed.

	Floodplain						Uplands					
Major/Minor Land Cover Category	County Ditch	Long Lake	Cahokia	Harding	Powder-mill	SUBTOTAL	County Ditch	Cahokia	Harding	Powder-mill	SUBTOTAL	TOTAL
Urban/Built-Up Land	**160.8**	**4,190.3**	**4,278.8**	**4,064.0**	**15.8**	**12,709.6**	**341.4**	**4,925.5**	**2,787.2**	**515.1**	**8,569.1**	**21,278.7**
High Density	47.6	640.7	1,567.6	781.3	3.1	3,040.3	40.5	418.8	314.7	15.1	789.0	3,829.3
Medium Density	111.6	3,309.2	2,624.2	3,109.2	12.7	9,166.9	282.2	4,168.7	2,304.6	470.4	7,225.9	16,392.8
Low Density	1.6	240.4	87.0	173.5	0.0	502.4	18.7	338.0	167.9	29.6	554.2	1,056.6
Cropland	**6,438.9**	**3,480.8**	**8,946.1**	**2,511.9**	**413.0**	**21,790.7**	**395.6**	**5,918.2**	**1,857.2**	**697.4**	**8,868.5**	**30,659.1**
Row Crops	5,408.7	3,378.8	8,015.2	2,477.0	257.5	19,537.2	371.6	4,897.7	1,603.7	413.2	7,286.2	26,823.3
Small Grains	1,030.1	102.1	930.9	0.0	155.5	2,218.6	24.0	1,020.5	253.5	284.2	1,582.3	3,800.9
Orchards/Nurseries	0.0	0.0	0.0	34.9	0.0	34.9	0.0	0.0	0.0	0.0	0.0	34.9
Grassland	**1,319.0**	**1,902.3**	**4,116.4**	**3,115.9**	**176.6**	**10,630.2**	**1,274.7**	**7,486.3**	**2,511.0**	**962.1**	**12,234.1**	**22,864.4**
Urban Grassland	719.9	1,828.3	3,352.3	3,115.9	101.6	9,118.0	1,253.6	6,119.1	2,270.6	740.3	10,383.6	19,501.6
Rural Grassland	599.1	74.1	764.1	0.0	74.9	1,512.3	21.1	1,367.3	240.4	221.7	1,850.5	3,362.8
Forested/Wooded Land	**477.5**	**221.3**	**904.2**	**980.1**	**115.0**	**2,698.0**	**860.4**	**9,652.2**	**7,574.2**	**1,772.2**	**19,859.0**	**22,557.0**
Deciduous Closed Canopy	414.8	197.7	669.2	823.3	97.9	2,202.8	759.5	8,795.5	7,113.6	1,657.5	18,326.0	20,528.8
Deciduous Open Canopy	62.7	23.6	235.1	156.8	17.1	495.3	101.0	856.6	460.6	114.8	1,532.9	2,028.2
Wetland	**642.3**	**457.2**	**4,267.4**	**2,046.9**	**263.3**	**7,677.1**	**60.7**	**515.3**	**207.9**	**25.4**	**809.3**	**8,486.4**
Shallow Marsh/Wet Meadow	103.6	181.0	1,142.0	656.9	160.3	2,243.9	0.0	0.2	0.7	0.0	0.9	2,244.8
Deep Marsh	0.0	31.1	301.6	332.0	0.0	664.7	0.0	1.6	0.0	0.0	1.6	666.3
Forested Wetlands	507.0	103.4	2,183.9	878.0	74.9	3,747.3	17.1	241.3	53.8	20.0	332.3	4,079.5

Table B.1 Continued

	Floodplain						Uplands					
Major/Minor Land Cover Category	**County Ditch**	**Long Lake**	**Cahokia**	**Harding**	**Powder-mill**	**SUBTOTAL**	**County Ditch**	**Cahokia**	**Harding**	**Powder-mill**	**SUBTOTAL**	**TOTAL**
Shallow Water Wetlands	31.6	141.7	640.0	179.9	28.0	1,021.2	43.6	272.2	153.4	5.3	474.6	1,495.8
Open Water	**66.9**	**263.8**	**2,827.2**	**324.9**	**0.9**	**3,483.7**	**4.4**	**19.8**	**7.3**	**1.8**	**33.4**	**3,517.1**
Open Water	66.9	263.8	2,827.2	324.9	0.9	3,483.7	4.4	19.8	7.3	1.8	33.4	3,517.1
total acres in subwatershed	9,105.3	10,515.7	25,340.2	13,043.6	984.5	58,989.4	2,937.3	28,517.3	14,944.8	3,973.9	50,373.3	109,362.7
% subwatershed in project area	8.3%	9.6%	23.2%	11.9%	0.9%	53.9%	2.7%	26.1%	13.7%	3.6%	46.1%	100.0%

Table B.2 National Land Cover Data (NLCD) from Illinois (USEPA 2000b, 2001) for study area, arranged by major landform and watershed.

	Floodplain						Uplands					
Major/Minor Land Cover Category	**County Ditch**	**Long Lake**	**Cahokia**	**Harding**	**Powder-mill**	**SUBTOTAL**	**County Ditch**	**Cahokia**	**Harding**	**Powder-mill**	**SUBTOTAL**	**TOTAL**
Urban/Built-Up Land	**218.6**	**3,787.1**	**3,655.2**	**4,188.5**	**7.3**	**11,856.7**	**448.1**	**6,856.5**	**4,134.9**	**878.7**	**12,318.2**	**24,174.9**
Low Intensity Residential	87.2	1,458.9	1,116.2	1,782.2	3.8	4,448.2	325.4	5,105.6	3,163.9	675.2	9,270.1	13,718.3
High Intensity Residential	21.1	1,694.4	682.7	1,519.4	0.0	3,917.6	27.4	1,254.9	542.2	112.8	1,937.2	5,854.9
High Intensity Commercial/Industrial	110.3	633.8	1,856.3	886.9	3.6	3,490.9	95.4	495.9	428.8	90.7	1,110.8	4,601.7
Agriculture	**5,082.5**	**3,016.3**	**7,921.5**	**1,988.2**	**209.9**	**18,218.4**	**279.3**	**3,714.4**	**1,176.9**	**217.9**	**5,388.5**	**23,606.9**
Row Crops	4,681.5	2,915.1	7,597.1	1,890.3	209.9	17,293.9	193.9	3,419.0	1,124.6	185.3	4,922.8	22,216.8
Small Grains	401.0	101.2	324.5	97.9	0.0	924.5	85.4	295.3	52.3	32.7	465.7	1,390.2

Table B.2 Continued

	Floodplain						Uplands					
Major/Minor Land Cover Category	**County Ditch**	**Long Lake**	**Cahokia**	**Harding**	**Powder-mill**	**SUBTOTAL**	**County Ditch**	**Cahokia**	**Harding**	**Powder-mill**	**SUBTOTAL**	**TOTAL**
Grassland	**2,446.1**	**2,192.1**	**5,617.8**	**4,001.2**	**355.4**	**14,612.6**	**1,353.9**	**10,702.1**	**4,611.5**	**1,652.4**	**18,319.8**	**32,932.4**
Other Grasses Urban/Recreational Parks	133.2	1,300.3	1,846.1	2,599.1	16.2	5,894.9	975.2	6,459.3	2,809.7	1,003.6	11,247.8	17,142.7
Natural/Semi-Natural Grassland/Herbaceous	6.7	23.8	42.0	44.7	2.9	120.1	23.4	336.5	66.3	73.6	499.7	619.8
Pasture/Hay	2,306.2	868.0	3,729.7	1,357.5	336.3	8,597.6	355.4	3,906.3	1,735.5	575.1	6,572.3	15,169.9
Forest	**631.8**	**466.8**	**1,994.8**	**1,120.6**	**164.3**	**4,378.4**	**672.5**	**5,567.8**	**4,164.9**	**969.4**	**11,374.6**	**15,753.0**
Deciduous Forest	616.9	409.9	1,699.5	998.8	141.9	3,866.9	572.2	5,027.1	4,037.5	937.8	10,574.6	14,441.6
Evergreen Forest	12.0	56.9	295.3	120.1	21.1	505.5	98.1	516.4	118.5	30.7	763.7	1,269.2
Mixed Forest	2.9	0.0	0.0	1.8	1.3	6.0	2.2	24.2	8.9	0.9	36.2	42.3
Wetland	**244.6**	**203.3**	**2,022.6**	**786.4**	**43.6**	**3,300.5**	**20.9**	**201.3**	**71.6**	**15.3**	**309.1**	**3,609.6**
Woody Wetland	239.7	140.6	1,675.0	628.0	41.8	2,725.2	20.0	177.5	48.3	15.1	260.9	2,986.0
Emergent Herbaceous Wetland	4.9	62.7	347.6	158.3	1.8	575.3	0.9	23.8	23.4	0.2	48.3	623.6
Other	**48.7**	**351.2**	**2,938.0**	**346.5**	**155.2**	**3,839.6**	**23.8**	**121.4**	**74.7**	**55.2**	**275.1**	**4,114.7**
Open Water	48.0	349.4	2,919.5	343.6	155.2	3,815.8	23.1	115.9	62.9	4.9	206.8	4,022.6
Bare Rock/Sand/Clay	0.7	1.8	7.1	1.8	0.0	11.3	0.7	5.6	11.8	11.6	29.6	40.9
Quarries/Strip Mines/Gravel Pits	0.0	0.0	11.3	1.1	0.0	12.5	0.0	0.0	0.0	38.7	38.7	51.1
total acres in subwatershed	8,672.3	10,016.7	24,150.0	12,431.4	935.8	56,206.2	2,798.6	27,163.4	14,234.5	3,788.9	47,985.3	104,191.5
% subwatershed in project area	8.3%	9.6%	23.2%	11.9%	0.9%	53.9%	2.7%	26.1%	13.7%	3.6%	46.1%	100.0%

Table B.3 Prime farmland status of soil mapping units within the study area, from the digital soil surveys of Madison and St. Clair Counties.

Land-form	Mapping Unit		Area (acres)	% Area by Land-form
	Prime Status/ Symbol	Name		
Floodplain				
	0 - Not prime farmland			
	1071	Darwin silty clay loam, undrained, 0 to 2 percent slopes, frequently flooded	3.8	0.01
	1071A	Darwin silty clay loam, undrained, 0 to 2 percent slopes, frequently flooded	2,302.1	4.04
	1248A	McFain silty clay loam, undrained, 0 to 2 percent slopes, frequently flooded	819.6	1.44
	2071A	Darwin-Urban land complex, 0 to 2 percent slopes, occasionally flooded	269.5	0.47
	2071L	Darwin-Urban land complex, 0 to 2 percent slopes, occasionally flooded, long duration	1,942.5	3.41
	2183A	Shaffton-Urban land complex, 0 to 2 percent slopes, occasionally flooded	4,017.5	7.05
	2284A	Tice-Urban land complex, 0 to 2 percent slopes	208.8	0.37
	2304B	Landes-Urban land complex, 2 to 5 percent slopes	676.5	1.19
	2591A	Nameoki-Urban land complex, 0 to 3 percent slopes	5.6	0.01
	2592A	Nameoki-Urban land complex, 0 to 3 percent slopes	794.1	1.39
	35F	Bold silt loam, 15 to 30 percent slopes	1.0	0.00
	3847L	Fluvaquents-Orthents complex, frequently flooded, long duration	218.1	0.38
	409A	Aquents, clayey, 0 to 2 percent slopes	42.5	0.07
	533	Urban land	2,633.3	4.62
	536	Dumps	298.4	0.52
	53B	Bloomfield loamy fine sand, 1 to 3 percent slopes	551.1	0.97
	7741B	Oakville fine sand, 2 to 5 percent slopes	31.5	0.06
	79C2	Menfro silt loam, 5 to 10 percent slopes, eroded	1.0	0.00
	79F	Menfro silt loam, 18 to 35 percent slopes	0.1	0.00
	801B	Orthents, silty, undulating	69.2	0.12
	801D	Orthents, silty, steep	785.5	1.38
	802B	Orthents, loamy, undulating	1,014.1	1.78
	802D	Orthents, loamy, steep	404.6	0.71
	8071A	Darwin silty clay, 0 to 2 percent slopes, occasionally flooded	90.1	0.16
	8071L	Darwin silty clay, 0 to 2 percent slopes, occasionally flooded, long duration	11,913.8	20.92
	8084A	Okaw silt loam, 0 to 2 percent slopes, occasionally flooded	13.6	0.02
	8122C	Colp silty clay loam, 5 to 10 percent slopes, severely eroded, occasionally flooded	4.6	0.01
	8338A	Hurst silt loam, 0 to 2 percent slopes, occasionally flooded	22.7	0.04

Table B.3 Continued

Land-form	Mapping Unit: Prime Status/ Symbol	Mapping Unit: Name	Area (acres)	% Area by Land-form
Floodplain - Continued				
	8338B	Hurst silt loam, 2 to 5 percent slopes, eroded, occasionally flooded	5.0	0.01
	8338C	Hurst silty clay loam, 5 to 10 percent slopes, eroded, occasionally flooded	8.8	0.02
	8591A	Fults silty clay, 0 to 2 percent slopes, occasionally flooded	1,407.4	2.47
	8592A	Nameoki silty clay, 0 to 2 percent slopes, occasionally flooded	1,300.3	2.28
	8646A	Fluvaquents, loamy, 0 to 2 percent slopes, occasionally flooded	1,245.3	2.19
	865	Pits, gravel	69.7	0.12
	866	Dumps, slurry	6.4	0.01
	8741B	Oakville fine sand, 2 to 5 percent slopes, occasionally flooded	155.6	0.27
	8741C	Oakville fine sand, 5 to 10 percent slopes, occasionally flooded	64.8	0.11
	962D2	Sylvan-Bold silt loams, _ to 18 percent slopes, eroded	0.8	0.00
	962F	Sylvan-Bold silt loams, 18 to 35 percent slopes	19.6	0.03
	962F2	Sylvan-Bold silt loams, 18 to 35 percent slopes, eroded	15.2	0.03
	962G	Sylvan-Bold silt loams, 35 to 60 percent slopes	5.3	0.01
	W	Water	4,058.5	7.12
	0 - Total		**37,497.7**	**65.83**
	1 - All areas are prime farmland			
	37A	Worthen silt loam, 0 to 2 percent slopes	1,504.2	2.64
	37B	Worthen silt loam, 2 to 5 percent slopes	383.4	0.67
	466A	Bartelso silt loam, 0 to 2 percent slopes	46.7	0.08
	6304A	Landes Variant very fine sandy loam, 0 to 3 percent slopes	5.4	0.01
	7150A	Onarga sandy loam, 0 to 3 percent slopes	15.0	0.03
	7430A	Raddle silt loam, 0 to 3 percent slopes	59.4	0.10
	75B	Drury silt loam, 2 to 5 percent slopes	150.1	0.26
	8038A	Rocher loam, 0 to 2 percent slopes, occasionally flooded	9.1	0.02
	8038B	Rocher loam, 2 to 5 percent slopes, occasionally flooded	216.3	0.38
	8078A	Arenzville silt loam, 0 to 2 percent slopes, occasionally flooded	213.1	0.37
	8102A	La Hogue loam, 0 to 3 percent slopes, occasionally flooded	58.7	0.10
	8122B	Colp silt loam, 1 to 4 percent slopes, occasionally flooded	20.2	0.04
	8150A	Onarga sandy loam, 0 to 3 percent slopes, occasionally flooded	312.8	0.55
	8151A	Ridgeville fine sandy loam, 0 to 2 percent slopes, occasionally flooded	160.7	0.28
	8180A	Dupo silt loam, 0 to 2 percent slopes, occasionally flooded	2,257.1	3.96
	8183A	Shaffton clay loam, 0 to 2 percent slopes, occasionally flooded	2,444.5	4.29
	81A	Littleton silt loam, 0 to 2 percent slopes	285.1	0.50
	8284A	Tice silty clay loam, 0 to 2 percent slopes, occasionally flooded	1,302.4	2.29

Table B.3 Continued

Land-form	Mapping Unit: Prime Status/ Symbol	Mapping Unit: Name	Area (acres)	% Area by Land-form
Floodplain - Continued				
	8304A	Landes very fine sandy loam, 2 to 5 percent slopes, occasionally flooded	7.1	0.01
	8304B	Landes very fine sandy loam, 2 to 5 percent slopes, occasionally flooded	3,874.1	6.80
	8331A	Haymond silt loam, 0 to 2 percent slopes, occasionally flooded	234.4	0.41
	8394A	Haynie silt loam, 0 to 2 percent slopes, occasionally flooded	6.8	0.01
	8415A	Orion silt loam, 0 to 2 percent slopes, occasionally flooded	188.9	0.33
	8434B	Ridgway silt loam, 2 to 5 percent slopes, occasionally flooded	7.9	0.01
	8452A	Riley clay loam, 0 to 3 percent slopes, occasionally flooded	30.1	0.05
	8674A	Dozaville ______, 0 to 2 percent slopes, occasionally flooded	1,003.2	1.76
	1 - Total		**14,796.9**	**25.98**
	2 - Only drained areas are prime farmland			
	8070A	Beaucoup silty clay loam, 0 to 2 percent slopes, occasionally flooded	1,146.5	2.01
	8070B	Beaucoup silty clay loam, 0 to 2 percent slopes, occasionally flooded	35.7	0.06
	8162A	Gorham silty clay loam, 0 to 2 percent slopes, occasionally flooded	207.3	0.36
	8302A	Ambraw loam, 0 to 2 percent slopes, occasionally flooded	312.4	0.55
	8333A	Wakeland silt loam, 0 to 2 percent slopes, occasionally flooded	258.5	0.45
	8334A	Birds silt loam, 0 to 2 percent slopes, occasionally flooded	802.5	1.41
	2 - Total		**2,762.9**	**4.85**
	3 - Only areas protected from flooding or not frequently flooded during the growing season are prime farmland			
	3038B	Rocher loam, 2 to 5 percent slopes, frequently flooded	9.9	0.02
	3081A	Littleton silt loam, 0 to 2 percent slopes, frequently flooded	280.4	0.49
	3180A	Dupo silt loam, 0 to 2 percent slopes, frequently flooded	23.9	0.04
	3331A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	293.1	0.51
	3336A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	50.9	0.09
	3415A	Orion silt loam, 0 to 2 percent slopes, frequently flooded	57.7	0.10
	3 - Total		**715.9**	**1.26**
	5 - Only drained areas that are either protected from flooding or not frequently flooded during the growing season are prime farmland			
	1070A	Beaucoup silty clay loam, 0 to 2 percent slopes, frequently flooded	380.1	0.67
	3070L	Beaucoup silty clay loam, 0 to 2 percent slopes, frequently flooded, long duration	120.5	0.21

Table B.3 Continued

Land-form	Mapping Unit: Prime Status/ Symbol	Mapping Unit: Name	Area (acres)	% Area by Land-form
Floodplain - Continued				
	3076A	Otter silt loam, 0 to 2 percent slopes, frequently flooded	54.4	0.10
	3333A	Wakeland silt loam, 0 to 2 percent slopes, frequently flooded	557.7	0.98
	3334A	Birds silt loam, 0 to 2 percent slopes, frequently flooded	75.8	0.13
	5 - Total		1,188.5	2.09
Floodplain Total			**56,962.0**	**100.00**
Upland				
	0 - Not prime farmland			
	1248A	McFain silty clay loam, undrained, 0 to 2 percent slopes, frequently flooded	3.9	0.01
	19D3	Sylvan silty clay loam, 10 to 15 percent slopes, severely eroded	433.8	0.87
	2078A	Winfield-Urban land complex, 2 to 8 percent slopes	9.8	0.02
	2079B	Menfro-Urban land complex, 2 to 5 percent slopes	106.9	0.22
	2079C2	Menfro-Urban land complex, 5 to 10 percent slopes, eroded	3.3	0.01
	2079D	Menfro-Urban land complex, 8 to 15 percent slopes	208.0	0.42
	2079D2	Menfro-Urban land complex, 10 to 18 percent slopes, eroded	166.3	0.33
	2079D3	Menfro-Urban land complex, 10 to 18 percent slopes, severely eroded	9.7	0.02
	2079E	Menfro-Urban land complex, 15 to 25 percent slopes	17.2	0.03
	2090B	Bethalto-Urban land complex, 2 to 5 percent slopes	21.1	0.04
	2183A	Shaffton-Urban land complex, 0 to 2 percent slopes, occasionally flooded	18.4	0.04
	2267B	Caseyville-Urban land complex, 2 to 5 percent slopes	8.5	0.02
	2283B	Downsouth-Urban land complex, 2 to 5 percent slopes	8.1	0.02
	2384B	Edwardsville-Urban land complex, 1 to 4 percent slopes	307.2	0.62
	2385A	either Edwardsville (384) or Mascoutah (385) -Urban land complex, 0 to 2 percent slopes	3.4	0.01
	2477B	Winfield-Urban land complex, 2 to 8 percent slopes	3,077.2	6.19
	2477C2	Winfield-Urban land complex, 8 to 15 percent slopes, eroded	13.8	0.03
	2477D3	Winfield-Urban land complex, 15 to 20 percent slopes, severely eroded	13.0	0.03
	283C2	Downsouth silt loam, 5 to 10 percent slopes, eroded	158.8	0.32
	31A	Pierron silt loam, 0 to 2 percent slopes	9.6	0.02
	35F	Bold silt loam, 15 to 30 percent slopes	33.7	0.07
	3847L	Fluvaquents-Orthents complex, frequently flooded, long duration	0.1	0.00
	441C2	Wakenda silt loam, 5 to 10 percent slopes, eroded	32.7	0.07

Table B.3 Continued

Land-form	Mapping Unit: Prime Status/ Symbol	Mapping Unit: Name	Area (acres)	% Area by Land-form
Upland - Continued				
	447C2	Winfield silt loam, 5 to 10 percent slopes, eroded	3.3	0.01
	447C3	Winfield silty clay loam, 5 to 10 percent slopes, severely eroded	7.8	0.02
	477B3	Winfield silt loam, 2 to 5 percent slopes, severely eroded	49.0	0.10
	477C2	Winfield silt loam, 5 to 10 percent slopes, eroded	492.9	0.99
	477C3	Winfield silty clay loam, 5 to 10 percent slopes, severely eroded	575.3	1.16
	477D2	Winfield silty clay loam, 10 to 15 percent slopes, eroded	9.5	0.02
	477D3	Winfield silty clay loam, 10 to 15 percent slopes, severely eroded	827.3	1.67
	533	Urban land	217.1	0.44
	536	Dumps	49.4	0.10
	53B	Bloomfield loamy fine sand, 1 to 3 percent slopes	37.6	0.08
	630D3	Navlys _____, _ to _ percent slopes, severely eroded	3.5	0.01
	7903	not given	0.5	0.00
	79C2	Menfro silt loam, 5 to 10 percent slopes, eroded	1,867.5	3.76
	79C3	Menfro silt clay loam, 5 to 10 percent slopes, severely eroded	238.7	0.48
	79D2	Menfro silt loam, 10 to 18 percent slopes, eroded	1,280.9	2.58
	79D3	Menfro silty clay loam, 10 to 18 percent slopes, severely eroded	2,366.2	4.76
	79F	Menfro silt loam, 18 to 35 percent slopes	5,354.6	10.78
	79F3	Menfro silty clay loam, 18 to 35 percent slopes, severely eroded	229.7	0.46
	79G	Menfro silt loam, 35 to 60 percent slopes	1,356.4	2.73
	801B	Orthents, silty, undulating	201.4	0.41
	801D	Orthents, silty, steep	502.3	1.01
	802B	Orthents, loamy, undulating	13.6	0.03
	8084A	Okaw silt loam, 0 to 2 percent slopes, occasionally flooded	0.3	0.00
	826D	Orthents, silty, acid substratum, rolling	85.7	0.17
	962D2	Sylvan-Bold silt loams, _ to 18 percent slopes, eroded	1,578.5	3.18
	962F	Sylvan-Bold silt loams, 18 to 35 percent slopes	1,929.5	3.88
	962F2	Sylvan-Bold silt loams, 18 to 35 percent slopes, eroded	5,577.2	11.23
	962G	Sylvan-Bold silt loams, 35 to 60 percent slopes	1,784.6	3.59
	W	Water	456.5	0.92
	0 - Total		**31,761.0**	**63.93**
	1 - All areas are prime farmland			
	283B	Downsouth silt loam, 2 to 5 percent slopes	712.6	1.43
	37A	Worthen silt loam, 0 to 2 percent slopes	50.8	0.10
	37B	Worthen silt loam, 2 to 5 percent slopes	361.2	0.73
	384A	Edwardsville silt loam, 0 to 2 percent slopes	455.3	0.92

Table B.3 Continued

Land-form	Mapping Unit: Prime Status/ Symbol	Mapping Unit: Name	Area (acres)	% Area by Land-form
Upland - Continued				
	384B	Edwardsville silt loam, 2 to 5 percent slopes	1,164.4	2.34
	441B	Wakenda silt loam, 2 to 5 percent slopes	216.9	0.44
	447B	Winfield silt loam, 2 to 5 percent slopes	6.3	0.01
	477B	Winfield silt loam, 2 to 5 percent slopes	3,320.7	6.68
	477B2	Winfield silt loam, 2 to 5 percent slopes, eroded	3.2	0.01
	75B	Drury silt loam, 2 to 5 percent slopes	391.2	0.79
	79B	Menfro silt loam, 2 to 5 percent slopes	5,621.2	11.31
	8180A	Dupo silt loam, 0 to 2 percent slopes, occasionally flooded	6.3	0.01
	81A	Littleton silt loam, 0 to 2 percent slopes	33.2	0.07
	8331A	Haymond silt loam, 0 to 2 percent slopes, occasionally flooded	15.2	0.03
	8674A	Dozaville ______, 0 to 2 percent slopes, occasionally flooded	1.1	0.00
	1 - Total		**12,359.7**	**24.88**
	2 - Only drained areas are prime farmland			
	267A	Caseyville silt loam, 0 to 2 percent slopes	313.5	0.63
	267B	Caseyville silt loam, 2 to 5 percent slopes	225.5	0.45
	333A	Wakeland silt loam, 0 to 2 percent slopes	11.3	0.02
	385A	Mascoutah silty clay loam, 0 to 2 percent slopes	840.6	1.69
	50A	Virden silt loam, 0 to 2 percent slopes	21.7	0.04
	517A	Marine silt loam, 0 to 2 percent slopes	5.8	0.01
	90A	Bethalto silt loam, 0 to 2 percent slopes	260.2	0.52
	90B	Bethalto silt loam, 2 to 5 percent slopes	582.9	1.17
	2 – Total		**2,261.5**	**4.55**
	3 - Only areas protected from flooding or not frequently flooded during the growing season are prime farmland			
	3078A	Arenzville silt loam, 0 to 2 percent slopes, frequently flooded	24.2	0.05
	3081A	Littleton silt loam, 0 to 2 percent slopes, frequently flooded	39.3	0.08
	3331A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	499.2	1.00
	3336A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	237.6	0.48
	3415A	Orion silt loam, 0 to 2 percent slopes, frequently flooded	345.3	0.69
	3 - Total		**1,145.6**	**2.31**
	5 - Only drained areas that are either protected from flooding or not frequently flooded during the growing season are prime farmland			
	3070L	Beaucoup silty clay loam, 0 to 2 percent slopes, frequently flooded, long duration	4.5	0.01

Table B.3 Continued

Land-form	Mapping Unit		Area (acres)	% Area by Land-form
	Prime Status/ Symbol	Name		
Upland - Continued				
	3076A	Otter silt loam, 0 to 2 percent slopes, frequently flooded	14.2	0.03
	3333A	Wakeland silt loam, 0 to 2 percent slopes, frequently flooded	1,894.7	3.81
	3334L	Birds silt loam, 0 to 2 percent slopes, frequently flooded, long duration	238.4	0.48
	5 - Total		**2,151.7**	**4.33**
Upland Total			**49,679.5**	**100.00**
Grand Total			**106,641.4**	

Table B.4 Soils of Horseradish Fields identified within the Study Area.

Mapping Unit		Acres	% Total
Symbol	Name		
	0 - Not prime farmland		
2071L	Darwin-Urban land complex, 0 to 2 percent slopes, occasionally flooded, long duration	0.6	0.0
53B	Bloomfield loamy fine sand, 1 to 3 percent slopes	55.3	3.6
801B	Orthents, silty, undulating	0.3	0.0
801D	Orthents, silty, steep	0.8	0.1
8071L	Darwin silty clay, 0 to 2 percent slopes, occasionally flooded, long duration	66.8	4.3
8122C	Colp silty clay loam, 5 to 10 percent slopes, severely eroded, occasionally flooded	0.2	0.0
	0 Total	**123.9**	**8.1**
	1 - All areas are prime farmland		
37A	Worthen silt loam, 0 to 2 percent slopes	198.0	12.9
37B	Worthen silt loam, 2 to 5 percent slopes	6.1	0.4
7430A	Raddle silt loam, 0 to 3 percent slopes	35.3	2.3
75B	Drury silt loam, 2 to 5 percent slopes	20.9	1.4
8078A	Arenzville silt loam, 0 to 2 percent slopes, occasionally flooded	96.3	6.3
8122B	Colp silt loam, 1 to 4 percent slopes, occasionally flooded	4.4	0.3
8150A	Onarga sandy loam, 0 to 3 percent slopes, occasionally flooded	59.3	3.9
8151A	Ridgeville fine sandy loam, 0 to 2 percent slopes, occasionally flooded	12.0	0.8

Table B.4 Continued

Mapping Unit Symbol	Mapping Unit Name	Acres	% Total
8180A	Dupo silt loam, 0 to 2 percent slopes, occasionally flooded	153.7	10.0
8183A	Shaffton clay loam, 0 to 2 percent slopes, occasionally flooded	1.7	0.1
81A	Littleton silt loam, 0 to 2 percent slopes	21.0	1.4
8284A	Tice silty clay loam, 0 to 2 percent slopes, occasionally flooded	55.9	3.6
8304B	Landes very fine sandy loam, 2 to 5 percent slopes, occasionally flooded	0.1	0.0
8331A	Haymond silt loam, 0 to 2 percent slopes, occasionally flooded	96.5	6.3
8415A	Orion silt loam, 0 to 2 percent slopes, occasionally flooded	32.9	2.1
8674A	Dozaville _______, 0 to 2 percent slopes, occasionally flooded	248.8	16.2
	1 Total	**1042.8**	**67.9**
	2 - Only drained areas are prime farmland		
8070A	Beaucoup silty clay loam, 0 to 2 percent slopes, occasionally flooded	13.7	0.9
8333A	Wakeland silt loam, 0 to 2 percent slopes, occasionally flooded	127.2	8.3
8334A	Birds silt loam, 0 to 2 percent slopes, occasionally flooded	45.1	2.9
	2 Total	**186.0**	**12.1**
	3 - Only areas protected from flooding or not frequently flooded during the growing season are prime farmland		
3081A	Littleton silt loam, 0 to 2 percent slopes, frequently flooded	42.2	2.7
3331A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	68.9	4.5
3336A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	0.1	0.0
3415A	Orion silt loam, 0 to 2 percent slopes, frequently flooded	0.3	0.0
	3 Total	**111.5**	**7.3**
	5 - Only drained areas that are either protected from flooding or not frequently flooded during the growing season are prime farmland		
1070A	Beaucoup silty clay loam, 0 to 2 percent slopes, frequently flooded	1.2	0.1
3333A	Wakeland silt loam, 0 to 2 percent slopes, frequently flooded	38.6	2.5
3334A	Birds silt loam, 0 to 2 percent slopes, frequently flooded	32.6	2.1
	5 Total	**72.4**	**4.7**
Grand Total		**1536.6**	**100.0**

B.5 HISTORIC LOSS OF FOREST, PRAIRIE, WETLANDS, LAKES AND PONDS, AND STREAMS WITHIN THE STUDY AREA

Natural resources in the study area have undergone dramatic changes since 1800. These changes are a local version of similar, extensive changes to Illinois' historic natural ecosystem. In this assessment, estimates of study area losses of forests, prairies, wetlands, lakes and ponds, and streams are compared to statewide and county-level losses when possible.

Two centuries ago, Illinois consisted of about 60% prairie, 38% forest, and 2% open water (IDNR 1994). The deciduous forests in the eastern half of the continent converged with the prairies from the west. At a regional and local level, there was great diversity in these forests and prairies, and they were often interspersed with various other kinds of natural features, including savannas, wetlands, lakes and ponds, streams, primary areas (glades, cliffs, lake shores), and caves (White 1978).

Today the landscape of Illinois is very different. According to IDNR (1996a), cropland occupies 60% of the state's surface. Rural and urban grasslands have replaced historic systems occurring on about another 20%. Current forests, wetlands, and open water occupy about 16%, and urban or built-up land the remaining 4%. During the transformation of the state's landscape over the last 200 years, human activities have been pervasive. The Illinois Natural Area Inventory found that "Illinois' natural landscape has been nearly completely altered." (White 1978:119); only seven-hundredths of 1% of Illinois' area consisted of high-quality, undisturbed remnants of natural communities. Of the 50 states, "Illinois ranks 49th (Iowa is 50th) in the percentage of land remaining in its original vegetation type (11%)" (IDNR 1994a:34).

B.5.1 Historic Forest Loss. The spatial extent of today's forest in the study area is only a fraction of what it used to be. The two "current" land cover estimates for all forest (including wetland or bottomland forest) in the study area vary from about 18% to about 24% (Table B.1 and Table B.2, NLCD's forest and woody wetland combined, and ILCD's forested/wooded land and forested wetlands combined). In contrast, about 59% of the study area was forested two centuries ago (Table 2-8 in main report). Since 1800, well over half the historic forest in the study area has been lost – about 59% based on the NLCD data, or about 70% based on the ILCD data. In the uplands, historic losses exceed 50% (54% for ILCD or 72% for NLCD data). On the floodplain, roughly 65% of the historic forest is gone from the study area (63% for NLCD or 68% for ILCD data).

Similar losses of forest have occurred in Illinois at the state and county level. In the early 1800s, about 38% of Illinois was forested (IDNR 1994), but today's forests envelop about 14% of the state (IDNR 1996; forest/woodland and bottomland forest combined). Presettlement forest covered about 40% of Madison County and about 49% of St. Clair County (Hill et al. 1998). In 1991, about 17% and 16% of these two counties, respectively, were forested (IDNR 1996; forest/woodland and bottomland forest, combined). Loss of historic forest for the state is about 63%, and about 58% and 67% for Madison and St. Clair Counties.

B.5.2 Historic Prairie Loss. The most striking loss in the study area is the virtual disappearance of prairie. According to the analysis of predevelopment land cover, about 35,000 acres of prairie occurred in the study area, and about 91% of it was found on the Mississippi River floodplain (Table 2-9 in main report). "By 1830, farmers began to realize that the prairie soils were more fertile than forest soils and much easier to convert to agricultural use" (McClain 1997:5).

The rate at which prairies were converted to farmland accelerated in the mid-1800s when mass-produced steel plows arrived in Illinois. Today apparently no prairie remains in the upland portion of the study area, and there is only one known remnant on the floodplain, which envelops less than 35 acres (Hill 1998). This disappearance of prairie equates to an overall loss in the study area of about 99.9%.

Illinois, the "Prairie State", once supported natural grasslands that covered about 60% of its surface (IDNR 1994). By the mid-1970s, all the surviving high-quality prairie remnants represented only 1/100 of 1% of the original extent (IDNR 1994). Like the state, about 58% of Madison County and 50% of St. Clair County supported prairie about two hundred years ago (Hill et al. 1998). By 1976, only 1.0 acre and 3.8 acres, respectively, of high-quality relics remained (IDNR 1994).

B.5.3 Historic Savanna Loss. Savanna is included in this section about existing conditions only because it may have been present in predevelopment times in the uplands, as dry-mesic and mesic savanna (Section 2.3.4.3 in main report). Savanna is not currently known from the study area (Hill 1998). Because periodic wildfires enabled this type of vegetation to persist in predevelopment times, the suppression of wildfire in Illinois that came with settlement caused vegetational changes. Tree density became greater, and open savanna converted to closed forest.

Besides fire absence and outright destruction during conversion to agriculture and development, other factors have led to the loss of this type of plant community. These include fragmentation, degradation of the ground cover from intense grazing, and invasion by exotic plant species (Hill 1998). "Areas of former savanna, ...could be restored or at least rehabilitated with vegetation management" (Hill 1998:52).

B.5.4 Historic Wetland Loss. Estimates of current wetland extent in the study area are 7.8% and 3.5% based on the ILCD and NLCD early-1990 land cover databases (Table B.1 and Table B.2), and 7.0% according to the Illinois Wetland Inventory (IWI) from the mid- 1980s (see below). Using soil mapping, 22.8% of the study area has been estimated to consist of historic wetlands (Table 2-13 in main report). These figures yield a net loss of historic wetland area in the study area of about two-thirds (66% ILCD, 69% IWI, 85% NLCD).

Two centuries ago, about 23% of Illinois' land surface was wetlands, yet today this resource – according to IWI data - comprises about 2.6% of the state, representing a loss of about 89% (Hill 1998). Historic wetlands in Madison and St. Clair Counties accounted for about 12% and 21% of their area, respectively (Hill et al. 1998). Current wetland coverage in these two counties, based on IWI data, is 4.7% and 7.8%, which equates with losses of 61% and 63%, respectively (Hill et al. 1998).

Figure 3-11in the main report displays the extent and location of wetland change in the study area by contrasting the distribution of historic and current wetlands. Areas of preservation, historic loss, and recent gain are distinguishable from each other. In this figure, all soil mapping units in each county's soil survey that exhibit wetland or hydric characteristics represent historic wetlands (see Table B.6). The Illinois Wetland Inventory serves as the current condition.

In Figure 3-11 in the main report, two large expanses of historic wetland loss are evident in the American Bottom. The largest of the two, in the north half of the study area, is bisected today by I-255 (north-south) and I-270 (east-west). It represents historic Rattan's Prairie, a broad wet-mesic prairie that probably was contiguous with other kinds of wetlands, such as wet-mesic floodplain forest on the east side of Long Lake. The other large area of wetland loss is in the southern half of the study area. Unlike Rattan's Prairie, this area was irregular in shape, and extended south of I-55/70 to the vicinity of Frank Holten State Park. It was a wetland complex dominated by wet-mesic prairie (part of historic Cold Prairie). Wetland prairie transitioned into other wetland types including marshes and ponds at several topographic depressions. In the uplands, historic wetlands were a minor component of the landscape, and apparently all have been lost. Historic wetlands in the study area (areas of preservation in Figure 3-11 in the main report) that escaped destruction are on the Mississippi River floodplain. They generally were wetter than those that were developed, and harder to drain, since they tended to occupy the lowest topography.

B.5.5 Historic Lake and Pond Loss. Unlike some of the other natural community classes, there are no estimates of the historic area of lakes and ponds in Illinois or Madison and St. Clair Counties. But most natural lakes in the state, including oxbow lakes on floodplains, have been drained (White and Madany 1976). According to the analysis of predevelopment land cover, the lake-slough-pond category represented 4.6% of the Mississippi River floodplain in the study area (Table 2-8 in the main report). Lakes, sloughs, and ponds have certainly disappeared from the study area's portion of the American Bottom due to drainage for conversion to agriculture and development. Yet, this is not borne out by contrasting this estimate of historic area with similar figures from datasets representing current conditions, such as has been done for some of the other natural community classes. If the "open water" category from both "current" land cover datasets is assumed to represent today's lakes, sloughs, and ponds, then there would be more "water" on the floodplain today (6.8% for NLCD data, 5.9% for ILCD data; Table B.1 and Table B.2). Similarly, the Illinois Wetland Inventory shows 5.1% of the floodplain consisting of limnetic lake deepwater and shallow lake wetland habitats (2,877 acres, Table 3-39 in the main report), which again is greater than the estimate from the predevelopment land cover data.

A much better estimate of historic area of lakes and ponds was obtained from topographical maps of the American Bottom created in 1908 by the early East Side Levee and Sanitary District. They are the most detailed historic maps amassed for this study because they display 2-foot contour intervals, as well as boundaries of standing water, including lakes, ponds and sloughs (Figure B.20). According to this source, 10.7% of the study area's floodplain (6,047 acres) consisted of lakes, ponds, and sloughs, excluding creek channels.

Comparing this historic 1908 estimate with current figures, about one-third to one-half the historic area of lakes, ponds, and sloughs is gone (about 36% according to the NLCD database, 45% to ILCD, or 52% to IWI). The overall loss is 50% when the area of waterbodies in 1908 is contrasted with areas mapped as water in each of the county's modern digital soil surveys. Figure 3-11 in the main report displays the extent and location of changes in lakes, ponds, and sloughs in the study area. Areas of preservation, historic loss, and recent gain are distinguishable from each other.

In the southern part of the study area, Pittsburg Lake (or Big or Grand Marais Lake) once enveloped about 800 acres, but today is represented by three remnant lakes at Frank Holten State Park. Spring Lake, in the vicinity of Cahokia Mounds State Historic Site, once covered about 325 acres. Today one relatively small pond represents this historic lake. A lake near East St. Louis, apparently called Indian Lake, had a surface area of about 450 acres, and only a portion of this aquatic area remains. Other large lakes that are gone include two outside the study area to the south - Goose Lake (about 570 acres) and Lily Lake (310 acres) - and Grassy Lake (about 260 acres), outside the study area to the north. The largest lake in the study area, Horseshoe Lake, occupied about 2,275 acres.

B.5.6 Historic Stream Loss. Like lakes and ponds, there is no statewide or county-level estimate of historic loss of streams. From an analysis of historic maps of the study area, about 27.6 miles of Cahokia Creek once meandered across the study area on the Mississippi River floodplain. Other floodplain channels included about 23.7 miles from upland tributaries that flowed into Cahokia Creek, and about 2.5 miles that came from the Prairie du Pont watershed. Comparing the historic channels with existing conditions, about 62% of Cahokia Creek by length has been filled in for development, and the isolated remnants no longer convey flowing waters. Of the floodplain channels tributary to Cahokia Creek, about 72% by length have either been filled in, or modified into ditches. Channels from the Prairie du Pont drainage experienced a loss of about 57%. Figure 3-12 in the main report shows the location of historic floodplain channels and existing remnants. The overall loss of all floodplain streams by length in the study area has been about 66%.

No estimate has been developed for this study of the losses of upland historic stream channels due to development. Portions of some tributary streams were straightened many years ago to facilitate the construction of railroad and road embankments that followed the stream bottoms. Examples of this are found in the Judy's Branch, Big Canteen Creek, and Powdermill Creek watersheds. By and large, historic tributary stream losses are much less than those in the bottoms.

Table B.6 Soil mapping units of study area and their wetland status, by landform (from the digital soil surveys of Madison and St. Clair Counties).

Land-form	Mapping Unit		Area (acres)	% by Landform
	Status/ Symbol	Name		
Floodplain				
	Developed			
	533	Urban land	2,633.3	4.62
	536	Dumps	298.4	0.52
	801B	Orthents, silty, undulating	69.2	0.12
	801D	Orthents, silty, steep	785.5	1.38
	802B	Orthents, loamy, undulating	1,014.1	1.78
	802D	Orthents, loamy, steep	404.6	0.71
	865	Pits, gravel	69.7	0.12
	866	Dumps, slurry	6.4	0.01
	Developed Total		**5,281.1**	**9.27**
	Nonwetland			
	3038B	Rocher loam, 2 to 5 percent slopes, frequently flooded	9.9	0.02
	3081A	Littleton silt loam, 0 to 2 percent slopes, frequently flooded	280.4	0.49
	3180A	Dupo silt loam, 0 to 2 percent slopes, frequently flooded	23.9	0.04
	3331A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	293.1	0.51
	3333A	Wakeland silt loam, 0 to 2 percent slopes, frequently flooded	557.7	0.98
	3336A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	50.9	0.09
	3415A	Orion silt loam, 0 to 2 percent slopes, frequently flooded	57.7	0.10
	35F	Bold silt loam, 15 to 30 percent slopes	1.0	0.00
	37A	Worthen silt loam, 0 to 2 percent slopes	1,504.2	2.64
	37B	Worthen silt loam, 2 to 5 percent slopes	383.4	0.67
	3847L	Fluvaquents-Orthents complex, frequently flooded, long duration	218.1	0.38
	466A	Bartelso silt loam, 0 to 2 percent slopes	46.7	0.08
	53B	Bloomfield loamy fine sand, 1 to 3 percent slopes	551.1	0.97
	6304A	Landes Variant very fine sandy loam, 0 to 3 percent slopes	5.4	0.01
	7150A	Onarga sandy loam, 0 to 3 percent slopes	15.0	0.03
	7430A	Raddle silt loam, 0 to 3 percent slopes	59.4	0.10
	75B	Drury silt loam, 2 to 5 percent slopes	150.1	0.26
	7741B	Oakville fine sand, 2 to 5 percent slopes	31.5	0.06
	79C2	Menfro silt loam, 5 to 10 percent slopes, eroded	1.0	0.00
	79F	Menfro silt loam, 18 to 35 percent slopes	0.1	0.00
	8038A	Rocher loam, 0 to 2 percent slopes, occasionally flooded	9.1	0.02
	8038B	Rocher loam, 2 to 5 percent slopes, occasionally flooded	216.3	0.38
	8078A	Arenzville silt loam, 0 to 2 percent slopes, occasionally flooded	213.1	0.37
	8102A	La Hogue loam, 0 to 3 percent slopes, occasionally flooded	58.7	0.10

Table B.6 Continued

Land-form	Mapping Unit Status/ Symbol	Name	Area (acres)	% by Landform
Floodplain -Continued				
	533	Urban land	2,633.3	4.62
	8122B	Colp silt loam, 1 to 4 percent slopes, occasionally flooded	20.2	0.04
	8122C	Colp silty clay loam, 5 to 10 percent slopes, severely eroded, occasionally flooded	4.6	0.01
	8150A	Onarga sandy loam, 0 to 3 percent slopes, occasionally flooded	312.8	0.55
	8151A	Ridgeville fine sandy loam, 0 to 2 percent slopes, occasionally flooded	160.7	0.28
	8180A	Dupo silt loam, 0 to 2 percent slopes, occasionally flooded	2,257.1	3.96
	8183A	Shaffton clay loam, 0 to 2 percent slopes, occasionally flooded	2,444.5	4.29
	81A	Littleton silt loam, 0 to 2 percent slopes	285.1	0.50
	8284A	Tice silty clay loam, 0 to 2 percent slopes, occasionally flooded	1,302.4	2.29
	8304A	Landes very fine sandy loam, 2 to 5 percent slopes, occasionally flooded	7.1	0.01
	8304B	Landes very fine sandy loam, 2 to 5 percent slopes, occasionally flooded	3,874.1	6.80
	8331A	Haymond silt loam, 0 to 2 percent slopes, occasionally flooded	234.4	0.41
	8333A	Wakeland silt loam, 0 to 2 percent slopes, occasionally flooded	258.5	0.45
	8338A	Hurst silt loam, 0 to 2 percent slopes, occasionally flooded	22.7	0.04
	8338B	Hurst silt loam, 2 to 5 percent slopes, eroded, occasionally flooded	5.0	0.01
	8338C	Hurst silty clay loam, 5 to 10 percent slopes, eroded, occasionally flooded	8.8	0.02
	8394A	Haynie silt loam, 0 to 2 percent slopes, occasionally flooded	6.8	0.01
	8415A	Orion silt loam, 0 to 2 percent slopes, occasionally flooded	188.9	0.33
	8434B	Ridgway silt loam, 2 to 5 percent slopes, occasionally flooded	7.9	0.01
	8452A	Riley clay loam, 0 to 3 percent slopes, occasionally flooded	30.1	0.05
	8592A	Nameoki silty clay, 0 to 2 percent slopes, occasionally flooded	1,300.3	2.28
	8674A	Dozaville ______, 0 to 2 percent slopes, occasionally flooded	1,003.2	1.76
	8741B	Oakville fine sand, 2 to 5 percent slopes, occasionally flooded	155.6	0.27
	8741C	Oakville fine sand, 5 to 10 percent slopes, occasionally flooded	64.8	0.11
	962D2	Sylvan-Bold silt loams, _ to 18 percent slopes, eroded	0.8	0.00
	962F	Sylvan-Bold silt loams, 18 to 35 percent slopes	19.6	0.03
	962F2	Sylvan-Bold silt loams, 18 to 35 percent slopes, eroded	15.2	0.03
	962G	Sylvan-Bold silt loams, 35 to 60 percent slopes	5.3	0.01
	Nonwetland Total		**18,734.6**	**32.89**

Table B.6 Continued

Land-form	Mapping Unit Status/ Symbol	Name	Area (acres)	% by Landform
Floodplain -Continued				
	Nonwetland/urban land complex			
	2183A	Shaffton-Urban land complex, 0 to 2 percent slopes, occasionally flooded	4,017.5	7.05
	2284A	Tice-Urban land complex, 0 to 2 percent slopes	208.8	0.37
	2304B	Landes-Urban land complex, 2 to 5 percent slopes	676.5	1.19
	2591A	Nameoki-Urban land complex, 0 to 3 percent slopes	5.6	0.01
	2592A	Nameoki-Urban land complex, 0 to 3 percent slopes	794.1	1.39
	Nonwetland/ulc Total		**5,702.5**	**10.01**
	Water			
	W	Water	4,058.5	7.12
	Water Total		**4,058.5**	**7.12**
	Wetland			
	1070A	Beaucoup silty clay loam, 0 to 2 percent slopes, frequently flooded	380.1	0.67
	1071	Darwin silty clay loam, undrained, 0 to 2 percent slopes, frequently flooded	3.8	0.01
	1071A	Darwin silty clay loam, undrained, 0 to 2 percent slopes, frequently flooded	2,302.1	4.04
	1248A	McFain silty clay loam, undrained, 0 to 2 percent slopes, frequently flooded	819.6	1.44
	3070L	Beaucoup silty clay loam, 0 to 2 percent slopes, frequently flooded, long duration	120.5	0.21
	3076A	Otter silt loam, 0 to 2 percent slopes, frequently flooded	54.4	0.10
	3334A	Birds silt loam, 0 to 2 percent slopes, frequently flooded	75.8	0.13
	409A	Aquents, clayey, 0 to 2 percent slopes	42.5	0.07
	8070A	Beaucoup silty clay loam, 0 to 2 percent slopes, occasionally flooded	1,146.5	2.01
	8070B	Beaucoup silty clay loam, 0 to 2 percent slopes, occasionally flooded	35.7	0.06
	8071A	Darwin silty clay, 0 to 2 percent slopes, occasionally flooded	90.1	0.16
	8071L	Darwin silty clay, 0 to 2 percent slopes, occasionally flooded, long duration	11,913.8	20.92
	8084A	Okaw silt loam, 0 to 2 percent slopes, occasionally flooded	13.6	0.02
	8162A	Gorham silty clay loam, 0 to 2 percent slopes, occasionally flooded	207.3	0.36

Table B.6 Continued

Land-form	Mapping Unit Status/ Symbol	Name	Area (acres)	% by Landform
Floodplain -Continued				
	8302A	Ambraw loam, 0 to 2 percent slopes, occasionally flooded	312.4	0.55
	8334A	Birds silt loam, 0 to 2 percent slopes, occasionally flooded	802.5	1.41
	8591A	Fults silty clay, 0 to 2 percent slopes, occasionally flooded	1,407.4	2.47
	8646A	Fluvaquents, loamy, 0 to 2 percent slopes, occasionally flooded	1,245.3	2.19
	Wetland Total		**20,973.3**	**36.82**
	Wetland/urban land complex			
	2071A	Darwin-Urban land complex, 0 to 2 percent slopes, occasionally flooded	269.5	0.47
	2071L	Darwin-Urban land complex, 0 to 2 percent slopes, occasionally flooded, long duration	1,942.5	3.41
	Wetland/ulc Total		**2,212.0**	**3.88**
Floodplain Total			**56,962.0**	**100.00**
Upland				
	Developed			
	533	Urban land	217.1	0.44
	536	Dumps	49.4	0.10
	801B	Orthents, silty, undulating	201.4	0.41
	801D	Orthents, silty, steep	502.3	1.01
	802B	Orthents, loamy, undulating	13.6	0.03
	826D	Orthents, silty, acid substratum, rolling	85.7	0.17
	Developed Total		**1,069.4**	**2.15**
	Nonwetland			
	19D3	Sylvan silty clay loam, 10 to 15 percent slopes, severely eroded	433.8	0.87
	267A	Caseyville silt loam, 0 to 2 percent slopes	313.5	0.63
	267B	Caseyville silt loam, 2 to 5 percent slopes	225.5	0.45
	283B	Downsouth silt loam, 2 to 5 percent slopes	712.6	1.43
	283C2	Downsouth silt loam, 5 to 10 percent slopes, eroded	158.8	0.32
	3078A	Arenzville silt loam, 0 to 2 percent slopes, frequently flooded	24.2	0.05
	3081A	Littleton silt loam, 0 to 2 percent slopes, frequently flooded	39.3	0.08
	3331A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	499.2	1.00
	3333A	Wakeland silt loam, 0 to 2 percent slopes, frequently flooded	1,894.7	3.81
	3336A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	237.6	0.48
	333A	Wakeland silt loam, 0 to 2 percent slopes	11.3	0.02

Table B.6 Continued

Land-form	Mapping Unit Status/ Symbol	Name	Area (acres)	% by Landform
Upland -Continued				
	8302A	Ambraw loam, 0 to 2 percent slopes, occasionally flooded	312.4	0.55
	3415A	Orion silt loam, 0 to 2 percent slopes, frequently flooded	345.3	0.69
	35F	Bold silt loam, 15 to 30 percent slopes	33.7	0.07
	37A	Worthen silt loam, 0 to 2 percent slopes	50.8	0.10
	37B	Worthen silt loam, 2 to 5 percent slopes	361.2	0.73
	3847L	Fluvaquents-Orthents complex, frequently flooded, long duration	0.1	0.00
	384A	Edwardsville silt loam, 0 to 2 percent slopes	455.3	0.92
	384B	Edwardsville silt loam, 2 to 5 percent slopes	1,164.4	2.34
	441B	Wakenda silt loam, 2 to 5 percent slopes	216.9	0.44
	441C2	Wakenda silt loam, 5 to 10 percent slopes, eroded	32.7	0.07
	447B	Winfield silt loam, 2 to 5 percent slopes	6.3	0.01
	447C2	Winfield silt loam, 5 to 10 percent slopes, eroded	3.3	0.01
	447C3	Winfield silty clay loam, 5 to 10 percent slopes, severely eroded	7.8	0.02
	477B	Winfield silt loam, 2 to 5 percent slopes	3,320.7	6.68
	477B2	Winfield silt loam, 2 to 5 percent slopes, eroded	3.2	0.01
	477B3	Winfield silt loam, 2 to 5 percent slopes, severely eroded	49.0	0.10
	477C2	Winfield silt loam, 5 to 10 percent slopes, eroded	492.9	0.99
	477C3	Winfield silty clay loam, 5 to 10 percent slopes, severely eroded	575.3	1.16
	477D2	Winfield silty clay loam, 10 to 15 percent slopes, eroded	9.5	0.02
	477D3	Winfield silty clay loam, 10 to 15 percent slopes, severely eroded	827.3	1.67
	517A	Marine silt loam, 0 to 2 percent slopes	5.8	0.01
	53B	Bloomfield loamy fine sand, 1 to 3 percent slopes	37.6	0.08
	630D3	Navlys ______, _ to _ percent slopes, severely eroded	3.5	0.01
	75B	Drury silt loam, 2 to 5 percent slopes	391.2	0.79
	7903	not given	0.5	0.00
	79B	Menfro silt loam, 2 to 5 percent slopes	5,621.2	11.31
	79C2	Menfro silt loam, 5 to 10 percent slopes, eroded	1,867.5	3.76
	79C3	Menfro silt clay loam, 5 to 10 percent slopes, severely eroded	238.7	0.48
	79D2	Menfro silt loam, 10 to 18 percent slopes, eroded	1,280.9	2.58
	79D3	Menfro silty clay loam, 10 to 18 percent slopes, severely eroded	2,366.2	4.76
	79F	Menfro silt loam, 18 to 35 percent slopes	5,354.6	10.78
	79F3	Menfro silty clay loam, 18 to 35 percent slopes, severely eroded	229.7	0.46
	79G	Menfro silt loam, 35 to 60 percent slopes	1,356.4	2.73
	8180A	Dupo silt loam, 0 to 2 percent slopes, occasionally flooded	6.3	0.01
	81A	Littleton silt loam, 0 to 2 percent slopes	33.2	0.07
	8331A	Haymond silt loam, 0 to 2 percent slopes, occasionally flooded	15.2	0.03
	8674A	Dozaville _______, 0 to 2 percent slopes, occasionally flooded	1.1	0.00

Table B.6 Continued

Land-form	Mapping Unit Status/ Symbol	Name	Area (acres)	% by Landform
Upland -Continued				
	90A	Bethalto silt loam, 0 to 2 percent slopes	260.2	0.52
	90B	Bethalto silt loam, 2 to 5 percent slopes	582.9	1.17
	962D2	Sylvan-Bold silt loams, _ to 18 percent slopes, eroded	1,578.5	3.18
	962F	Sylvan-Bold silt loams, 18 to 35 percent slopes	1,929.5	3.88
	962F2	Sylvan-Bold silt loams, 18 to 35 percent slopes, eroded	5,577.2	11.23
	962G	Sylvan-Bold silt loams, 35 to 60 percent slopes	1,784.6	3.59
	Nonwetland Tota		**43,029.0**	**86.61**
	Nonwetland/urban land complex			
	2078A	Winfield-Urban land complex, 2 to 8 percent slopes	9.8	0.02
	2079B	Menfro-Urban land complex, 2 to 5 percent slopes	106.9	0.22
	2079C2	Menfro-Urban land complex, 5 to 10 percent slopes, eroded	3.3	0.01
	2079D	Menfro-Urban land complex, 8 to 15 percent slopes	208.0	0.42
	2079D2	Menfro-Urban land complex, 10 to 18 percent slopes, eroded	166.3	0.33
	2079D3	Menfro-Urban land complex, 10 to 18 percent slopes, severely eroded	9.7	0.02
	2079E	Menfro-Urban land complex, 15 to 25 percent slopes	17.2	0.03
	2090B	Bethalto-Urban land complex, 2 to 5 percent slopes	21.1	0.04
	2183A	Shaffton-Urban land complex, 0 to 2 percent slopes, occasionally flooded	18.4	0.04
	2267B	Caseyville-Urban land complex, 2 to 5 percent slopes	8.5	0.02
	2283B	Downsouth-Urban land complex, 2 to 5 percent slopes	8.1	0.02
	2384B	Edwardsville-Urban land complex, 1 to 4 percent slopes	307.2	0.62
	2477B	Winfield-Urban land complex, 2 to 8 percent slopes	3,077.2	6.19
	2477C2	Winfield-Urban land complex, 8 to 15 percent slopes, eroded	13.8	0.03
	2477D3	Winfield-Urban land complex, 15 to 20 percent slopes, severely eroded	13.0	0.03
	Nonwetland/ulc Total		**3,988.3**	**8.03**
	Unknown			
	2385A	Either Edwardsville (384) or Mascoutah (385) -Urban land complex, 0 to 2 percent slope	3.4	0.01
	Unknown Total		**3.4**	**0.01**
	Water			
	W	Water	456.5	0.92
	Water Total		456.5	0.92

Table B.6 Continued

Land-form	Mapping Unit Status/ Symbol	Name	Area (acres)	% by Landform
Upland -Continued				
	Wetland			
	1248A	McFain silty clay loam, undrained, 0 to 2 percent slopes, frequently flooded	3.9	0.01
	3070L	Beaucoup silty clay loam, 0 to 2 percent slopes, frequently flooded, long duration	4.5	0.01
	3076A	Otter silt loam, 0 to 2 percent slopes, frequently flooded	14.2	0.03
	31A	Pierron silt loam, 0 to 2 percent slopes	9.6	0.02
	3334L	Birds silt loam, 0 to 2 percent slopes, frequently flooded, long duration	238.4	0.48
	385A	Mascoutah silty clay loam, 0 to 2 percent slopes	840.6	1.69
	50A	Virden silt loam, 0 to 2 percent slopes	21.7	0.04
	8084A	Okaw silt loam, 0 to 2 percent slopes, occasionally flooded	0.3	0.00
	Wetland Total		**1,132.9**	**2.28**
Upland Total			**49,679.5**	**100.00**
Grand Total			**106,641.4**	

B.7 WETLAND CLASSIFICATION AND SECTION 404 AND "SWAMPBUSTER" WETLANDS

B.7.1 Wetland Classification. The Illinois Wetland Inventory (IWI) serves as the basis for describing the types, amount, and location of wetlands currently found within the study area. The IWI is founded on the same data collected by the U.S. Fish and Wildlife Service (USFWS) to develop a national inventory of wetlands and deepwater habitats (Cowardin et al. 1979; USFWS 2001). These habitats were delineated from aerial photography, and in the vicinity of the study area, photographs used for this purpose were taken during 1981-1988, with most from 1985. Therefore, the database representing current wetlands is about 15 years old. A more recent wetland inventory does not exist.

In the IWI, wetlands and deepwater habitats are classified according to geomorphic, vegetational, and water regime characteristics. The IWI classification is based on the scheme used by the USFWS in the National Wetland Inventory (NWI), but with some modification (Suloway and Hubbell 1994). Unlike the cumbersome names and codes used in the national inventory to designate wetland types, the IWI names are more "user-friendly", and they are used in this report. Wetlands are broken down into 11 kinds, of which 8 occur in the study area. The minimum wetland area delineated by the USFWS in the NWI is 0.01 acres.

Of the 8 wetlands types, "swamps" are forested wetlands occurring at sites where water is present either year-round or most of the year. "Bottomland forests" are also forested wetlands but the duration of flooding or soil saturation is either temporary or seasonal. "Shallow marsh/wet meadow" is a class having emergent (rooted nonwoody) vegetation and a temporary or seasonal water regime. "Deep marsh" is also characterized by emergent vegetation, but the water regime is permanent to semipermanent, like that of a swamp. "Open water" wetlands are areas of water less than 20 acres in extent that are not vegetated and are less than 6.6 feet (2 meters) deep; they include "ponds, borrow pits, small reservoirs, and open water areas within a marsh or swamp" (Suloway and Hubbell 1994:7). "Scrub-shrub" wetlands support woody vegetation such as trees and shrubs that are less than 20 feet in height. These wetlands can be transitional areas undergoing succession from emergent wetland to forested wetland, with temporary or seasonal water regimes, or they can be shrub swamp natural communities that have permanent or semipermanent standing water. Unlike the previous wetland types, "shallow lake" and "lake shore" wetlands are lake-like areas greater than 20 acres, with little (less than 30%) persistent vegetative cover. Shallow lake wetlands are open bodies of shallow water. Lake shore wetlands are usually found along the shores of lakes that experience wave action, as well as along the edges of large rivers.

Unlike the NWI, which classified wetland types down to individual water regimes, each of the IWI wetland classes represents a range of water regime conditions. This "flexibility" in the classification system allows for natural variability in individual wetlands over time as they respond to year-to-year fluctuations in hydrology. In addition to water regime characteristics, the NWI assigned other attributes to delineated wetlands using photo-interpretation. Wetlands created or affected by excavation or impoundment have been distinguished from those not associated with these activities. The IWI refers to the former as "modified" wetlands and the latter as "natural" wetlands. The relationship between NWI wetland codes and IWI wetland names applicable to the study area is displayed in Table B.8.

Section 404 and "Swampbuster" Wetlands. Section 404 of the Clean Water Act regulates the discharge of dredged and fill materials into waters of the United States. The St. Louis District, Corps of Engineers, administers the Section 404 permit program in Illinois where the study area lies. Waters of the U.S. include: all waters that are, may be, or have been used in interstate or foreign commerce; their tributaries; wetlands adjacent to these waterways and tributaries; and isolated wetlands, water bodies (such as small lakes and ponds), intermittent streams, wet meadows and mudflats. Wetlands are defined as "areas inundated or saturated by surface or ground water at a frequency or duration sufficient to support and, under normal circumstances, support a prevalence of vegetation adapted for life in saturated soil conditions." Size of an area to be considered a water of the U.S. is not a limitation. Areas smaller than an acre are regulated.

Wetlands subject to Section 404 jurisdiction have not been mapped for purposes of administering the permit program. Delineation of Section 404 wetlands is conducted on a case-by-case basis for individual permit actions. Although the wetlands identified in the Illinois Wetland Inventory serve satisfactorily in representing existing wetlands for purposes of this study, they do not represent existing wetlands subject to Section 404 jurisdiction, for two reasons.

First, the IWI database is about 15 years old, and not representative of today's conditions. Second, delineation of Section 404 wetlands requires an on-site investigation, and information used to delineate IWI wetlands was obtained remotely by aerial photography. Information about wetlands for which the District has permitted dredge or fill activities is not reflected in the characterization of existing wetlands presented in Section 3.12.2.4 of the main report.

Unlike the Section 404 regulatory program, "Swampbuster" is a disincentive program that requires farmers who voluntarily receive certain public agricultural subsidies through the U.S. Department of Agriculture to conserve wetlands on land they own or farm. The Wetland Conservation provision of the 1985 Farm Bill, as amended, is the authority for this program, which is administered by the Natural Resources Conservation Service (NRCS) and the Farm Service Agency. Various categories of wetlands are recognized under Swampbuster, such as wetland, farmed wetland, prior converted wetland, and converted wetland. NRCS maintains an inventory of wetlands altered by agriculture, but it is not comprehensive. Similar to Section 404, the characterization of current wetlands in Section 3.12.2.4 of the main report does not reflect any NRCS inventory or mapping of wetlands affected by agricultural practices.

Table B.8 Cross Reference between Codes of National Wetlands Inventory and Illinois Wetlands Inventory applicable to the Study Area.

Upland			
NWI	**IWI**		
U	0		
Wetlands			
palustrine scrub-shrub			
natural		**modified/artificial**	
NWI	**IWI**	**NWI**	**IWI**
PSS1/EMA	1110	PSS1AX	2110
PSS1/EMC	1110	PSS1CX	2110
PSS1A	1110	PSS1FH	2110
PSS1AD	1110	PSS1FX	2110
PSS1C	1110		
PSS1CD	1110		
PSS1F	1110		
palustrine forested swamp			
natural		**modified/artificial**	
NWI	**IWI**		
PFO1F	1121		

Table B.8 Continued

Wetlands-Continued			
palustrine forested bottomland forest			
natural		modified/artificial	
NWI	IWI	NWI	IWI
PFO1/EMA	1122	PFO1AH	2122
PFO1/SSA	1122	PFO1AX	2122
PFO1A	1122	PFO1CH	2122
PFO1AD	1122	PFO1CX	2122
PFO1C	1122		
PFO1CD	1122		
palustrine emergent shallow marsh/wet meadow			
natural		modified/artificial	
NWI	IWI	NWI	IWI
PEM/FO1A	1131	PEM/FO1CX	2131
PEM/FO1C	1131	PEMAH	2131
PEM/SS1A	1131	PEMAX	2131
PEM/SS1C	1131	PEMCH	2131
PEMA	1131	PEMCX	2131
PEMAD	1131		
PEMADF	1131		
PEMAF	1131		
PEMC	1131		
PEMCD	1131		
PEMCDF	1131		
PEMCF	1131		
palustrine emergent deep marsh			
natural		modified/artificial	
NWI	IWI	NWI	IWI
PEMF	1132	PEMFH	2132
PEMFD	1132	PEMFX	2132
palustrine open water			
natural		modified/artificial	
NWI	IWI	NWI	IWI
PABF	1140	PABGX	2140
PUBF	1140	PAB4GX	2140
PUBG	1140	PUBFH	2140
		PUBFX	2140
		PUBGH	2140
		PUBGX	2140

Table B.8 Continued

Wetlands-Continued			
lacustrine shallow lake			
natural			
NWI	**IWI**		
L2UBH	1210		
lacustrine lake shore			
natural		**modified/artificial**	
NWI	**IWI**	**NWI**	**IWI**
L2USA	1220	L2USCH	2220
		L2USCX	2220
DEEPWATER HABITATS			
deepwater lacustrine			
NWI	**IWI**	**NWI**	**IWI**
natural		**modified/artificial**	
L1UBG	3110	L1UBHH	4110
L1UBH	3110	L1UBHX	4110

Table B.9 Potential number of native and introduced vascular plant species occurring at each INAI natural community in study area.

INAI Natural Community	Tree		Shrub		Vine		Grass		Sedge		Forb		Fern		All Native	All Exotic	Native & Exotic	% Exotic
	Nat	Exo	Nat	Exo	Nat	Exo	Nat	Exo	Nat	Exo	Nat	Exo	Nat	Exo				
Dry upland forest	31	2	17	2	11	1	16	0	8	0	115	3	6	0	204	8	212	0.04
Dry-mesic upland forest	34	2	12	1	13	1	15	3	11	0	133	6	10	0	228	13	241	0.05
Mesic upland forest	33	1	14	1	7	1	15	0	7	0	89	0	9	0	174	3	177	0.02
Mesic floodplain forest	35	2	15	2	16	0	17	1	15	0	128	6	7	0	233	11	244	0.05
Wet-mesic floodplain forest	30	0	12	0	9	1	13	3	13	0	78	10	3	0	158	14	172	0.08
Wet floodplain forest	16	0	2	0	3	0	8	1	5	0	45	3	2	0	81	4	85	0.05
Wet-mesic prairie	1	0	14	1	3	0	19	9	11	0	164	20	3	0	215	30	245	0.12
Mesic sand prairie	10	1	16	0	6	0	29	8	18	0	194	30	5	0	278	39	317	0.12
Loess hill prairie (2)	17	3	19	0	9	2	21	8	8	0	162	20	4	0	240	33	273	0.12
Dry-mesic savanna (3)	11	0	11	0	1	0	16	2	4	0	87	21	0	0	130	23	153	0.15
Marsh	7	0	6	0	2	0	19	2	32	0	100	5	5	0	171	7	178	0.04
Shrub swamp	6	0	10	0	2	0	4	0	11	0	48	1	2	0	83	1	84	0.01
Lake and pond (4)	3	0	3	0	1	0	11	2	14	0	79	2	1	0	112	4	116	0.03
Stream (4)	0	0	1	0	0	0	0	0	1	0	21	1	0	0	23	1	24	0.04
Cultural (4)	3	5	6	3	8	4	29	30	15	0	124	129	2	0	187	171	358	0.48

(1) INAI = Illinois Natural Area Inventory; this table is a summary of Table B.17 (list of vascular plants known or likely to occur in study area).
Nat = native, Exo = Exotic or introduced to Illinois
(2) Historically present in study area but not currently
(3) Not present currently, possibly historically
(4) These are community classes, and not individual communities

Table B.10 List of common invertebrates known to occur or likely to occur in the study area (1).

Common name	Taxa / Scientific Name
	Phylum Annelida
	Class Aphanoneura
	Order Aeolosomatida
Suction-feeding worms	Family Aeolosomatidae
	Aeolosomatidae
	Class Branchiobdellae
	Order Branchiobdellida
Crayfish worms	Family Cambarincolidae
	Cambarincolidae
Leeches	Class Hirudinea
	Order Pharyngobdellida
	Family Erpobdellidae
	Erpobdella punctata
	Mooreobdella microstoma
	Mooreobdella punctata
	Order Rhynchobdellida
	Family Glossiphoniidae
	Helobdella elongata
	Helobdella stagnalis
	Placobdella montifera
	Placobdella ornata
	Family Piscicolidae
	Piscicolaria sp.
	Class Oligochaeta
	Order Haplotaxida
Aquatic earthworms	Family Naididae
	Bratislavia unidentata
	Chaetogaster diaphanus
	Dero digitata
	Dero furcata
	Dero nivea
	Dero pectinata
	Nais behningi
	Nais bretscheri
	Nais communis
	Nais elinguis
	Nais pardalis
	Nais sp.
	Nais varibilis

Table B.10 Continued

Common name	Taxa / Scientific Name
	Ophidonais serpentina
	Paranais frici
	Pristina aequiseta
	Pristina leidyi
	Pristina longisseta
	Slavina appendiculata
	Specaria josinae
Sludge worms	Family Tubificidae
	Aulodrilus limnobius
	Aulodrilus pigueti
	Bothrioneurum vejdovskyanum
	Branchiura sowerbyi
	Ilyodrilus templetoni
	Imm. Tub. w/ cap. chaetae
	Imm. Tub. w/o cap. chaetae
	Limnodrilus cervix
	Limnodrilus claparedianus
	Limnodrilus hoffmeisteri
	Limnodrilus immatures
	Limnodrilus maumeensis
	Limnodrilus udekemianus
	Quistadrilus multisetosus
	Spirosperma cf. *ferox*
	Tubifex tubifex
Aquatic earthworms	Family Lumbriculidae
	Lumbricidae
	Phylum Arthopoda
	Class Branchiopoda
	Order Cladocera
	Family Sididae
	Sida crystallina
	Class Arachnida
	Order Acarina
Ticks	Family Ixodidae
	Amblyomma americanum
	Dermacentor variabilis
	Haemaphysalis leporio

Table B.10 Continued

Common name	Taxa / Scientific Name
Chiggers	Family Trombiculidae
	Eutrombicula spp.
	Order Araneae
	Family Loxoscelidae
Brown recluse spider	*Loxoceles reclusa*
	Family Therididae
Black widow spider	*Latrodectus mactans*
	Class Crustacea
	Order Branchiura
Copepods	Family Argulidae
	Argulus sp.
	Order Decapoda
Grass shrimp	Family Palaemonidae
	Palaemonetes kadiakensis
	Order Isopoda
Sowbugs	Family Asellidae
	Asellus brevicauda
	Asellus intermedius
	Caecidotea brevicauda
	Caecidotea opthalmica
	Caecidotea packardi
	Caecidotea spatulata
	Class Hexapoda
Cockroaches	Order Blattodea
Beetles	Order Coleoptera
	Family Dryopidae
	Helichus sp.
	Family Dytiscidae
	Laccophilus fasciatus
	Laccophilus maculosus maculosus
	Laccophilus proximus
	Family Elmidae
	Ancyronyx sp.
	Dubiraphia sp.
	Stenelmis sp.
	Family Gyrinidae
	Dineutus horneii
	Dineutus sp.

Table B.10 Continued

Common name	Taxa / Scientific Name
	Family Haliplidae
	Peltodytes sexamaculatus
	Peltodytes sp.
	Family Hydrophilidae
	Berosus infuscatus
	Berosus peregrinus
	Enochrus diffusus
	Enochrus pygmaeus
	Hydrochara obtusata
	Hydrophilus triangularis
	Tropisternus blatchleyi
	Tropisternus glaber
	Tropisternus lateralis nimbatus
	Tropisternus mexicanus mexicanus
	Tropisternus mexicanus striolatus
	Tropisternus modestus
	Tropisternus natator
	Tropisternus sp. (adult)
	Order Diptera
	Family Ceratapoganidae
	Bezzia complex
	Ceratapogan sp.
	Monohelea sp.
	Palpomyia complex
Phantom midges	Family Chaoboridae
	Chaoborus punctipennis
Non-biting midges	Family Chironomidae
	Ablabesmyia americana
	Ablabesmyia cinctipes
	Ablabesmyia illinoensis
	Ablabesmyia mallochi
	Ablabesmyia parajanta
	Chironomus attenuatus
	Chironomus crassicaudatus
	Chironomus decorus
	Chironomus riparius grp.
	Chironomus stigmaterus
	Clinotanypus singuis
	Coelotanypus concinnus

Table B.10 Continued

Common name	Taxa / Scientific Name
	Coelotanypus scapularis
	Conchapelopia sp.
	Corynoneura sp.
	Cricotopus bicinctus
	Cricotopus sylvestris grp.
	Cryptochironomus blarina
	Cryptochironomus fulvus
	Cryptotendipes sp.
	Dicrotendipes funidus
	Dicrotendipes modestus
	Dicrotendipes neomodestus
	Dicrotendipes nervosus
	Einfeldia sp.
	Glyptotendipes lobiferus
	Glyptotendipes pallens
	Glyptotendipes paripes
	Harnischia curtilamellatus
	Kiefferulus dux
	Leptochironomus sp.
	Microchironomus sp.
	Nilotanypus sp.
	Parachironomus monochromus
	Paracladopelma sp.
	Parametriocnemus sp.
	Pentaneura sp.
	Phaenopsectra flavipes
	Polypedilum convictum
	Polypedilum illinoense
	Polypedilum ontario
	Polypedilum scalaenum grp.
	Procladius bellus
	Procladius sublettei
	Psectrocladius sp.
	Rheotanytarsus sp.
	Stenochironomus hilaris
	Tanypus neopunctipennis
	Tanypus stellatus
	Tanytarsus sp.
	Thienemaniella sp.

Table B.10 Continued

Common name	Taxa / Scientific Name
	Thienemannimyia grp.
	Tribelos fuscicornis
	Tribelos jucundum
	Xenochironomus xenolabis
Mosquitoes	Family Culicidae
	Aedes aegypti
	Aedes albopictus
	Aedes atlanticus
	Aedes atropalpus
	Aedes canadensis
	Aedes cinereus
	Aedes dorsalis
	Aedes dupreei
	Aedes fitchi
	Aedes flavescens
	Aedes grossbecki
	Aedes hendersoni
	Aedes informatus
	Aedes mitchellae
	Aedes nigromaculis
	Aedes sollicitans
	Aedes sticticus
	Aedes stimulans
	Aedes thibaulti
	Aedes tormentor
	Aedes triseriatus
	Aedes trivittatus
	Aedes vexans
	Anopheles barberi
	Anopheles crucians
	Anopheles punctipennis
	Anopheles quadrimaculatus
	Anopheles walkeri
	Coquillettidia perturbans
	Culex erraticus
	Culex peccator
	Culex pipiens
	Culex quinquefasciatus
	Culex restuans

Table B.10 Continued

Common name	Taxa / Scientific Name
	Culex salinarius
	Culex tarsalis
	Culex territans
	Culiseta inornata
	Mansonia perturbans
	Orthopodomyia alba
	Orthopodomyia signifera
	Psorophora ciliata
	Psorophora confinnis
	Psorophora cyanescens
	Psorophora discolor
	Psorophora ferox
	Psorophora horrida
	Psorophora howardi
	Psorophora varipes
	Toxorinchites rutilis septentrionalis
	Uranotaenia sapphirina
Dixid midges	Family Dixidae
	Dixa sp.
	Family Muscidae
Flies	*Limnophora aequifrons*
	Musca domestica
	Stomoxys calcitrans
Sand & Moth Flies	Family Psychodidae
	Culicoides sp.
	Psychoda sp.
	Family Simulidae
	Simulium tuberosum complex
	Simulium vittatum complex
	Simulium spp.
	Family Stratiomyidae
	Stratiomyia sp.
	Family Tabanidae
	Chrysops pikei
	Chrysops vittatus
	Tabanus equalis
	Tabanus quinquevittatus
	Family Tipulidae
	Tipula sp.

Table B.10 Continued

Common name	Taxa / Scientific Name
Mayflies	Order Ephemeroptera
	Family Baetidae
	Baetis flavistriga
	Baetis intercalaris
	Callibaetis ferrugineus
	Callibaetis fluctuans
	Callibaetis sp.
	Centroptilum sp.
	Labiobaetis dardanus
	Procleon sp.
	Family Caenidae
	Caenis latipennis
	Caenis punctata
	Caenis sp.
	Family Ephemeridae
	Hexagenia limbata
	Family Heptageniidae
	Heptagenia diabasia
	Heptagenia sp.
	Stenacron interpunctatum
	Stenonema femoratum
	Stenonema interpunctatum
	Family Leptohyphidae
	Tricorythodes sp.
	Leptophlebia sp.
	Family Potamanthidae
	Anthopotamus myops
	Order Hemiptera
True water bugs	Family Belostomatidae
	Belostoma flumineum
	Belostoma lutarium
	Lethocerus americanus
Water striders	Family Gerridae
	Aquarius remigis
	Gerris canaliculatus
	Gerris insperatus
	Gerris marginatus
	Gerris remigis
	Trepobates inermis
	Trepobates subnitidus

Table B.10 Continued

Common name	Taxa / Scientific Name
Backswimmers	Family Notocentidae
	Notonecta indica
	Notonecta sp.
	Notonecta undulata
Pigmy Backswimmers	Family Pleidae
	Neoplea striola
Water boatmen	Family Corixidae
	Corisella edulis
	Hesperocorixa nitida
	Hesperocorixa obliqua
	Palmocorixa buenoi
	Pleocoris femoratus
	Ramphocorixa acuminata
	Sigara alternata
	Sigara hubbelli
	Sigara sp.
	Trichocorixa calva
	Trichocorixa kanza
Water treaders	Family Mesoveliidae
	Mesovelia mulsanti
	Mesovelia sp.
Water scorpions	Family Nepidae
	Ranatra buenoi
	Ranatra fusca
	Ranatra nigra
Bees, wasps, ants	Order Hymenoptera
Moths and Butterflies	Order Lepidoptera
Dobsonflies	Order Megaloptera
	Family Corydalidae
	Sialis sp.
Grasshoppers and Crickets	Order Orthoptera
Dragonflies and Damselflies	Order Odonata
	Family Aeshnidae
	Anax sp.
	Epiaeschna heros
	Family Calopterygidae
	Calopteryx sp.
	Hetaerina sp.

Table B.10 Continued

Common name	Taxa / Scientific Name
	Family Coenagrionidae
	Argia tibialis
	Coenagrion sp.
	Enallagma sp.
	Ischnura posita
	Ischnura sp.
	Family Corduliidae
	Cordulia sp.
	Family Libellulidae
	Erythemis simplicicollis
	Libellula sp.
	Pachydiplax longipennis
	Perithemis domitia
	Perithemis tenera
	Sympetrum sp.
	Family Protoneuridae
	Neoneura sp.
	Family Siphlonuridae
	Siphlonurus sp.
Stoneflies	Order Plecoptera
	Family Capniidae
	Allocapnia vivipara
	Family Nemouridae
	Amphinemura sp.
	Family Perlidae
	Acroneuria abnormis
	Attaneuria ruralis
	Perlinella drymo
	Family Taeniopterygidae
	Taeniopteryx burksi
Fleas	Order Siphonaptera
Caddisflies	Order Tricoptera
	Family Brachycentridae
	Brachycentrus numerosus
	Family Hydropsychidae
	Cheumatopsyche pettiti
	Hydropsyche betteni
	Hydropsyche orris
	Potamyia flava
	Symphitopsyche riola

Table B.10 Continued

Common name	Taxa / Scientific Name
	Family Hydroptilidae
	Hydroptila scolops
	Hydroptila waubseana
	Ochrotrichia shawnee
	Orthotrichia americana
	Family Leptoceridae
	Athripsodes transversus
	Leptocerus americanus
	Oecetis inconspicua
	Family Philopotamidae
	Chimarra feria
	Chimarra obscura
	Family Phryganeidae
	Phryganea sayi
	Family Polycentropodidae
	Cyrnellus fraternus
	Cyrnellus sp.
	Neureclipsis crepuscularis
	Nyctiophylax vestitus
	Polycentropus centralis
	Family Rhyacophilidae
	Rhyacophila fenestra
	Family Helicopsychidae
	Helicopsyche borealis
	Tricoptera (pupae)
Scuds, Sideswimmers	Class Malacostraca
	Order Amphipoda
	Family Crangonyctidae
	Crangonyx forbesi
	Family Gammaridae
	Gammarus minus
	Gammarus pseudolimnaeus
	Gammarus troglophilus
	Family Hyalellidae
	Hyalella azeteca
	Order Decapoda
	Family Cambaridae
	Cambarus diogenes

Table B.10 Continued

Common name	Taxa / Scientific Name
	Orconectes immunis
	Orconectes virilis
	Procambarus acutus
Seed shrimps	Class Ostracoda
	Order Podocopa
	Family Candonidae
	Cypria opthalmica
	Physocypria pustulosa
	Family Ilyocyprididae
	Ilyocypris bradyi
	Family Pisidiidae
	Candona caudata
	Phylum Mollusca
	Class Bivalvia
	Order Pelecypoda
Fingernail clams	Family Sphaeriidae
	Musculium transversum
	Order Unionoida
Clams, Mussels	Family Unionidae
	Potamilus ohioensis
	Unionidae
	Anodonta grandis
	Anodonta suborbicularis
	Toxolasma parvus
Snails & Limpets	Class Gastropoda
	Order Architaenioglossa
	Family Viviparidae
	Viviparus sp.
	Order Basommatophora
	Family Ancylidae
	Ferrissia sp.
	Family Planorbidae
	Heliosoma sp.
	Family Lymnaeidae
	Lymnaea sp.
	Family Physidae
	Physa gyrina
	Physa integra
	Physella sp.

Table B.10 Continued

Common name	Taxa / Scientific Name
Horsehair worms	Phylum Nematomorpha
	Class Gordioida
	Order Gordiida
	Family Gordiidae
	Gordius sp.
Flatworms	Phylum Platyhelminthes
	Class Turbellaria
	Order Tricladida
	Family Planaridae
	Dugesia dorotocephala
	Dugesia tigrina
	Phagocata gracilis
	Phagocata velata

(1) Compiled from:
Envirpnmental Science and Engineering, Inc.; Horseshoe Lake Biological Assessment; December 1990.
Illinois Department of Natural Resources; Sinkhole Plain Area Assessment, Volume 3: Living Resources; 1998.
Illinois Environmental Protection Agency; An Intensive Survey of the American Bottoms Basin 1984. December 1989.
Illinois Environmental Protection Agency; An Intensive Survey of the Mississippi South Central Basin: Data Summary, Summer 1998 Draft Report; October 2000.
Parker, R.B.; East St. Louis & Vivinity, Illinois Harding Ditch Combined Area St. Clair County, Illinois, Environmental Inventory Report Part A; Biological Elements - Pestiferous Arthropods; August 1973
QST Environmnetal and Hall Consulting; Horseshoe Lake Biological 1997 Assessment Final Report; November 7, 1997.

Table B.11 List of mosquitoes known to occur or likely to occur in the study area.

Mosquito Species (2)	Human Pest	Activity Period (3)	Disease Vector (4)	Effective Flight Range (miles)	Larval Habitat (5)									Adult Habitat (6)								
					AC	TH	PSR	FF	TP	GUP	BOG	PL	SS	DP	SW	MAR	RIC	POL	VEG	WO	NLS	DOM
Aedes aegypti	Yes	D	DF, YF	0.10	X	X			X	X								X				X
Aedes albopictus	Yes	D, N	DF, YF, DH, Possible LE	0.10	X	X			X											X		X
Aedes atlanticus	Yes	D	LE	<5					X	X										X		
Aedes atropalpus							X							X								
Aedes canadensis	No	SD, N	DH, LE	0.10			X	X	X											X	X	
Aedes cinereus	No	SD, E		<1			X		X	X	X										X	
Aedes dorsalis	Yes	D, N	WEE	10-20						X						X			X			
Aedes dupreei	No						X		X													
Aedes fitchi												X				X						
Aedes flavescens	Yes	D, E							X													
Aedes grossbecki	Yes	D					X		X		X											
Aedes hendersoni						X																
Aedes infirmatus	Yes	D							X													
Aedes mitchellae	Yes	D, E	WEE						X	X												
Aedes nigromaculis	Yes	D		2-5						X									X			
Aedes sollicitans	Yes	D, E, N	EEE, WEE, DH, VEE	5-20				X											X	X		
Aedes sticticus	Yes	E		25-30					X											X		
Aedes stimulans	Yes	D, E					X		X													
Aedes thibaulti	Yes	D				X																
Aedes tormentor									X													
Aedes triseriatus	Yes	D, E	EEE, WEE, LE	0.5-1	X	X															X	
Aedes trivittatus	Yes	D							X		X											
Aedes vexans	Yes	D, E	EEE, WEE, LE, DF	5-20					X	X									X			
Anopheles barberi					X	X																
Anopheles crucians	Yes	E, N		1+												X						X

Table B.11 Continued

Mosquito Species (2)	Human Pest	Activity Period (3)	Disease Vector (4)	Effective Flight Range (miles)	Larval Habitat (5)									Adult Habitat (6)								
					AC	TH	PSR	FF	TP	GUP	BOG	PL	SS	DP	SW	MAR	RIC	POL	VEG	WO	NLS	DOM
Anopheles punctipennis	Yes	E, N	LE, DH, M	1	X						X	X	X						X	X		X
Anopheles quadrimaculatus	Yes	E, N	EEE, WEE, M	0.5-1	X							X	X		X		X					X
Anopheles walkeri	Yes	D, E, N	M	0.5-2								X				X					X	
Coquillettidia perturbans	Yes	E	LE, EEE, FV									X										
Culex erraticus	Yes	DD										X			X							
Culex peccator												X										
Culex pipiens	Yes	E, N	LE, WEE, FV, DH, FIL, SLE, WNV	1+	X				X					X				X				X
Culex quinquefasciatus	Yes	N		1+	X																	X
Culex restuans	Yes	E, N	EEE, WEE, DH, FV		X				X	X	X			X								
Culex salinarius	Yes	E, N	SLE, FV, DH		X	X				X						X	X					X
Culex tarsalis	Yes	N	LE, WEE, SLE	2-10														X	X	X		X
Culex territans	No	E									X	X			X	X						
Culiseta inornata	Yes	E, N	LE, EEE, FV	1+	X		X				X										X	
Mansonia perturbans		E	Possible EEE	1-5								X							X			
Orthopodomyia alba	No	E			X	X																
Orthopodomyia signifera	No	E	EEE, WEE		X	X																
Psorophora ciliata	Yes	D, E, N	EEE	5+				X	X	X							X		X			
Psorophora confinnis	Yes	N		5-10					X										X			
Psorophora cyanescens	Yes	D, E, N		5					X	X											X	
Psorophora discolor	Yes	D								X												
Psorophora ferox	Yes	D, E	VEE						X				X									
Psorophora horrida	Yes						X						X									
Psorophora howardi	Yes	E							X													
Psorophora varipes	Yes	D							X													

Table B.11 Continued

Mosquito Species (2)	Human Pest	Activity Period (3)	Disease Vector (4)	Effective Flight Range (miles)	Larval Habitat (5)									Adult Habitat (6)								
					AC	TH	PSR	FF	TP	GUP	BOG	PL	SS	DP	SW	MAR	RIC	POL	VEG	WO	NLS	DOM
Toxorinchites rutilis septentrionalis	No				X															X		
Uranotaenia sapphirina	No							X							X							

(1) Compiled from:
Center for Disease Control. National Center for Infectious Diseases. Division of Vector-Borne Infectious Diseases web page http://www.cdc.gov/ncidod/dvbid/westnile/index.htm
East Side Health District (ESHD). 2001. Planning aid letter dated July 12, 2001 for the East St. Louis Interior Flood Control Study. Administrative Offices, East St. Louis, IL.
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Illinois Environmental Protection Agency (IEPA). December 1989. An Intensive Survey of the American Bottoms Basin 1984. Division of Water Pollution Control, Springfield, IL.
Mosquito Surveillance Guide with West Nile Virus Emphasis, CY 2001. U.S. Army Center for health Promotion and Preventive Medicine South. Fort McPherson, GA
(http://chppm-www.apgea.army.mil/ento/westnile/south/tab%20c/mosquito%20listing%20life%20history.pdf)
U.S. Army Corps of Engineers (USACE). St. Louis, MO. 1981. East St. Louis and Vicinity, Illinois, Cahokia Canal Drainage Area, Madison and St. Clair Counties, Illinois,
Environmental Inventory Report, Volume 3.

(2) Bold denotes major nuisance to humans.

(3) The following activity codes are used:

D – Day
SD - Shady day
E – Evening
N – Night
DD - Dawn and dusk

Table B.11 Continued

(4) The following disease codes are used:

DF - Dengue fever
EEE - Eastern equine encephalitis
FV - Flanders virus
M – Malaria
VEE - Venezuelan equine encephalitis
WNV - West Nile virus
DH - Dog heartworm
Fil - Filariasis
LE - LaCrosse encephalitis
SLE - St. Louis encephalitis
WEE - Western equine encephalitis
YF - Yellow fever

(5) The following larval habitat codes are used:

AC- Artificial containers (ie, tires, cans, etc.)
PSR - Pools filled by snow melt or spring rains
TP - Temporary or semi-permanent shaded woodland pools containing fallen leaves
BOG – Bogs
SS - In marginal vegetation of sluggish streams
SW – Swamps
RIC - Rice fields
TH - Water-filled tree cavities
FF - Eggs laid in mud or vegetation in frequently flooded marshes
GUP - Grassy / unshaded temporary pools
PL - Ponds and lakes with emergent or surface vegetation
DP - Deep, shaded pools
MAR - Freshwater marshes
POL - Sewage lagoons, catch basins, and other polluted waters

(6) The following adult habitat codes are used:

VEG – Vegetation
NLS - Near larval site
WO - Woodlands
DOM - Domestic

Table B.12 Fish species known to occur or likely to occur in the study area, including the adjacent Mississippi River.

Name (2,3)		Known	Habitat				
Common name	**Family/*Species* name**		**Creeks**	**Small Rivers**	**Medium & Large Rivers**	**Standing Water**	**Abundance**
Lampreys	**Petromyzontidae**						
Chestnut lamprey	*Ichthyomyzon castaneus*			X	X		NC
Silver lamprey	*Ichthyomyzon unicuspis*				X		NC
Sturgeons	**Acipenseridae**						
Pallid sturgeon (FE, SE)	***Scaphirhynchus albus (FE, SE)***				X		NC
Shovelnose sturgeon	*Scaphirhynchus platorynchus*				X		NC
Paddlefishes	**Polyodontidae**						
Paddlefish	*Polyodon spathula*				X		NC
Gars	**Lepisosteidae**						
Spotted gar	*Lepisosteus oculatus*				X	X	NC
Longnose gar	*Lepisosteus osseus*				X		NC
Shortnose gar	*Lepisosteus platostomus*				X		NC
Bowfins	**Amiidae**						
Bowfin	*Amia calva*	*			X	X	NC
Mooneyes	**Hiodontidae**						
Goldeye	*Hiodon alosoides*				X		NC
Mooneye	*Hiodon tergisus*				X		NC
Freshwater eels	**Anguillidae**						
American eel	*Anguilla rostrata*				X		NC
Herrings, Shads, Sardines	**Clupeidae**						
Skipjack herring	*Alosa chrysochloris*				X		NC
Gizzard shad	*Dorosoma cepedianum*	*		X	X	X	C
Threadfin shad	*Dorosoma petenense*				X	X	NC

Table B.12 Continued

Name (2,3)		Known	Habitat				
Common name	**Family/*Species* name**		**Creeks**	**Small Rivers**	**Medium & Large Rivers**	**Standing Water**	**Abundance**
Minnows & Carps	**Cyprinidae**						
Bighead carp (I)	*Aristichthys nobilis*			X	X	X	NC
Central stoneroller	*Campostoma anomalum*	*	X	X			C
Goldfish (I)	*Carassius auratus*	*	X	X			NC
Grass carp (I)	*Ctenopharyngodon idella*	*			X		NC
Red shiner	*Cyprinella lutrensis*	*	X	X	X		C
Spotfin shiner	*Cyprinella spiloptera*		X	X	X		NC
Common carp (I)	*Cyprinus carpio*	*		X	X	X	C
Gravel chub	*Erimystax x-punctatus*				X		NC
Western silvery minnow	*Hybognathus argyritis*				X		NC
Mississippi silvery minnow	*Hybognathus nuchalis*				X		NC
Plains minnow	*Hybognathus placitus*		X	X	X		NC
Redfin shiner	*Lythrurus umbratilis*				X		NC
Speckled chub	*Macrhybopsis aestivalis*			X	X		NC
Sturgeon chub (SE)	***Macrhybopsis gelida (SE)***				X		NC
Sicklefin chub	*Macrhybopsis meeki*				X		NC
Silver chub	*Macrhybopsis storeriana*			X	X	X	NC
Golden shiner	*Notemigonus crysoleucas*	*			X		NC
Emerald shiner	*Notropis atherinoides*	*			X		C
River shiner	*Notropis blennuis*			X	X		C
Ghost shiner	*Notropis buchanani*		X	X	X		NC
Bigmouth shiner	*Notropis dorsalis*	*			X		NC
Spottail shiner	*Notropis hudsonius*		X	X	X		NC

Table B.12 Continued

Name (2,3)		Known	Habitat				
Common name	**Family/*Species* name**		**Creeks**	**Small Rivers**	**Medium & Large Rivers**	**Standing Water**	**Abundance**
Sand shiner	*Notropis ludibundus*	*			X		C
Silverband shiner	*Notropis shumardi*				X		NC
Mimic shiner	*Notropis volucellus*		X	X	X		NC
Suckermouth minnow	*Phenacobius mirabilis*		X	X	X		NC
Bluntnose minnow	*Pimephales notatus*		X	X			C
Fathead minnow	*Pimephales promelas*	*		X	X		NC
Bullhead minnow	*Pimephales vigilax*	*			X		NC
Flathead chub (SE)	***Platygobio gracilis (SE)***				**X**		**NC**
Creek chub	*Semotilus atromaculatus*	*	X	X			C
Suckers	**Catostomidae**						
River carpsucker	*Carpiodes carpio*	*		X	X		NC
Quillback	*Carpiodes cyprinus*		X	X	X		NC
Highfin carpsucker	*Carpiodes velifer*		X	X	X		NC
White sucker	*Catostomus commersoni*	*	X	X	X		C
Blue sucker	*Cycleptus elongatus*			X	X		NC
Northern hog sucker	*Hypentelium nigricans*		X				NC
Smallmouth buffalo	*Ictiobus bubalus*	*			X		C
Bigmouth buffalo	*Ictiobus cyprinellus*	*			X		NC
Black buffalo	*Ictiobus niger*				X		NC
Silver redhorse	*Moxostoma anisurum*			X	X		NC
Golden redhorse	*Moxostoma erythrurum*		X	X	X		NC
Shorthead redhorse	*Moxostoma macrolepidotum*	*		X	X		NC

Table B.12 Continued

Name (2,3)		Known	Habitat				
Common name	**Family/*Species* name**		**Creeks**	**Small Rivers**	**Medium & Large Rivers**	**Standing Water**	**Abundance**
N.A. Freshwater Catfishes	**Ictaluridae**						
Black bullhead	*Ameiurus melas*	*	X	X	X	X	NC
Yellow bullhead	*Ameiurus natalis*	*	X	X	X	X	NC
Blue catfish	*Ictalurus furcatus*				X		NC
Channel catfish	*Ictalurus punctatus*	*		X	X	X	C
Stonecat	*Noturus flavus*		X	X			NC
Tadpole madtom	*Noturus gyrinus*		X	X			NC
Flathead catfish	*Pylodictis olivaris*			X	X	X	NC
Pikes	**Esocidae**						
Grass pickerel	*Esox americanus*	*	X	X	X	X	NC
Mudminnows	**Umbridae**						
Central mudminnow	*Umbra limi*		X			X	NC
Salmonides	**Salmonidae**						
Rainbow trout	Oncorhynchus mykiss	*		X	X	X	NC
Trout Perches	***Percopsidae***						
Trout-perch	*Percopsis omiscomaycus*		X	X	X	X	NC
Pirate perches	**Aphredoderidae**						
Pirate perch	*Aphredoderus sayanus*		X				NC
Silversides	**Atherinidae**						
Brook silverside	*Labidesthes sicculus*			X	X	X	NC
Killifishes	**Fundulidae**						
Blackstripe topminnow	*Fundulus notatus*		X	X	X		NC
Livebearers	**Poeciliidae**						
Mosquitofish	*Gambusia affinis*	*	X			X	NC

Table B.12 Continued

Name (2,3)		Known	Habitat				
Common name	**Family/*Species* name**		**Creeks**	**Small Rivers**	**Medium & Large Rivers**	**Standing Water**	**Abundance**
Sculpins	**Cottidae**						
Banded sculpin	*Cottus carolinae*		X				NC
Temperate Basses	**Moronidae**						
White bass	*Morone chrysops*	*		X	X		C
Yellow bass	*Morone mississippiensis*	*	X	X	X	X	NC
Sunfishes and Freshwater Basses	**Centrarchidae**						
Flier	*Centrarchus macropterus*		X	X		X	NC
Warmouth	*Chaenobryttus gulosus*	*	X	X	X	X	NC
Green sunfish	*Lepomis cyanellus*	*	X	X	X	X	C
Orangespotted sunfish	*Lepomis humilis*	*	X	X	X		NC
Bluegill	*Lepomis macrochirus*	*	X	X	X	X	C
Redear sunfish	*Lepomis microlophus*	*	X	X	X	X	NC
Smallmouth bass	*Micropterus dolomieu*		X	X		X	NC
Largemouth bass	*Micropterus salmoides*	*	X	X	X	X	C
White crappie	*Pomoxis annularis*	*	X	X	X	X	C
Black crappie	*Pomoxis nigromaculatus*	*	X	X	X	X	C
Perches and Darters	**Percidae**						
Mud darter	*Etheostoma asprigene*		X	X	X		NC
Bluntnose darter	*Etheostoma chlorosomum*		X	X	X		NC
Fantail darter	*Etheostoma flabellare*		X	X			NC
Johnny darter	*Etheostoma nigrum*		X	X	X		NC
Orangethroat darter	*Etheostoma spectabile*		X	X			NC
Logperch	*Percina caprodes*		X	X	X		NC

Table B.12 Continued

Name (2,3)		Known	Habitat				
Common name	**Family/*Species* name**		**Creeks**	**Small Rivers**	**Medium & Large Rivers**	**Standing Water**	**Abundance**
Blackside darter	*Percina maculata*		X	X			NC
Slenderhead darter	*Percina phoxocephala*		X	X	X		NC
River darter	*Percina shumardi*				X		NC
Sauger	*Stizostedion canadense*			X	X		NC
Walleye	*Stizostedion vitreum*				X	X	NC
Drums and Croakers	**Sciaenidae**						
Freshwater drum	*Aplodinotus grunniens*	*		X	X		NC
NUMBER OF KNOWN SPECIES PER HABITAT TYPE			46	60	82	28	

(1) Compiled from ESE (1990), IEPA (1989, 2000), Page et al. (1998), QST (1997), Smith (1979), and Thomerson (1973, 1974, 1981).
(2) Bold type indicates Illinois endangered (SE), or federally endangered (FE) species.
(3) (I) = Introduced species
(4) The following abundance codes are used: C = common, NC = uncommon.

Table B.13 List of bird species known to occur or likely to occur in the ESLERP study area.

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Loons	**Gaviidae**									
Red-throated Loon	*Gavia stellata*							M		
Common Loon	*Gavia immer*							M		
Grebes	**Podicipedidae**									
Pied-billed Grebe (ST)	***Podilymbus podiceps (ST)***						**B M**	**B M**		
Horned Grebe	*Podiceps auritus*							M		
Red-necked Grebe	*Podiceps grisegena*							M		
Eared Grebe	*Podiceps nigricollis*							M		
Western Grebe	*Aechmorphorus occidentalis*							M		
Pelicans	**Pelecanidae**									
American White Pelican	*Pelecanus erythrorhynchos*							M		
Cormorants	**Phalacrocoracidae**									
Double-crested Cormorant	*Phalacrocorax auritus*						B	M		
Herons	**Ardeidae**									
American Bittern (SE)	***Botaurus lentiginosus (SE)***						**B M**			
Least Bittern (ST)	***Ixobrychus exilis (ST)***						**B M**			
Great Blue Heron	*Ardea herodias*	B	B				B W M	B W M		
Great Egret	*Ardea alba*						B M	M		
Snowy Egret (SE)	***Egretta thula (SE)***						**B M**			
Little Blue Heron (SE)	***Egretta caerulea (SE)***						**B M**	**M**		
Cattle Egret	*Bubulcus ibis*		B		M		B M		M	
Green Heron	*Butorides virescens*		B M				B M	B M		
Black-crowned Night-heron (SE)	***Nycticorax nycticorax (SE)***		**B M**				**B M**	**B**		
Yellow-crowned Night-heron (SE)	***Nyctanassa violaceus (SE)***		**B M**				**B**			
New World Vultures	**Cathartidae**									
Turkey Vulture	*Cathartes aura*	B W M	B W M	M	B W M	B W M			B W M	

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Swans, Geese, & Ducks	**Anatidae**									
Greater White-fronted Goose	*Anser albifrons*						W M	W M	W M	
Snow Goose	*Chen caerulescens*						W M	W M	W M	
Ross's Goose	*Chen rossii*						W M	W M	W M	
Canada Goose	*Branta canadensis*						B W M	B W M	B W M	M
Tundra Swan	*Cygnus columbianus*						M	M		
Trumpeter Swan	*Cygnus buccinator*						M	M		
Swan	*Cygnus olor*						M	M		
Wood Duck	*Aix sponsa*		B M				B M	M		
Gadwall	*Anas strepera*						W M	W M		
American Black Duck	*Anas rubripes*		M				W M	W M	M	
American Wigeon	*Anas americana*						M	M		
Mallard	*Anas platyrhynchos*		B W M		B		B W M	B W M	B W M	
Green-winged Teal	*Anas crecca*						M	M		
Blue-winged Teal	*Anas discors*				B		B M	M		
Northern Pintail	*Anas acuta*						M	M	M	
Northern Shoveler	*Anas clypeata*						B W M	W M		
Canvasback	*Aythya valisineria*						W M	W M		
Redhead	*Aythya americana*						W M	W M		
Ring-necked Duck	*Aythya collaris*						W M	W M		
Greater Scaup	*Aythya marila*						W M	W M		
Lesser Scaup	*Aythya affinis*						W M	W M		
Oldsquaw	*Clangula hyemalis*							M		
Surf Scoter	*Melanitta perspicillata*							M		
White-winged Scoter	*Melanitta fusca*							W M		

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Black Scoter	*Melanitta nigra*							M		
Common Goldeneye	*Bucephala clangula*							W M		
Bufflehead	*Bucephala albeola*						M	W M		
Hooded Merganser	*Lophodytes cucullatus*		B M				M	M		
Common Merganser	*Mergus merganser*							W M		
Red-breasted Merganser	*Mergus serrator*						M	M		
Ruddy Duck	*Oxyura jamaicensis*						B M	M		
Eagles, Kites, & Hawks	**Accipitridae**									
Osprey (SE)	***Pandion haliaetus (SE)***							**M**		
Mississippi Kite (SE)	***Ictina mississippiensis (SE)***	**M**	**B M**							
Bald Eagle (ST, FT)	***Haliaeetus leucocephalus (ST, FT)***		**B W M**					**B W M**		
Northern Harrier (SE)	***Circus cyaneus (SE)***				**B W M**		**B W M**		**W M**	
Sharp-shinned Hawk	*Accipiter striatus*	B W M	W M	W M		W M				W M
Cooper's Hawk	*Accipiter cooperii*	B W M		B W M		B W M				W M
Northern Goshawk	*Accipiter gentilis*	W M		W M			M	M		
Red-shouldered Hawk (ST)	***Buteo lineatus (ST)***		**B W M**							
Broad-winged Hawk	*Buteo platypterus*	B M								
Red-tailed Hawk	*Buteo jamaicensis*	B W M		B W M	B W M				B W M	B W M
Rough-legged Hawk	*Buteo lagopus*				W				W	
Golden Eagle	*Aquila chrysaetos*	M		M	M					
Falcons	**Falconidae**									
American Kestrel	*Falco sparverius*				B W M	B W M			B W M	B W M
Merlin	*Falco columbarius*	M	M	M	M	M	M	M	M	M
Peregrine Falcon (SE)	***Falco peregrinus (SE)***	**M**	**M**	**M**	**M**	**M**	**M**	**B M**	**M**	**M**

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Grouse	**Phasianidae**									
Wild Turkey	*Meleagris gallopavo*	B W M	B W M	B W M		B W M			W M	
Quail	**Odontophoridae**									
Northern Bobwhite	*Colinus virginianus*			B W M	B W M	B W M			B W M	
Rails	**Rallidae**									
Yellow Rail	*Coturnicops noveboracensis*				M		M			
King Rail (SE)	***Rallus elegans (SE)***				**B M**		**B M**			
Virginia Rail	*Rallus limicola*				M		B M			
Sora	*Porzana carolina*				M		B M			
Common Moorhen (ST)	***Gallinula chloropus (ST)***						**B M**			
American Coot	*Fulica americana*						B M	W M		
Plovers	**Charadriidae**									
Black-bellied Plover	*Pluvialis squatarola*						M	M		
American Golden-Plover	*Pluvialis dominica*				M		M	M	M	
Semipalmated Plover	*Charadrius semipalmatus*						M			
Piping Plover (SE, FE)	***Charadrius melodus (SE, FE)***						**M**	**M**		
Killdeer	*Charadrius vociferus*				B M		B M		B M	B M
Stilt & Avocet	**Recurvirostridae**									
Black-necked Stilt	*Himantopus mexicanus*						B M			
American Avocet	*Recurvirostra americana*						M			
Sandpipers	**Scolopacidae**									
Greater Yellowlegs	*Tringa melanoleuca*						M			
Lesser Yellowlegs	*Tringa flavipes*						M			
Solitary Sandpiper	*Tringa solitaria*						M			

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Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Willet	*Catoptrophorus semipalmatus*						M			
Spotted Sandpiper	*Actitis macularia*						M	B		
Upland Sandpiper (SE)	***Bartramia longicauda (SE)***				B M					
Hudsonian godwit	*Limosa haemmastica*						M			
Marbled Godwit	*Limosa fedoa*						M			
Ruddy Turnstone	*Arenaria interpres*						M			
Red Knot	*Calidris canutus*						M			
Sanderling	*Calidris alba*						M			
Semipalmated Sandpiper	*Calidris pusilla*						M			
Western Sandpiper	*Western Sandpiper*						M			
Least Sandpiper	*Calidris minutilla*						M			
White-rumped Sandpiper	*Calidris fuscicollis*						M			
Baird's Sandpiper	*Calidris bairdi*				M		M			
Pectoral Sandpiper	*Calidris melanotos*				M		M		M	
Dunlin	*Calidris alpina*						M			
Stilt Sandpiper	*Calidris himantopus*						M			
Buff-breasted Sandpiper	*Tryngites subruficollis*				M		M			
Short-billed Dowitcher	*Limnodromus griseus*						M			
Long-billed Dowitcher	*Limnodromus scolopaceus*						M			
Common Snipe	*Gallinago gallinago*				M		M			
American Woodcock	*Scolopax minor*	B M	B M	B M						
Wilson's Phalarope (SE)	***Phalaropus tricolor (SE)***						**M**	**M**		
Red-necked Phalarope	*Phalaropus lobatus*						M	M		

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Jaegers, Gulls, & Terns	**Laridae**									
Laughing Gull	*Larus atricilla*							M		
Franklin's Gull	*Larus pipixcan*						M	M	M	
Bonaparte's Gull	*Larus philadelphia*						M	M	M	
Ring-billed Gull	*Larus delawarensis*						W M	W M	W M	
Herring Gull	*Larus argentatus*						M	W M	M	
Thayer's Gull	*Larus thayeri*							W		
Iceland Gull	*Larus glaucoides*							W		
Lesser Black-backed Gull	*Larus fuscus*							W M		
Glaucous Gull	*Larus hyperboreus*							W		
Great Black-backed Gull	*Larus marinus*							W		
Black-legged Kittiwake	*Rissa tridactyla*							M		
Caspian Tern	*Sterna caspia*							M		
Common Tern (SE)	***Sterna hirundo (SE)***							**M**		
Forster's Tern (SE)	***Sterna forsteri (SE)***						**M**	**M**		
Least Tern (SE, FE)	***Sterna antillarum (SE, FE)***							**B M**		
Black Tern (SE)	***Chlidonias niger (SE)***						**B M**	**M**		
Doves	**Columbidae**									
Rock Dove (I)	*Columba livia*								B W M	B W M
Eurasian Collared Dove	*Streptopelia decaocto*									B
Mourning Dove	*Zenaida macroura*			B W M					B W M	B W M
Cuckoos, Roadrunner & Anis	**Cuculidae**									
Black-billed Cuckoo	*Coccyzus erythropthalmus*	M		B M		M				
Yellow-billed Cuckoo	*Coccyzus americanus*	B M	B M	B M		B M				

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Owls	**Strigidae**									
Eastern Screech-owl	*Otus asio*			B W M		B W M				B W M
Great Horned Owl	*Bubo virginianus*	B W M	B W M			B W M			B W M	B W M
Barred Owl	*Strix varia*		B W M			B W M				
Long-eared Owl	*Asio otus*	W M		W M						
Short-eared Owl (SE)	***Asio flammeus (SE)***				**W M**					
Northern Saw-whet Owl	*Aegolius acadicus*	W M		W M						
Goatsuckers	**Caprimulgidae**									
Common Nighthawk	*Chordeiles minor*				M	B			M	B M
Whip-poor-will	*Caprimulgus vociferus*	B M				B M				
Swifts	**Apodidae**									
Chimney Swift	*Chaetura pelagica*	B M	B M	B M	M	B M	M	M	M	B M
Hummingbirds	**Trochilidae**									
Ruby-throated Hummingbird	*Archilochus colubris*	B M	B M	B M		B M				B M
Kingfishers	**Alcedinidae**									
Belted Kingfisher	*Ceryle alcyon*						B W M	B W M		
Woodpeckers	**Picidae**									
Red-headed Woodpecker	*Melanerpes erythrocephalus*	W M	B W M			W M			B M	B M
Red-bellied Woodpecker	*Melanerpes carolinus*	B W M	B W M	B W M		B W M				B W M
Yellow-bellied Sapsucker	*Sphyrapicus varius*	W M	W M			W M				W M
Downy Woodpecker	*Picoides pubescens*	B W M	B W M	B W M		B W M				B W M
Hairy Woodpecker	*Picoides villosus*	B W M	B W M	W M		B W M				B W M
Northern Flicker	*Colaptes auratus*	B W M	B W M	B W M		B W M				B W M
Pileated Woodpecker	*Dryocopus pileatus*	B W M	B W M			B W M				W M

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Flycatchers	**Tyrannidae**									
Olive-sided Flycatcher	*Contopus cooperi*	M	M	M		M				M
Eastern Wood-pewee	*Contopus virens*	B M	B M			B M				B M
Yellow-bellied Flycatcher	*Empidonax flaviventris*	M	M	M						
Acadian Flycatcher	*Empidonax virescens*	B M	B M							
Alder Flycatcher	*Empidonax alnorum*			M		M	M			
Willow Flycatcher	*Empidonax traillii*			B M		M	B M			
Least Flycatcher	*Empidonax minimus*	M	M	M		M				M
Eastern Phoebe	*Sayornis phoebe*		B M							B M
Great Crested Flycatcher	*Myiarchus crinitus*	B M	B M	M		B M				M
Western Kingbird	*Tyrannus verticalis*	M		B M	B M	B M			B M	
Eastern Kingbird	*Tyrannus tyrannus*	M		B M	B M	B M			B M	
Larks	**Alaudidae**									
Horned Lark	*Eremophila alpestris*				B W M				B W M	
Swallows	**Hirundinidae**									
Purple Martin	*Progne subis*				B M		B M	B M		B
Tree Swallow	*Tachycineta bicolor*		B M		B M		B M	B M		
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		B		B M		B M	B M		
Bank Swallow	*Riparia riparia*				B M		B M	B M		
Cliff Swallow	*Petrochelidon pyrrhonota*				B M		B M	B M		
Barn Swallow	*Hirundo rustica*			B M	B M		B M	B M	B M	B M
Jays & Crows	**Corvidae**									
Blue Jay	*Cyanocita cristata*	B W M	B W M	B W M		B W M			B W M	B W M
American Crow	*Corvus brachyrhynchos*	B W M	B W M	B W M	B W M	B W M	B W M	B W M	B W M	B W M
Fish Crow	*Corvus ossifragus*	B M	B M					B M		

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Chickadees & Titmice	**Paridae**									
Carolina Chickadee	*Poecile carolinensis*	B W M	B W M	B W M		B W M				B W M
Black-capped Chickadee	*Poecile atricapillus*	B W M	B W M	B W M		B W M				B W M
Tufted Titmouse	*Baeolophus bicolor*	B W M	B W M			B W M				B W M
Nuthatches	**Sittidae**									
Red-breasted Nuthatch	*Sitta canadensis*	M								W M
White-breasted Nuthatch	*Sitta carolinensis*	B W M	B W M			B W M				B W M
Creeper	**Certhiidae**									
Brown Creeper (ST)	***Certhia americana (ST)***	**W M**	**B W M**							**W M**
Wrens	**Troglodytidae**									
Carolina Wren	*Thryothorus ludovicianus*	B W M	B W M	B W M		B W M				B W M
House Wren	*Troglodytes aedon*	B W M		B W M		B W M				B W M
Winter Wren	*Troglodytes troglodytes*	B W M	B W M				B W M			
Sedge Wren	*Cistothorus platensis*				B M		B M			
Marsh Wren	*Cistothorus palustris*						B M			
Kinglets	**Regulidae**									
Golden-crowned Kinglet	*Regulus satrapa*	W M	W M			W M				W M
Ruby-crowned Kinglet	*Regulus calendula*	M		M		M				
Gnatcatchers	**Sylviidae**									
Blue-gray Gnatcatcher	*Polioptila caerulea*	B M	B M	B M		B M				
Thrushes	**Turdidae**									
Eastern Bluebird	*Sialia sialis*	B W M		B W M	B M	B W M			B W M	B W M
Veery (ST)	***Catharus fuscescens (ST)***	**M**	**M**			**M**				**M**
Gray-cheeked Thrush	*Catharus minimus*	M	M			M				M

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Swainson's Thrush	*Catharus ustulatus*	M	M	M		M				M
Hermit Thrush	*Catharus guttatus*	W M	W M	W M		W M				W M
Wood Thrush	*Hylocichla mustelina*	B M	B M			M				M
American Robin	*Turdus migratorius*	B W M	B W M	B W M	M	B W M			M	B W M
Mockingbirds & Thrashers	**Mimidae**									
Gray Catbird	*Dumetella carolinensis*		B M	B M		B M				B M
Northern Mockingbird	*Mimus polyglottos*			B W M						B W M
Brown Thrasher	*Toxostoma rufum*			B M	B	B M			B M	B M
Wagtails & Pitpits	**Motacillidae**									
American Pipit	*Anthus rubescens*						M		M	
Waxwings	**Bombycillidae**									
Cedar Waxwing	*Bombycilla cedrorum*	B W M	B W M	B W M		B W M				B W M
Shrikes	**Laniidae**									
Loggerhead Shrike (ST)	***Lanius ludovicianus (ST)***			**B W M**	**B W M**				**B W M**	
Starling	**Sturnidae**									
European Starling (I)	*Sturnus vulgaris*	B W M	B W M			B W M			B W M	B W M
Vireos	**Vireonidae**									
White-eyed Vireo	*Vireo griseus*		B M	B M		B M				
Bell's Vireo	*Vireo bellii*			B M	B M					
Blue-headed Vireo	*Vireo solitarius*	M	M			M				
Yellow-throated Vireo	*Vireo flavifrons*	B M	B M							M
Warbling Vireo	*Vireo gilvus*	M	B M	B M		B M				B M
Philadelphia Vireo	*Vireo philadelphicus*	M		M		M				M
Red-eyed Vireo	*Vireo olvaaceus*	B M	B M	M		B M				M

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Warblers	**Parulidae**									
Blue-winged Warbler	*Vermivora pinus*	M	M	B M		M				M
Golden-winged Warbler	*Vermivora chrysoptera*	M	M	M		M				M
Tennessee Warbler	*Vermivora peregrina*	M	M	M		M				M
Orange-crowned Warbler	*Vermivora celata*	M	M	M		M				M
Nashville Warbler	*Vermivora ruficapilla*	M	M	M		M				M
Northern Parula	*Parula americana*	B M	B M			M				M
Yellow Warbler	*Dendroica petechia*		M	B M		M	B M			M
Chestnut-sided Warbler	*Dendroica pensylvanica*	M	M	M		M				M
Magnolia Warbler	*Dendroica magnolia*	M	M	M		M				M
Cape May Warbler	*Dendroica tigrina*	M	M			M				M
Black-throated Blue Warbler	*Dendroica caerulescens*	M	M			M				M
Yellow-rumped Warbler	*Dendroica coronata*	W M	W M	M		W M				M
Black-throated Green Warbler	*Dendroica virens*	M	M			M				M
Blackburnian Warbler	*Dendroica fusca*	M	M			M				M
Yellow-throated Warbler	*Dendroica dominica*	M	B M							
Pine Warbler	*Dendroica pinus*	B M	M			M				M
Prairie Warbler	*Dendroica discolor*			B M						
Palm Warbler	*Dendroica palmarum*	M	M	M	M	M	M		M	M
Bay-breasted Warbler	*Dendroica castanea*	M	M	M		M				M
Blackpoll Warbler	*Dendroica striata*	M	M	M		M				M
Cerulean Warbler	*Dendroica cerulea*	B M	B M			M				M
Black-and-white Warbler	*Mniotilta varia*	B M	M	M		M				M
American Redstart	*Setophaga ruticilla*	M	B M	M		M				M
Prothonotary Warbler	*Protonotaria citrea*		B M							

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Worm-eating Warbler	*Helmitheros vermivorus*	B M								
Ovenbird	*Seiurus aurocapillus*	B M		M		M				M
Northern Waterthrush	*Seiurus noveboracensis*		M							M
Louisiana Waterthrush	*Seiurus motacilla*	B M	M							
Kentucky Warbler	*Oporornis formosus*	B M	M			M				
Connecticut Warbler	*Oporornis agilis*	M	M	M		M				M
Mourning Warbler	*Oporornis philadelphia*	M	M	M		M				M
Common Yellowthroat	*Geothlypis trichas*			B M	B M	B M	B M		B M	B M
Hooded Warbler	*Wilsonia citrina*	B M								M
Wilson's Warbler	*Wilsonia pusilla*	M	M	M		M				M
Canada Warbler	*Wilsonia canadensis*	M	M	M		M				M
Yellow-breasted Chat	*Icteria virens*			B M		M				
Tanagers	**Thraupidae**									
Summer Tanager	*Piranga rubra*	B M				B M				M
Scarlet Tanager	*Piranga olivacea*	B M	B M			B M				M
Grosbeaks & Buntings	**Cardinalidae**									
Northern Cardinal	*Cardinalis cardinalis*	B W M	B W M	B W M		B W M			B W M	B W M
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	B M	B M	B M		B M				M
Blue Grosbeak	*Guiraca caerulea*			B M		B M				
Indigo Bunting	*Passerina cyanea*	B M	B M	B M		B M			M	
Dickcissel	*Spiza americana*				B M				B M	
Towhees & Sparrows	**Emberizidae**									
Eastern Towhee	*Pipilo erythrophthalmus*	B W M	M	B W M						M
American Tree Sparrow	*Spizella arborea*			W M	W M	W M	W M		W M	W M
Chipping Sparrow	*Spizella passerina*	B M		M	M	B M				B M

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Clay-colored Sparrow	*Spizella pallida*			M						
Field Sparrow	*Spizella pusilla*			B W M	B W M	B W M	W M		B M	
Vesper Sparrow	*Pooecetes gramineus*				M				M	
Lark Sparrow	*Chondestes grammacus*			B M	B M				B M	
Savannah Sparrow	*Passerculus sandwichensis*				W M		M		M	
Grasshopper Sparrow	*Ammodramus savannarum*				B M					
Henslow's Sparrow (SE)	***Ammodramus henslowii (SE)***				**B M**					
Le Conte's Sparrow	*Ammodramus leconteii*				M		M			
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsoni*						M			
Fox Sparrow	*Passerella iliaca*	W M	W M	W M		M				M
Song Sparrow	*Melospiza melodia*			B W M	B W M		B W M		B W M	B W M
Lincoln's Sparrow	*Melospiza lincolnii*		M	M			M			M
Swamp Sparrow	*Melospiza georgiana*		W M	W M	W M		W M			
White-throated Sparrow	*Zonotrichia albicollis*	W M	W M	W M		W M				W M
Harris's Sparrow	*Zonotrichia querula*			M					M	M
White-crowned Sparrow	*Zonotrichia leucophrys*			W M	W M					W M
Dark-eyed Junco	*Junco hyemalis*	W M	W M	W M	W M	W M			W M	W M
Lapland Longspur	*Calcarius lapponicus*				W M				W M	
Smith's Longspur	*Smith's Longspur*				M				M	
Snow Bunting	*Plectrophenax nivalis*				W				W	
Blackbirds & Orioles	**Icteridae**									
Bobolink	*Dolichonyx oryzivorus*				M		M			
Red-winged Blackbird	*Agelaius phoeniceus*	W	W	B M	B W M	B M	B M		B W M	B M
Eastern Meadowlark	*Sturnella magna*				B W M				B W M	
Western Meadowlark	*Sturnella neglecta*				W M				W M	

Table B.13 Continued

Name (2, 3)		Habitat (4, 5)								
Common name	***Family/Species name***	**UpFor**	**ForWet**	**Shrub**	**Grass**	**Sav**	**HeWet**	**Water**	**Crop**	**Cul**
Yellow-headed Blackbird (SE)	***Xanthocephalus xanthocephalus (SE)***						**B M**			
Rusty Blackbird	*Euphagus carolinus*	W	W M				M		W M	M
Brewer's Blackbird	*Euphagus cyanocephalus*				M				M	
Common Grackle	*Quiscalus quiscula*	B W M	B W M			M	B		W M	B W M
Brown-headed Cowbird	*Molothrus ater*	B W M	B W M	B M	B M	B M	B M		B W M	B W M
Orchard Oriole	*Icterus spurius*	M	M	B M		B M	B M			B M
Baltimore Oriole	*Icterus galbula*	B M	B M	B M		B M				B M
Finches	**Fringillidae**									
Purple Finch	*Carpodacus purpureus*	W M	W M	M		M				W M
House Finch (I)	*Carpodacus mexicanus*	M	M	B W M		M				B W M
Red Crossbill	*Loxia curvirostra*	W M								W M
Common Redpoll	*Carduelis flammea*	W		W	W					W
Pine Siskin	*Carduelis pinus*	B W M		B W M						B W M
American Goldfinch	*Carduelis tristis*	W M	W M	B W M	B W M	W M				B W M
Evening Grosbeak	*Coccothraustes vespertinus*	W M	W M							W M
Old World Sparrows	**Passeridae**									
House Sparrow (I)	*Passer domesticus*								B W M	B W M
Eurasian Tree Sparrow (I)	*Passer montanus*			B W M					B W M	B W M
NUMBER OF SPECIES PER HABITAT TYPE		**118**	**115**	**104**	**69**	**108**	**117**	**83**	**67**	**115**

(1) Compiled from Parker (1973, 1974, 1981) and IDNR (1998).
(2) Bold type indicates Illinois threatened (ST), Illinois endangered (SE), and/or federally endangered (FE) species.
(3) (I) = Introduced species

Table B.13 Continued

(4) The following habitat codes are used:
- UpFor = Upland and mesic forest
- ForWet = Forested wetland, including wet floodplain forest and forested swamps)
- Shrub = Shrublands (open habitats dominated by shrubs, inclluding old hayfields)
- Grass = Grasslands (including pasture and hayfield)
- Sav = Savanna
- HeWet = Wetlands (seasonally flooded, open habitats such as marshes and sedge meadows)
- Water = Lakes, ponds, impoundments, rivers, larger streams
- Crop = Crops
- Cul = Residential areas (including urban centers and the "urban forest")

(5) The following utilization codes are used
- B = Breeding (species that currently or historically have bred in the area)
- W = Winter (species present from December through February)
- M = Migrant (species present during the March-May and late August-November periods)

B.14 ENDANGERED AND THREATENED SPECIES

This document addresses federally- and state-listed endangered and threatened species that may occur within the study area of the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project, Madison and St. Clair Counties, Illinois. The probable effects of the recommended plan on these species are also addressed.

B.14.1 Existing Conditions. This section describes the federally- and state-listed endangered and threatened species that may occur within the study area, and the likelihood that they are present. Ten federally-listed species are described, as are 47 state-listed species, which include the federally-listed species (Table B.14.1.1).

The potential presence of such species was determined through consultations with the U.S. Fish and Wildlife Service (USFWS), the Illinois Department of Natural Resources (IDNR) with its Natural Heritage Database, and Corps biologists. Information was also obtained from review of prior reports and publications, and from a field survey conducted for this study.

In 1998, a survey for federally- and state-listed species was conducted in a portion of the study area (ZE 1998). Two floodplain sites, Brushy (Levy) Lake and Frank Holten State Park, were assessed for use by listed species. Brushy (Levy) Lake lies about one mile east of Horseshoe Lake in the center of the study area, between I-255, I-55/70, and Cahokia Canal. Holten State Park, about four miles south of Brushy (Levy) Lake, is in the southern part of the study area. The survey identified any known historic use, actual use during site visits in the fall of 1998, and potential use by listed species in these areas.

Table B.14.1.1 Threatened and endangered species occurring or likely to occur in the study area.

(SE = state endangered, ST = state threatened, FE = federally endangered, FT = federally threatened, FC = federal species of concern)

Common Name	Scientific Name	Status
Plants		
Pale false foxglove	*Agalinis skinneriana*	ST
Decurrent false aster	*Boltonia decurrens*	ST, FT
Small burhead	*Echinodorus tenellus*	SE
Mud plantain	*Heteranthera reniformis*	SE
Bead grass	*Paspalum dissectum*	SE
Eastern prairie fringed orchid	*Platanthera leucophaea*	SE, FT
Royal catchfly	*Silene regia*	SE
Spring ladies' tresses	*Spiranthes vernalis*	SE
Prairie spiderwort	Tradescantia bracteata	ST
Freshwater Crustacean		
Illinois cave amphipod	*Gammarus acherondytes*	SE, FE

Table B.14.1.1 Continued

(SE = state endangered, ST = state threatened, FE = federally endangered, FT = federally threatened, FC = federal species of concern)

Common Name	Scientific Name	Status
Fish		
Pallid sturgeon	*Scaphirhynchus albus*	SE, FE
Sturgeon chub	*Macrhybopsis gelida*	SE
Flathead chub	*Platygobio gracilis*	SE
Amphibians		
Illinois chorus frog	*Pseudacris streckeri illinoensis*	ST
Reptiles		
Timber rattlesnake	*Crotalus horridus*	ST
Great Plains rat snake	*Elaphe guttata emoryi*	ST
Massasauga rattlesnake	*Sistrurus catenatus*	SE, FCL
Flathead snake	*Tantilla gracilis*	ST
Birds		
Pied-billed Grebe	*Podilymbus podiceps*	ST
American Bittern	*Botaurus lentiginosus*	SE
Least Bittern	*Ixobrychus exilis*	ST
Snowy Egret	*Egretta thula*	SE
Little Blue Heron	*Egretta caerulea*	SE
Black-crowned Night-heron	*Nycticorax nycticorax*	SE
Yellow-crowned Night-heron	*Nyctanassa violaceus*	SE
Osprey	*Pandion haliaetus*	SE
Mississippi Kite	*Ictina mississippiensis*	SE
Bald Eagle	*Haliaeetus leucocephalus*	ST, FT
Northern Harrier	*Circus cyaneus*	SE
Red-shouldered Hawk	*Buteo lineatus*	ST
Peregrine Falcon	*Falco peregrinus*	SE
King Rail	*Rallus elegans*	SE
Common Moorhen	*Gallinula chloropus*	ST
Piping Plover	*Charadrius melodus*	SE, FE
Upland Sandpiper	*Bartramia longicauda*	SE
Wilson's Phalarope	*Phalaropus tricolor*	SE
Common Tern	*Sterna hirundo*	SE
Forster's Tern	*Sterna forsteri*	SE
Least Tern	*Sterna antillarum*	SE, FE
Black Tern	*Chlidonias niger*	SE
Short-eared Owl	*Asio flammeus*	SE
Brown Creeper	*Certhia americana*	ST

Table B.14.1.1 Continued

(SE = state endangered, ST = state threatened, FE = federally endangered,
FT = federally threatened, FC = federal candidate for listing)

Common Name	Scientific Name	Status
Veery	*Catharus fuscescens*	ST
Loggerhead Shrike	*Lanius ludovicianus*	ST
Henslow's Sparrow	*Ammodramus henslowii*	SE
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	SE
Mammals		
Gray bat	*Myotis grisescens*	SE, FE
Indiana bat	*Myotis sodalis*	SE, FE

B.14.2 Federally-Listed Species. Under the Endangered Species Act of 1973, federal agencies are required to conserve biological and wildlife species that have been federally listed as endangered or threatened. A species is endangered if it is in danger of extinction throughout all or a significant portion of its range, and threatened if it is likely to become endangered within the foreseeable future. All federal agencies must consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that any actions authorized, funded, or carried out by the agencies are not likely to jeopardize the continued existence of any endangered or threatened species, or to result in the destruction of or substantial damage to its critical habitat. While this consultation is in progress, an agency must not make an irretrievable commitment of resources to its project.

In connection with this East St. Louis and Vicinity, Illinois study, consultation with the USFWS is required to ensure thorough consideration of potential effects on endangered and threatened species. There may be opportunities for the Corps to restore or protect habitat for threatened and endangered species, or to contribute to endangered species recovery plans, as part of ecosystem restoration projects and initiatives.

As shown in table B.12, The U. S. Fish and Wildlife Service has identified eight federally-listed species, and one candidate for listingn, that may be present in the study area in a letter dated March 10, 1999 (see Appendix G or N). The piping plover (*Charadrius melodus*) has been added to this list by the Corps because it has been recently sighted within the study area.

Table B.14.2.1 Federally listed species occurring or likely to occur in the study area.

Common Name	Scientific Name	Status
Least tern	*Sterna antillarum*	FE
Piping plover	*Charadrius melodus*	FE
Gray bat	*Myotis grisescens*	FE
Indiana bat	*Myotis sodalis*	FE
Pallid sturgeon	*Scaphirhynchus albus*	FE
Illinois cave amphipod	*Gammarus acherondytes*	FE
Bald eagle	*Haliaeetus leucocephalus*	FT
Decurrent false aster	*Boltonia decurren*	FT
Eastern prairie fringed orchid	*Platanthera leucophaea*	FT
Eastern massasauga rattlesnake	*Sistrurus catenatus*	FCS

(SE = state endangered, ST = state threatened, FE = federally endangered, FT = federally threatened, FC = federal candidate species)

In Illinois, all these federally-listed species are also state-listed species, including the massasauga.

B.14.3 Potential and Documented Occurrences of Federally-Listed Species within the Study Area. In its 1999 letter, the USFWS indicated that no designated critical habitat exists within the study area for any of the seven species it listed. Similarly, there is no designated critical habitat for the piping plover or massasauga. The potential or documented occurrences of federally-listed species in the study area are discussed below.

Least tern. The least tern has occasionally been observed within the study area at Horseshoe Lake during spring migration in recent years (McMullen 2001). No known nesting habitat of the least tern occurs within the study area or adjacent reach of the Mississippi River. The species is listed as endangered in Madison County, Illinois. This bird forages for small fish in shallow water areas along the river and in backwater areas, such as side channels and sloughs. Foraging and nesting habitat are located in close proximity to each other. From late April to August, least terns nest on sparsely vegetated alluvial or dredge spoil islands and sand/gravel bars in or adjacent to rivers, lakes, gravel pits and cooling ponds. They nest in colonies with conspecifics and sometimes with the piping plover (*Charadrius melodus*). Nesting locations usually are at the higher elevations and away from the water's edge. Dams, reservoirs, and other changes to river systems have eliminated most historic least tern habitat. Narrow forested river corridors have replaced historical wide channels dotted with sandbars that are preferred by the terns. Furthermore, recreational activities on rivers and sandbars disturb the nesting terns, causing them to abandon their nests.

Piping plover. The piping plover has occasionally been observed within the study area at Horseshoe Lake during fall migration in recent years (McMullen 2001). No known nesting habitat of the piping plover occurs within the study area or adjacent reach of the Mississippi River. This species is a rare migrant in Illinois, present from early to mid May until late July to late September. Nesting and feeding territories are typically fairly wide, sandy, sparsely or unvegetated lakeshore beaches, as well as unvegetated sandbars in the Mississippi River.

Food items are picked from sands washed by flowing water, and consist almost entirely of various insects, worms, small crustaceans, mollusks, beetles, and fly larvae. Nests appear as a depression or scrape in the sand, and are sometimes lined with pebbles or bits of shell.

Bald eagle. The bald eagle breeds and over winters in Madison and St. Clair Counties, Illinois. According to IDNR and its Natural Heritage Database, two records of the bald eagle occur within the southern portion of the study area. One site is Frank Holten State Park, at the edge of a lake by IL Route 157. The other site is south of Centerville at Mullens Slough, a lake-like water body between Harding Ditch and the bluff to the east. Neither record represents occurrences of nesting or communal night roosting, but instead instances of daytime perching during winter, presumably during foraging. ZE (1998) reported that this species might use floodplain forests at Brushy (Levy) Lake and Holten State Park.

This species was federally listed in 1978 as endangered in 43 states and threatened in five. In recent years, bald eagle numbers have increased dramatically. The bald eagle has expanded its distribution throughout the United States, and its protected status was changed in 1995 from endangered to threatened throughout the lower 48 states. Because of its population recovery, it was proposed for delisting on July 6, 1999, but no final determination on delisting has yet been made.

The majority of bald eagle use in the vicinity of St. Louis occurs during winter. Winter use is highest where the river is ice-free and adequate perch sites are available. Food availability dictates bald eagle use of an area during winter. These areas are important, providing stable feeding areas during periods of high caloric demand. Large concentrations of eagles often are associated with open water areas bordered by suitable perch trees. High use areas include warm water effluents of power plants, municipal and industrial discharges, power plant cooling ponds, many of the tailwaters below the locks and dams, constrictions in the river which remain free of ice, and mouths of large tributary rivers. Daytime perching areas are located near eagle foraging areas and are used to hunt from, eat in, or rest on. Trees within 30 m of the shore are preferred.

Winter communal roosting behavior is found in a wide variety of habitats and is important for winter survival. Roost sites probably are selected because they offer bald eagles special advantages such as proximity to feeding areas, protection from the wind and cold, favorable sun exposure, and isolation. Eagles could abandon a wintering area if roost sites are removed or disturbed, thus causing stress during a critical period of the year and potentially affecting survival. Protecting roost sites is therefore important. Communal roosts receive high bald eagle use during the winter, with some sites supporting up to 50 eagles at a time. Roost sites are commonly used during evenings, but may be used during the day in inclement weather. No communal roost sites are known within or near the study area.

Although eagles occasionally nest on the ground or on cliffs, they prefer to nest in mature timber areas closely associated with water. Preferred nesting sites are usually tall, prominent trees of a variety of species with an open structure and stable limbs that allow easy approach from the air.

Nest densities are highest in areas with minimal human activity. Densities are reduced in areas of moderate human use and are rare in heavy human use areas. Unsuccessful nesting was observed on Arsenal Island in 1994 (USDOT 2000). This location is about three miles west of the study area, where Prairie du Pont Ditch enters the Mississippi River.

Gray bat. The gray bat is listed as federally endangered in Madison County, Illinois. Within the county, it has been collected from two localities north of the study area. One site is a cave near Elsah (about 20 miles northwest), and the other is the Alton sewer system (about 5 miles northwest) that apparently served as a temporary resting site during migration (Hofmann and Heske 1999). This species occupies a limited geographic range in limestone karst areas of the southeastern United States. Gray bats roost in caves year round. Winter caves are deep and vertical, and provide a large volume below the lowest entrance to act as cold air traps. A much wider variety of cave types are used during spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals. Summer caves, especially those used by maternity colonies, are nearly always located within a kilometer of rivers or reservoirs over which the bats feed on a variety of flying aquatic and terrestrial insects. Except for brief periods of inclement weather in early spring and possibly late fall, adult gray bats feed almost exclusively over water along river or reservoir edges. Foraging areas are in close proximity (within 2 kilometers) of the roosting cave. Females give birth to a single young in late May or early June. Gray bats are endangered largely because of their habit of living in very large numbers in only a few caves. As a result, they are extremely vulnerable to disturbance. There are no caves within the study area, and those used by the gray bat are not in close proximity.

Indiana bat. Two historic records from Madison County include hibernating individuals from a cave near Alton (about 5 miles northwest), and a specimen captured from the campus at Southern Illinois University at Edwardsville apparently during migration (Hoffmeister 1989; Hofmann and Heske 1999). The latter location most likely is within the study area. ZE (1998) reported that this species might use floodplain forests at Brushy (Levy) Lake and Holten State Park. The Indiana bat is a migratory species that occurs in forested habitat throughout much of the eastern United States, including Madison and St. Clair Counties, Illinois. Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula include caves and abandoned mines. During summer, the Indiana bat frequents the corridors of small streams with well-developed riparian woods as well as mature upland forests. It forages for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, and over farm ponds and in pastures. It has been shown that the foraging range for the bats varies by season, age, and sex and ranges up to 81 acres (33 ha).

Females emerge from hibernation in late May or early April to migrate to summer roosts, where they form nursery colonies ranging in size from one to 100 individuals. Each female gives birth to a single young in late June or early July before eventually returning to hibernacula from late August to September. A single maternity colony typically utilizes a primary roost tree and several alternates.

Some males remain in the area near the winter hibernacula during the summer months, but others disburse throughout the range of the species and roost individually or in small numbers. Indiana bats tend to return to the same roosting area year after year (USFWS 1996).

Numerous tree species may be used for roosting and the species may not be as important as the presence of structural features such as loose bark, snags, or cavities. However, the use of a particular tree does appear to be influenced by weather conditions such as temperature and precipitation. The following tree species are known to have been utilized as maternity roost trees: slippery elm (*Ulmus rubra*), American elm (*U. americana*), cottonwood (*Populus deltoides*), northern red oak (*Quercus rubra*), post oak (*Q. stellata*), white oak (*Q. alba*), silver maple (*Acer saccharinum*), bitternut hickory (*Carya cordiformis*), shagbark hickory (*C. ovata*), green ash (*Fraxinus pennsylvanica*), white ash (*F. americana*), and sycamore (*Platanus occidentalis*). These additional species are known to have been used by summering males: shingle oak (*Q. imbricaria*), sassafras (*Sassafras albidum*), and sugar maple (*A. saccharum*) (Garner and Gardner 1992).

Pallid sturgeon. The pallid sturgeon occurs in the Mississippi River downstream from the mouth of the Missouri River (Pflieger 1997). There are also no recent reports of the species from the Mississippi River in the vicinity of the study area (USDOT 2000). According to USFWS (1993), areas of most recent and frequent occurrence on the Mississippi River in Illinois and Missouri are near Chester, Illinois and Caruthersville, Missouri, which are about 70 and 300 river miles downstream of the study area, respectively.

Pallid sturgeon, like shovelnose sturgeon, inhabit comparatively large flowing rivers, but pallid sturgeon occur over a narrower range of conditions. They are postulated to prefer greater turbidity (Bailey and Cross 1954, Lee 1980), finer substrates, and deeper, wider channels; and they are more likely than shovelnose sturgeon to occur in sinuous reaches and near long-established islands and alluvial bars (Bramblett 1996). Pallid sturgeon typically inhabit thalwegs and channels of relatively low slope (Constant *et al.* 1997). Characteristic depths inhabited by pallid sturgeon vary among populations and with river morphology, with fish typically avoiding shallow waters. In the Middle Mississippi River, Sheehan *et al.* (1998) located pallid sturgeon in water depths ranging from 1.8 to 19.2 m. The sturgeon were primarily found in the main channel and main channel border habitats. They were also found in depositional areas between wingdams, downstream island tip, and wingdam tip habitats. Tag returns have also shown that the species may be using a range of habitats in off-channel areas, including tributaries of the Mississippi River. Pallid sturgeon are most frequently caught over a sand bottom, which is the predominant bottom substrate within the species' range on the Mississippi River. Habitat alteration, commercial fishing, and environmental contamination are believed to have played a role in the pallid sturgeon's decline.

Illinois cave amphipod. The Illinois cave amphipod is listed as endangered in St. Clair County, Illinois. This species is endemic to the Illinois Sinkhole Plain in Monroe and St. Clair Counties in southwestern Illinois. This sinkhole region lies just outside the study area to the south. This species is a small, cave-dwelling crustacean which lives in the "dark zone" of cave streams.

Like other amphipods, this species needs cold water and does not tolerate a wide range in water temperatures. They are sensitive to touch and avoid light. The Illinois cave amphipod feeds on dead animals and plants as well as the thin bacterial film covering submerged surfaces. No caves are found within the study area.

Decurrent false aster. According to IDNR and its Natural Heritage Database, two records of this plant occur within the study area. One site is the Fairmont City INAI (Illinois Natural Area Inventory) site, which is located on the south side of I-55/70 between IL Routes 203 and 111. The other is at Horseshoe Lake west of Walker Island. Surveys of this plant at these two locations were reported by USDOT (2000). A total of 21 separate colonies were identified in scattered locations adjacent to Cahokia Canal and Lansdowne Ditch (Schoenberger Creek) in the vicinity of the new Mississippi River bridge and relocated I-70 and I-64 connector (USDOT 2000).

The decurrent false aster is a perennial floodplain plant of open, wetland habitats, and its distribution includes Madison and St. Clair Counties, Illinois (USFWS 2001). Historically it occurred in wet prairies, shallow marshes, and shores of rivers, creeks, and lakes on the floodplain of the Illinois and Mississippi Rivers (Schwegman and Nyboer 1985). Currently it is found most often in old agricultural fields and along roadsides and lake shores where alluvial soils have been disturbed (USDOT 2000).

This plant is an early successional species that requires either natural or human disturbance to create and maintain suitable habitat. In the past, the annual flood/drought cycle of the Illinois River provided the natural disturbance required by this species. Annual spring flooding created open, high-light habitat and reduced competition by killing other less flood-tolerant, early successional species. Field observations indicate that in "weedy" areas without disturbance, the species is eliminated by competition within 3 to 5 years (USFWS 1990).

Smith *et al.* (1998) found that populations of *B. decurrens* increased in size at three sites studied on the Illinois River following the flood of 1993, with the greatest increase occurring at the two sites that had the most severe flooding. These results suggest that the removal of competing species by flood waters may be an important factor in maintaining populations of *B. decurrens* in the floodplain. *Boltonia decurrens* has high light requirements for growth and seed germination (Smith *et al.* 1993, Smith *et al.* 1995), and shading from other vegetation is thought to contribute to its decline in undisturbed areas.

Colonies located in the vicinity of Cahokia Canal and Lansdowne Ditch "are predominantly located on old or mowed fields, in wetlands, or on the edges of active fields, farm facilities, golf courses, or a railroad" (USDOT 2000:60). The colony at the Fairmont City INAI site consisted of six plants in 1993, but none were observed in 1994 and 1995 (USDOT 2000). In addition to this colony, seven other colonies were found in contiguous areas. During field surveys conducted for this study, several plants were noted at one of these colonies in mid-April 2000. A large population consisting of more than 100,000 individuals was identified in 1998 at Horseshoe Lake east of IL Route 203 (USDOT 2000). This plant may also occur at Brushy (Levee) Lake (ZE 1998).

Eastern prairie fringed orchid. Also known as the prairie white fringed orchid, this species formerly occurred over much of north and central Illinois, including Madison County, but is now confined to the northeast corner of the state (Herkert 1991). It may have occurred in St. Clair County. This plant is found in mesic to wet prairies located on uplands and in river valleys. It may be present wherever prairie remnants are encountered. There is only one prairie remnant within the study area. It is found at the Poag Railroad Prairie INAI (Illinois Natural Area Inventory) site, located between Cahokia Creek Diversion Canal and I-270in the northern portion of the study area. IDNR did not report any record of this species from its Biological Heritage Database for this INAI site or for the rest of the study area.

Eastern massasauga rattlesnake. This rattlesnake, a candidate for listing, is known from the study area. According to IDNR and its Biological Heritage Database, a historical record of this species occurs on the Mississippi River floodplain, on the west side of Cahokia Canal between Route 162 and Horseshoe Lake Road. According to IDNR, the species may occur within a 1.5-mile radius of this location. Such an area would extend west from IL Route 157 almost to IL Route 111, and from IL Route 162 to the south side of Horseshoe Lake Road. ZE (1998) reported that this species might use areas of floodplain forest/scattered shrubs at Brushy (Levy) Lake and Holten State Park. The massasauga or swamp rattler historically lived in prairies of the Midwest, apparently in the wetter areas, and today inhabits old fields, floodplain forests, marshlands, and bogs. It is active from April through October, and often suns on clumps of grass, in branches of small shrubs, or near crayfish burrows. It feeds on small rodents. At Carlyle Lake, in Clinton County, Illinois, it overwinters in crayfish burrows, hibernating until spring. The snake can withstand submersion in water for brief periods of time. At Carlyle Lake, crayfish burrows also offer protection from prescribed burns aboveground in managed habitats. Massasaugas breed in spring and autumn, and four to 20 young are born in late summer or early autumn. According to the USFWS, adverse impacts to habitats utilized by this species of concern and potential direct impacts to individuals should be avoided.

B.14.4 State-Listed Species. The 1999 letter from USFWS requested that a list of state-listed species be obtained from IDNR for this study. IDNR forwarded information about state-listed species in a letter dated May 3, 2000, accompanied by a map of the study area.

Lists of state-endangered and state-threatened species that may occur in the study area are below. They were developed from the information submitted by IDNR, and from lists of plants, amphibians and reptiles, fishes, birds, and mammals that are likely to occur in the study area (see Tables B.12, B.13, B.17 in Appendix B, and Tables 3-38 and 3-40 of the main report).

B.14.4.1 Potential and Documented Occurrences of State-Endangered Species within the Study Area. The potential or documented occurrences of state-endangered species in the study area are discussed below. Descriptions for these species are based on information obtained from Herkert (1992), Hill (1998), IBIRD (2000), ILPIN (2002), INRIN (2001), NRCS (2002), Phillips et al. (1999), Purdue (2001), and UMMZ (2000).

B.14.4.1.1 Plants:

Bead grass. A historic record from St. Clair County indicates that bead grass once occurred along the Mississippi River prior to 1893; no recent occurrences are known. IDNR did not report any record of this species from its Biological Heritage Database for the study area. Bead grass is found in disturbed sites and shallow water. This species is a subaquatic perennial forming repent mats with culms 20-60 cm long.

Royal catchfly. This plant is known from Madison County from recent records. According to IDNR and its Biological Heritage Database, it occurs in the northwest portion of the study area at the Chouteau Catchfly INAI (Illinois Natural Area Inventory) site. This site is along a railroad track west of IL Route 111, between Cahokia Creek Diversion Canal and I-270. Royal catchfly occurs in dry-mesic barrens and prairies. This species is a taprooted perennial herb, 0.5-1.6 m high. In Illinois it is known from both the Wabash and lower Mississippi River drainages.

Prairie spiderwort. This plant is known from Madison County from recent records. IDNR did not report any record of this species from its Biological Heritage Database for the study area. Prairie spiderwort occurs in dry-mesic silt and sand prairies in western Illinois, often in disturbed habitats. It is classified as a rhizomatous perennial herb, 5 to 45 cm high.

Spring ladies' tresses. This plant is known from Madison County from recent records. According to IDNR and its Biological Heritage Database, it occurs in the north part of the study area at the Poag Railroad Prairie INAI (Illinois Natural Area Inventory) site. This site is east of IL Route 111, between Cahokia Creek Diversion Canal and I-270. Spring ladies' tresses occurs in acidic soils in prairies and old fields in the southern third of Illinois. This species is a perennial tuberous orchid growing to 60 cm in height.

Small burhead. Small burhead is known from St. Clair County from historical records. IDNR did not report any record of this species from its Biological Heritage Database for the study area. A species of sandy margins of shallow ponds, the small burhead reaches its northern range limit in western Illinois. It has been collected in the floodplains of the Illinois and Mississippi rivers. This species is an annual herb, 1.5 to 10 cm high.

Mud plantain. This perennial herb is known from the Mississippi River floodplain in St. Clair County from one historical record. IDNR did not report any record of this species from its Biological Heritage Database for the study area. Mud plantain reaches its northern range limit in southern Illinois, where it occurs in wetlands and floodplains of major rivers.

Eastern prairie fringed orchid. This plant is discussed above in the section on federally-listed species.

B.14.4.1.2 Invertebrates:

Illinois cave amphipod. This crustacean is discussed above in the section on federally-listed species.

B.14.4.1.3 Fish:

Pallid sturgeon. This species is discussed above in the section on federally-listed species.

Sturgeon chub. The sturgeon chub occurs in Illinois only in the Mississippi River below the mouth of the Missouri River. It has not been collected recently from the Mississippi River; only historical records represent its occurrence. IDNR did not report any record of this species from its Biological Heritage Database for the study area. It prefers swift current in large, silty rivers that have course sand or fine gravel bottoms. This species eats bottom-dwelling invertebrates, and spawns from late spring to mid-summer. Adult sturgeon chub are typically 4-8-cm in length.

Flathead chub. The flathead chub is found in the Mississippi River downriver of its confluence with the Missouri River. The species has not been collected recently from the Mississippi River; only historical records represent its occurrence. IDNR did not report any record of this species from its Biological Heritage Database for the study area. It lives in large rivers, and prefers flowing waters over a sandy bottom. Aquatic insects comprise its diet, and spawning occurs in late summer. Adults are about 20 cm in length.

B.14.4.1.4 Reptiles:

Massasauga. This species is discussed above in the section on federally-listed species.

B.14.4.1.5 Birds:

American Bittern. IDNR did not report any record of this species from its Biological Heritage Database for the study area. The American bittern is secretive and solitary nature, and many parts of their life history are unknown. They are found in northeastern and central Illinois marshes, although occurrence is rare. In the vicinity of the study area, this species is known as a migrant, and assumed to be a breeder. Breeding and nesting occur in spring in marshy or dense tall grass areas; nests are over the water. The American bittern also feeds in marshy areas and will eat almost anything of the appropriate size, but seems to prefer frogs and fish.

Snowy Egret. The snowy egret currently nests in a rookery in Alorton, located in the southern part of the study area (USDOT 2000; McMullen 2001). Very few nesting colonies for little blue herons are known in Illinois. This nesting site also includes the great egret, cattle egret, little blue heron, and black-crowned night-heron (McMullen 2001). According to IDNR and its Natural Heritage Database, the snowy egret used a rookery in the study area along Long Lake, northeast of Granite City, but this use is now historical (McMullen 2001). Foraging individuals were reported by USDOT (2000) in the spring of 1995 and 1997 in the vicinity of Cahokia Canal and Lansdowne Ditch (Schoenberger Creek), west of existing I55/70.

This species was also sighted in fall of 1998 foraging in marshes and adjacent canals at Brushy (Levy) Lake and Frank Holten State Park (ZE 1998). The snowy egret is found in Illinois between late April and late August. It is considered a rare migrant, post-breeding wanderer, and rare local summer resident. Egrets are highly social, frequently associating with little blue and Louisiana herons in their nesting and foraging habitats. Preferred nesting habitat includes wetlands that afford a dense thicket of small trees or shrubs near water's edge. Most nests are from five to 10 feet above the ground, but can range from 0 to 30. Snowy egrets forage primarily in shallow wetland areas on small fishes, crustaceans, amphibians, reptiles and insects.

Little Blue Heron. According to IDNR and its Natural Heritage Database, the little blue heron is known from two rookeries within the study area. One in Alorton is shared with the black-crowned night-heron, snowy egret, cattle egret, and great egret (McMullen 2001). The other, along Long Lake northeast of Granite City, was used historically (McMullen 2001). Very few nesting colonies for little blue herons are known in Illinois. Foraging individuals were reported by USDOT (2000) in the spring of 1995 and 1997 in the vicinity of Lansdowne Ditch (Schoenberger Creek), west of existing I55/70, and roosting birds were noted near Cahokia Canal during spring 1995. This species was also sighted in fall of 1998 foraging in marshes and adjacent canals at Brushy (Levy) Lake and Frank Holten State Park (ZE 1998). The little blue heron occurs in Illinois is from mid-April to early September. The population usually includes a few nesting birds and many post-breeding migrants. The little blue heron is found primarily in freshwater marshes, also lakes, ponds, sloughs and marshy stream borders. The little blue heron feeds on small fishes, crayfishes, frogs, aquatic insects, turtles, snakes, lizards, terrestrial insects, and spiders in shallow waters of lagoons, swamps, marshes, rice fields, and mudflats. Little blue herons nest colonially in homogeneous groups often near other heron species in dense growth forms that border wetlands, usually hardwoods. Nests are often five to 10 feet or more above the ground.

Black-crowned night-heron. According to IDNR and its Natural Heritage Database, the black-crowned night-heron is known from two rookeries within the study area. One in Alorton is shared with the little blue heron, snowy egret, cattle egret, and great egret (McMullen 2001). The other along Long Lake northeast of Granite City was used historically (McMullen 2001). USDOT (2000) reported this species foraging or roosting near Cahokia Canal and Lansdowne Ditch, west of existing I-55/70 in the National City/East St. Louis area. This species was also sighted in fall of 1998 foraging in marshes and adjacent canals at Brushy (Levy) Lake and Frank Holten State Park (ZE 1998). The black-crowned night-heron is a migratory bird, spending from early April to late October in Illinois. In the vicinity of the study area, it is assumed to be a breeder. This species seems adapted to every conceivable habitat in which a wader may exist, and it appears nest site selection revolves around the quality and proximity of foraging areas. They feed on small fishes (primarily gizzard shad) and other aquatic life. The black-crowned night-heron often nests with other heron species, but also nests singly. They usually place the nest in trees, shrubs, or marsh vegetation near accessible foraging areas; nest height above the ground is very variable.

Yellow-crowned night-heron. According to IDNR and its Natural Heritage Database, one record of this species occurs within the study area. The site is in a park in western Granite City, and nesting by a few individuals has occurred in recent years (McMullen 2001). ZE (1998) reported that this species might use marshes and adjacent canals at Brushy (Levy) Lake and Holten State Park. The yellow-crowned night-heron is fairly common as a migrant and summer resident in southern Illinois. Its seasonal presence apparently extends from mid April until late August. Various types of wetland and aquatic habitats have been noted for foraging, including pools, stream edges, sloughs, swamps, and lagoons. Food items can consist of a wide variety of animals, but crayfish make up most of the diet. Bottomland forest seems to be the primary habitat used for nesting. The nest is often built on a tree limb at a distance from the trunk, and consists of heavy twigs. Nest height can vary between near ground level to over 50 feet. Yellow-crowned night-herons either nest together in small groups, not far from larger rookeries consisting of other species, or else singly. This species is secretive and not tolerant of human disturbance. The population in Illinois consists of relatively few individuals.

Osprey. IDNR did not report any record of this species from its Biological Heritage Database for the study area. However, this species was observed foraging over marsh habitat at Frank Holten State Park in fall 1998 (ZE 1998). This bird of prey is an uncommon migrant in Illinois. It is usually found near water bodies, such as rivers, lakes, ponds, and small streams. Fish comprise nearly the entire diet, but occasionally frogs, snakes, and birds are eaten. This bird dives to catch prey, and when successful, flies with the prey item to a perch to eat it. Large trees usually serve as perches. They are also used for nesting, which occurs in close proximity to water bodies. Cliffs and ledges or man-made structures may also be used for nesting sites.

Mississippi Kite. IDNR did not report any record of this species from its Biological Heritage Database for the study area. The Mississippi kite is a rare wanderer into central Illinois. This species also breeds in heavily wooded areas and apparently prefers to nest in the tops of the tallest trees available. Nests in Illinois were built at edges of bottomland woods. Mississippi kites forage over open areas such as agricultural fields, open fields of annual vegetation, and bottomland forests in Illinois, where they feed heavily on insects, but occasionally consume small snakes, lizards, and frogs.

Northern Harrier. IDNR did not report any record of this species from its Biological Heritage Database for the study area. However, the northern harrier was observed foraging over marsh habitat at Brushy (Levy) Lake in fall 1998 (ZE 1998). This species is a common migrant, winter resident, and occasional summer resident in Illinois. Harriers are predatory birds that soar low (10-30 ft) above fields, short grass, pastures and other open country types. Prey usually consists mainly of small mammals, but they also consume birds, frogs, small reptiles, crustaceans and insects. Harriers breed in marshes and prairies among low shrubs, tall weeds, or reeds, and construct nests on the ground in areas sheltered by this vegetation.

Peregrine Falcon. IDNR did not report any record of this species from its Biological Heritage Database for the study area. About four miles west of the study area in Madison County, the species nested successfully at the I-270 bridge over the Mississippi River in 1996 (USDOT 2000).

It also nests in downtown St. Louis in Missouri (McMullen 2001). The peregrine falcon occurs as a rare migrant in Illinois from early April to mid May, and early September to November. In Illinois, migrants are most commonly seen along the Mississippi River and Lake Michigan. Peregrines are territorial species that return to the same vicinity in successive years. Nests are usually located on rock ledges, bluffs, vertical escarpments, river gorges, and watergaps with precipitous cliffs; however, tree sites and city buildings may also be used. Peregrines hunt over waterways, wetlands, and open fields where they feed almost exclusively on birds in flight.

King Rail. IDNR did not report any record of this species from its Biological Heritage Database for the study area. ZE (1998) reported that this species might use marshes at Brushy (Levy) Lake and Holten State Park. USDOT (2000) reported nesting by this species in 1995 in the vicinity of Downtown St. Louis Parks Airport, which is just southwest of the study area. King rails occur in Illinois from mid April to late October as uncommon migrants, locally uncommon summer residents, and very rare winter residents. They are typically found in freshwater marshes, but are known to inhabit or utilize a wide variety of habitats as long as terrain supports a reasonable amount of vegetation and is frequently wet. King rails usually feed on animal matter such as insects, beetles, grasshoppers, aquatic bugs, and dragonfly nymphs in shallow water approximately 2-3 inches deep. Seeds and other parts of plants are eaten casually but waste grain may be important during fall and winter. Nests are usually placed above or near water in thick vegetation or freshwater plants in freshwater marshes, ponds, sloughs, marshy edges of lakes, sluggish streams, and roadside ditches.

Piping plover. This species is discussed above in the section on federally-lsited species.

Upland Sandpiper. IDNR did not report any record of this species from its Biological Heritage Database for the study area. The Upland Sandpiper (Bartramia longicauda), a state-endangered species, occurs in Illinois between mid April to mid September as an uncommon migrant and summer resident. Pastures and hayfields are the most important habitat for nesting and feeding. However, open grasslands adjacent to airports, schools, roadsides and other areas appear to provide attractive habitat in Illinois, replacing disappearing pastures and hayfields. Diet is composed primarily of terrestrial insects, as well as beetles, moths, ants, flies, bugs, centipedes, millipedes, spiders, snails, earthworms and beetle and lepidopteran larvae. They may also consume weed seeds and waste grain such as wheat. Nests are scratched-out shallow depressions usually lined with dried grass bits, found in pastures, domestic hayfields and native prairie.

Wilson's Phalarope. IDNR did not report any record of this species from its Biological Heritage Database for the study area. Wilson's Phalarope is an uncommon migrant in Illinois. It is the most land dwelling of the phalaropes, preferring sloughs, mud flats, potholes and shallow waters with surrounding grasslands as feeding, and foraging habitat. The species has a commensal relationship with birds that stir up bottom, exposing food such as aquatic insects, mosquito and crane fly larvae. They also are reported to feed on some terrestrial insects and predacious diving beetles.

Common Tern. IDNR did not report any record of this species from its Biological Heritage Database for the study area. Common terns occur in Illinois from early to late May, and from late July to early October as fairly common migrants. During migration they have been seen near large lakes and large rivers. Common terns are known to frequent sand or pebble beaches, stone or rocky shores, grassy uplands, or even areas with dense vegetation. Large areas of open water are essential for foraging since they feed almost exclusively on small fishes, but occasionally may consume insects and other invertebrates. The only nesting colony in Illinois is located a few hundred yards from Lake Michigan on a pebbly substrate containing patches of sweet clover and thistle.

Forster's Tern. IDNR did not report any record of this species from its Biological Heritage Database for the study area. Forster's tern occurs in Illinois from late April to mid May, and late July to mid October. This species is a common migrant in the vicinity of the study area. The Forster's tern eats a more varied diet than other tern species. Fish are its principle food item, but they also consume insects and limited amounts of carrion (dead fish and frogs) and bird eggs, sometimes conspecifics. During the breeding season the Forster's tern is primarily found on marsh-bordered lakes slightly larger than those preferred by black terns, while outside of nesting it is known to frequent beaches and more open water. For nest sites, higher dry substrates are preferred, such as muskrat houses, driftage or matted vegetation.

Least tern. This species is discussed above in the section on federally-listed species.

Black Tern. IDNR did not report any record of this species from its Biological Heritage Database for the study area. The Black tern occurs in Illinois from early to late May, and from late July to late September as a common migrant. Historically it bred in the vicinity of the study area. Their primary habitat in Illinois is glacial lake edges that provide ample amounts of cover and open water. Preferred nesting habitats are lake edges or marshes where marsh vegetation (cattail, bulrush, etc.) is locally low and thin, most commonly near open water. Black terns eat mostly insects, primarily dragonflies and damselflies, but also take small fishes.

Short-eared Owl. IDNR did not report any record of this species from its Biological Heritage Database for the study area. The short-eared owl is an uncommon winter resident in north and central portions of the state, a rare winter resident in southern portions, and a rare summer resident. It is a grassland species associated with prairies, grassy fields, grain stubble, and marshes. Nests are invariably placed on the ground near a clump of vegetation in such habitat. Most of the short-eared's diet is comprised of small mammals, with voles and mice being the most important and common prey items.

Henslow's Sparrow. IDNR did not report any record of this species from its Biological Heritage Database for the study area. Henslow's Sparrow is an occasional migrant and local summer resident in north and central portions of Illinois, and a very rare winter resident in southern portions. It is assumed to be a migrant and breeder in the vicinity of the study area.

Meadows, open grasslands and weedy and abandoned fields, all with wet areas, dense grass-forb mosaics and scattered small woody growths appear to be essential habitat. The species will not breed in or will abandon a field that has been mowed or burned. Nests are on the ground. This sparrow forages in taller grasses, feeding mostly on grasshoppers, beetles, crickets, and butterfly and moth larva. Some plant matter may also be eaten.

Yellow-headed Blackbird. According to IDNR and its Natural Heritage Database, there is one record of the yellow-headed blackbird within the study area. The Eagle Park Marsh INAI (Illinois Natural Area Inventory) site at the southwest end of Horseshoe Lake supported a breeding population of this species until 1983 (USDOT 2000). The yellow-headed blackbird is native to Illinois and was once common in marshes of the Chicago region. It may have been common along the Mississippi and Illinois Rivers. It is a migrant in the vicinity of the study area. Yellow-headed blackbirds inhabit marshes, sloughs, and marshy borders of lakes, ponds or streams. Permanent water appears essential. This species invariably nests in thick stands of emergent vegetation over standing water. Feeding takes place in aquatic vegetation and also in upland fields, barnyards, meadows, and prairies. They consume primarily flies, midges, mosquitoes, dragonflies, damselflies, butterflies, and moths; but forage on seeds and grains during periods of low insect abundance.

B.14.4.1.6 Mammals:

The gray bat and Indiana bat are discussed above in the section on federally-listed species.

B.14.4.2 Potential and Documented Occurrences of State-Threatened Species within the Study Area. The potential or documented occurrences of state-threatened species in the study area are discussed below. Descriptions for these species are based on information obtained from Herkert (1992), Hill (1998), IBIRD (2000), ILPIN (2002), INRIN (2001), NRCS (2002), Phillips et al. (1999), Purdue (2001), and UMMZ (2000).

B.14.4.2.1 Plants:

Pale false foxglove. IDNR did not report any record of this species from its Biological Heritage Database for the study area. It is known from St. Clair County from historical records. Pale false foxglove is found in loess hill prairies and sand prairies. This species is a hemiparasitic annual herb that measures 10 to 60 cm in height.

Decurrent false aster. This species is discussed above in the section on federally-listed species.

B.14.4.2.2 Amphibians:

Illinois chorus frog. According to INDR and its Biological Heritage Database, this frog currently occurs in the northern portion of the study area on the Mississippi River's floodplain, near historic Cahokia Creek. Four separate areas of "precision habitat" for this species have been established to meet the species' life history requirements. Two such areas border both sides of historic Cahokia Creek in areas where strips of riparian forest still remain.

The others are west of the old channel along Streetcar and Wanda Roads. The Illinois chorus frog inhabits sand prairies and remnants such as sandy agricultural fields and waste areas, spending most of life underground. It burrows in sand and emerges after heavy, early spring rains to breed in nearby flooded fields, ditches, and other vernal ponds. Eggs are laid in small, jelly-covered clusters attached to twigs and branches underwater. Embryos hatch in a few days and tadpoles transform in about two months. Adult frogs consume small insects. Predators of this frog include fish and bullfrogs.

B.14.4.2.3 Reptiles:

Great Plains rat snake. IDNR did not report any record of this species from its Biological Heritage Database for the study area. The great plains rat snake inhabits rocky, wooded hillsides, hill prairies, bluffs, and adjacent brushy fields. This nocturnal snake mates in April or May and lays 3-30 eggs a few weeks later. The young hatch in August. Diet includes mammals, birds, and bird eggs. Medium-sized mammals and raptors are its main predators. It is found only along the Mississippi River bluffs from Jersey to Randolph counties.

Flathead snake. IDNR did not report any record of this species from its Biological Heritage Database for the study area. The flathead snake inhabits rocky, wooded limestone hillsides. It is believed to be nocturnal, and is and found mostly in spring and autumn under rocks, logs, and other moist debris in forest or brushy slopes. It burrows deeply as surface soil dries in summer. It is sometimes found on or along roads at the bottom of rocky hillsides. Flathead snakes mate in April and May and deposits 2-4 eggs in moist soil or under rocks during June. The young hatch in September. This species eats scorpions, spiders, centipedes, and a variety of other small arthropods, which are probably tracked by scent.

Timber rattlesnake. IDNR did not report any record of this species from its Biological Heritage Database for the study area. The timber rattlesnake occurs in heavy forest along rocky outcrops and bluffs. It is active from April through October, and is often seen sunning on rock ledges near winter dens. It forages during summer in upland forests and some border and disturbed habitats where rodents are abundant. Its diet consists mainly of small mammals, such as mice, squirrels, and chipmunks. It usually mates in July and August, with six to 10 young born during late summer or early autumn of the following year.

B.14.4.2.4 Birds:

Pied-billed Grebe. According to IDNR and its Biological Heritage Database, three records of this species occur within the study area. These sites are represented by a wetland on the east side of Granite City, Eagle Park Marsh INAI (Illinois Natural Area Inventory) site at the southwest end of Horseshoe Lake, and by Horseshoe Lake west of Walker Island. Pied-billed grebes have used Eagle Park Marsh for breeding in the past (USDOT 2000). ZE (1998) reported that this species might use marshes at Brushy (Levy) Lake and Holten State Park. The species is a common migrant in Illinois. It is the first grebe to arrive north in the spring and the last to leave in the fall.

It is also the most solitary of the grebes. It prefers shallow freshwater ponds less than 7 hectares, especially those with dense stands of emergent vegetation. They feed mainly on insects, fish and crayfish in freshwater ponds and marshes. Breeding and nesting occurs on ponds with shore and emergent vegetation; nests are over the water.

Least Bittern. According to IDNR and its Natural Heritage Database, one record of the least bittern occurs within the study area. The site is in Horseshoe Lake just east of Walker Island. The least bittern is an uncommon migrant and summer resident in Illinois. It is a shy, secretive bird that hides in tall cattails and sedges. It feeds at the water's edge in marshes, but quickly retreats back into the vegetation after capturing prey. Diet consists of fish, aquatic insects, amphibians, various invertebrates, and occasionally shrews and mice. Least bitterns nest in the dense growth of marsh emergents above shallow water.

Bald eagle. This species is discussed above in the section on federally-listed species.

Red-shouldered Hawk. IDNR did not report any record of this species from its Biological Heritage Database for the study area. ZE (1998) reported that this species might use floodplain forests at Brushy (Levy) Lake and Holten State Park. Red-shouldered hawks live year-round in lowland woods, swamps, along rivers, and also near farmlands, in upland woods, and near grasslands. They nest high in large trees in forests associated with water, such as swamps or riparian habitat. Hawks hunt in agricultural areas, grasslands, and forest edges. Small mammals and amphibians make up a large portion of diet, although it can be extremely varied and composition apparently depends in part upon prey availability.

Common Moorhen. According to IDNR and its Natural Heritage Database, three records of the common moorhen occur within the study area. One site is northeast of Horseshoe Lake, south of IL Route 162 and west of IL Route 111. The other sites are Horseshoe Lake just east of Walker Island, and Eagle Park Marsh INAI (Illinois Natural Area Inventory) site in the southwest end of Horseshoe Lake, where it has nested in the past (USDOT 2000). It was observed near Lansdowne Ditch in spring of 1995 (USDOT 2000). ZE (1998) reported that this species might use marshes at Brushy (Levy) Lake and Holten State Park. The common moorhen is an occasional migrant and summer resident in central and southern Illinois. It frequents freshwater marshes and ponds with emergent aquatic vegetation, primarily cattails and bulrushes. Moorhens walk on floating vegetation picking food items off plant and water surfaces. Food items include seeds, grass, rootlets, soft parts of water plants, snails, grasshoppers, as well as various other insects and worms. Nests are usually elevated slightly above the water among robust emergent vegetation.

Brown Creeper. IDNR did not report any record of this species from its Biological Heritage Database for the study area. The brown creeper is considered a migrant in Illinois, arriving in late September and usually leaving by late April. It occupies deciduous and mixed woodlands, with cypress swamps and floodplain forest apparently being its primary habitat in Illinois. The brown creeper almost invariably nests on dead or dying trees that have most of the bark peeled off.

The nest is placed between a loose slab of bark and the trunk. This species is primarily insectivorous, taking a variety of insect types and life stages. It does not disturb the bark as do nuthatches or woodpeckers, but picks items from cracks and crevices and off bark surfaces. A small amount of vegetable matter may also be taken.

Veery. IDNR did not report any record of this species from its Biological Heritage Database for the study area. The veery is a common migrant from early to late May, and an uncommon migrant between early and late September. It occurs mostly in moist or floodplain deciduous forests with a shrub or herbaceous understory. Soil moisture and vegetation structure apparently are the most important components of its habitat. This bird feeds mostly on the ground, eating insects (beetles, ants, wasps, and bees) during spring and summer, but mostly wild fruit in the fall.

Loggerhead Shrike. IDNR did not report any record of this species from its Biological Heritage Database for the study area. ZE (1998) reported that this species might use areas of scattered thorny shrubs at Holten State Park. USDOT (2000) reported the sighting of a single individual, presumed to be a migrant, in spring of 1995 near the Mississippi River, north of I-55/70 and west of IL Route 3; this location is just outside the study area's boundary. The loggerhead shrike is a year round resident in southern regions of the state; however, additional migrants arrive as early as mid to late February, with peak influxes throughout March. Habitat includes open areas with mixed shrub/brush hedgerows and scattered thorny trees. Non-row crops such as wheat, hay, and abandoned fields are used as habitat if there are surrounding hedgerows and trees. The loggerhead shrike is occasionally found in oak or red cedar habitat or orchards, and occurrences in urban areas have been reported. Nests are found in smaller trees and shrubs with heavily twigged growth. Loggerheads prey mainly on insects and small animals, depending on the season.

B.14.4.3 Environmental Consequences. This section, along with Sections B.14.1-B.14.3 (existing status of endangered and threatened species), represents the Corps' Biological Assessment of the recommended plan's effect on federally-listed species that may occur within the study area. This Biological Assessment is prepared in compliance with Section 7(c) of the Endangered Species Act of 1973, as amended.

B.14.4.3.1 Potential Effects on Federally-Listed Species:

Least tern. The least tern (*Sterna antillarum*), a federally- and state-endangered species, has no known nesting habitat within the study area or adjacent reach of the Mississippi River. The species has occasionally been observed at Horseshoe Lake during spring migration in recent years (McMullen 2001). Horseshoe Lake does not lie within the footprint of any of the action areas comprising the recommended plan. Because the recommended plan will not adversely affect any potential foraging habitat consisting of shallow water at backwater areas, no effect is expected on the least tern.

Piping Plover. The piping plover (*Charadrius melodus*), a federally- and state-endangered species, has occasionally been observed within the study area at Horseshoe Lake during fall migration in recent years (McMullen 2001). Horseshoe Lake does not lie within the footprint of any of the action areas comprising the recommended plan. Because the recommended plan will not adversely affect any potential feeding territories consisting of sandy, sparsely or unvegetated lakeshore beaches, as well as unvegetated sandbars in the Mississippi River, the recommended plan is not expected to affect this species.

Bald eagle. The bald eagle (*Haliaeetus leucocephalus*), a federally- and state-threatened species, currently has no nests within the study area or adjacent reach of the Mississippi River. Likewise, no winter communal roosting sites occur within or near the study area. A record of this species at the Mullens Slough Action Area most likely represents an individual observed during the daytime in winter perching in a tree near the edge of the lake, which it was using as a foraging area. By adding overwintering fish habitat and structural diversity to the lake at Mullens Slough, the recommended plan is expected to enhance the local fisheries resource, and provide greater foraging opportunities for the bald eagle. A similar benefit to this species could occur at the Spring Lake Action Area if a fisheries resource were to become established within the artificial lake located there. Removal of trees in the uplands to construct tributary stream sediment detention basins is not expected to affect this bird. Therefore, no adverse effects to the bald eagle are expected.

Gray bat. The gray bat (*Myotis grisescens*), a federally- and state-endangered species, does not roost within the study area because there are no caves in the study area. Caves that the gray bat uses are not nearby. As gray bats feed over water along river or reservoir edges in proximity to roost caves, it is unlikely that this species will be affected.

Indiana bat. The Indiana bat (*Myotis sodalis*), a federally- and state-endangered species, has no winter hibernacula (caves or abandoned mines) within the study area, or within 5 kilometers of its boundary. Forested habitats within the study area are considered to be potential habitat for this species. Trees suitable to serve as summer roosts are expected to occur in forests in both the floodplain and upland portions of the study area. Some tree felling and removal is expected to be a component of the recommended plan. In the uplands, tree removal at each of the 155 sites for a proposed tributary stream sediment detention dam is estimated to affect about 0.3 acre of trees per site.

Relatively small amounts of trees are expected to be removed along Burdick Branch, Schoolhouse Branch, and Harding Ditch where their existing channels are proposed to be widened. Similarly, small numbers of trees are expected to be removed from the Old Cahokia Creek, Brushy Lake, and Spring Lake Action Areas to restore portions of historic Cahokia Creek. Likewise, incidental tree removal is expected at all floodplain action areas to develop the proposed habitat areas.

To avoid impacting the Indiana bat, tree clearing activities would not occur during the period of April 1 to September 30, which is the assumed maternity roosting season. If it is necessary to clear trees during this time frame, trees proposed for removal will be surveyed for appropriate roosting features (cavities, loose bark structure), and mist net surveys may be necessary to determine if Indiana bats are present. With this tree clearing restriction, the recommended plan is unlikely to affect the Indiana bat.

Pallid sturgeon. The pallid sturgeon (*Scaphirhynchus albus*), a federally- and state-endangered species, is found only in the Mississippi River and not within the study area. Since no feature of the recommended plan is located in the Mississippi River, the recommended plan is not expected to affect this species.

Illinois Cave Amphipod. The Illinois cave amphipod (*Gammarus acherondytes*), a federally- and state-endangered species, lives only in caves. Because no caves are within the study area, and the recommended plan will not impact any caves, the Illinois cave amphipod is unlikely to be affected.

Decurrent false aster. The decurrent false aster (*Boltonia decurrens*), a federally- and state-threatened species, is known to occur within one of the proposed action areas on the Mississippi River floodplain. At the Spring Lake Action Area, a number of colonies of decurrent false aster have been reported by USDOT (2000) from marsh and other habitats at Indian Lake, located on the south side of I-55/70 between IL Routes 203 and 111. Additionally, the species might occur at the floodplain component of the Brushy Lake Action Area (ZE 1998), located north of I-55/70 between Cakokia Canal and Fairmont Avenue. At Indian Lake, the proposed restoration of Cahokia Creek, and establishment of a 328-foot (100 meter) wide forested riparian zone on both sides of the creek restoration, may overlap with colonies previously identified. These proposed features might also overlap with a wetlands compensation site to be used for decurrent false aster mitigation by USDOT (2000) for the new Mississippi River bridge and relocated I-70 and I-64 connector. Similarly, proposed reforestation of all existing open habitats at Brushy Lake (except for the existing prairie restoration) may overlap with any colony(s) that might occur there.

If the recommended plan is approved, the location and extent of existing decurrent false aster colonies (and USDOT mitigation site) will be defined and compared with proposed features at these two action areas. Proposed features found to be overlapping with individual plants or colonies will be modified to avoid any overlap. A main goal of these efforts will be to preserve and maintain existing habitat used by the species in a state of high-light levels with open, nonwoody vegetation. The reintroduction of periodic "flood pulses" into these floodplain action areas is expected to benefit the decurrent false aster because flood waters can promote seed dispersal, and this type of ecosystem disturbance can retard the encroachment of woody vegetation into open areas. Similarly, the reintroduction of periodic prescribed burns during the fall or early spring when plants are senescent can also maintain the open nonwoody character of existing habitat. Provided any potential overlap of currently proposed features with existing individuals or colonies is avoided, the recommended plan is not expected to adversely affect the decurrent false aster.

Eastern prairie fringed orchid. The eastern prairie fringed orchid (*Platanthera leucophaea*), a federally-threatened and state-endangered species, can be found in prairie remnants. According to IDNR's Natural Heritage Database, this species has not been reported from the study area, including the Poag Road Prairie INAI site, which is the only prairie remnant within the study area. The closest component of the recommended plan to this prairie remnant is the floodplain portion of the Old Cahokia Creek Action Area, which lies about one mile to the east. Therefore, it is unlikely that the eastern prairie fringed orchid will be affected.

Eastern massasauga rattlesnake. The Eastern massasauga rattlesnake (*Sistrurus catenatus*), a federal candidate for listing and state-endangered species, is not known from any proposed action area. According to IDNR, it may occur within 1.5 miles of a site east of Horseshoe Lake that represents an historical record on the Mississippi River floodplain. Components of the recommended plan in the Mississippi River floodplain that overlap with this circular area include the action areas at Brushy Lake, Judy's-Burdicks, and Elm Slough. ZE (1998) reported that this snake might occur at Brushy Lake. Cropland currently comprising nearly all of the Judy's-Burdicks floodplain area, much of Elm Slough, and the northern portion of Brushy Lake is not suitable habitat for this species. Suitable habitat consisting of forested wetlands and marshes is present at Brushy Lake and Elm Slough. The response of this species to periodic ecosystem disturbances in historic times, specifically overbank flooding in floodplains and wild fire, may never have been documented. The snake most likely escaped periodic wildfire by hiding underground in crayfish burrows or similar voids. It could naturally withstand brief periods of flooding, and may have escaped from rising waters by moving to higher ground or climbing vegetation.

The proposed expansion of natural habitats at the Elm Slough and Brushy Lake Action Areas into adjacent cropland would benefit this species. The reintroduction of periodic historic ecosystem disturbance in the form of prescribed fire is not likely to adversely affect this species. The effect of periodically flooding proposed action areas with stormwater on a temporary basis may be dependent on flooding depth and duration. At Elm Slough, maximum depth of flooding is expected to be about two feet, and maximum duration about 36 hours. At Brushy Lake, 410 feet NGVD is expected to be the maximum elevation of flooding for stormwater from Schoolhouse Branch. Maximum depth would be about three feet; maximum duration was not calculated for this site. At 410 feet NGCD, about three-fourths of the action area would be flooded.

It is unlikely that this snake will be adversely affected by the recommended plan. However, if the recommended plan is approved, a survey for the massasauga will be conducted within proposed action areas that involve excavation or clearing in wet, open areas, or forested wetlands, including Dobrey Slough, Elm Slough, Brushy Lake, and Spring Lake. If the recommended plan is approved, further refinement of features at such action areas would be coordinated with pertinent federal and state natural resource agencies to avoid potential adverse impacts to the massasauga.

B.14.4.3.1.1 Summary of Potential Effects on Federally-Listed Species. Based on this evaluation, it is the St. Louis District's opinion that the recommended plan will not adversely impact any of the federally threatened or endangered species, or candidate species for listing, that may occur in the study area, provided that 1) tree felling is restricted to the time of the year (October 1 through March 31) when Indiana bat maternity colonies are not present, and 2) any potential overlap of proposed features with existing decurrent false aster populations, or USDOT decurrent false aster mitigation areas, is avoided. The U.S. Fish and Wildlife Service reviewed the Biological Assessment contained in the Draft EIS circulated for public review, and concurred with the District's opinion (in a letter dated June 3, 2003, from the Department of the Interior) that the proposed project is not likely to adversely affect any federally listed threatened or endangered species. Consultation concerning threatened and endangered species will be necessary for each proposed action area. This Biological Assessment will be revised and updated as necessary, and will appear again in future NEPA compliance documents prepared for each of the action areas once detailed plans are finalized.

B.14.4.3.2 Potential Effects on State-Listed Species.

B.14.4.3.2.1 Plants. It is unlikely that any of the nine state-listed plants will be adversely affected by the recommended plan for the following reasons.

The royal catchfly (*Silene regia*), found in dry-mesic barrens and prairies, is known to occur in the study area from a recent record, but only from the Chouteau Catchfly INAI site. The nearest proposed action area is Old Cahokia Creek, three miles to the east. Spring ladies' tresses (*Spiranthes vernalis*), which inhabits acidic soils in prairies and old fields, is also known recently in the study area, but only from the Poag Railroad Prairie INAI site. The closest proposed action area, Old Cahokia Creek, is about one mile east. Prairie remnants are not found within any proposed action area, but old field habitats occur in the Spring Lake and Cahokia Mounds Action Areas (about 200 acres). At Spring Lake, an area of old field habitat (about 20 acres) is proposed to be excavated and replaced with marsh. At Cahokia Mounds, a number of inactive hay lease areas that are old fields (about 180 acres) are proposed to be restored to prairie. If the recommended plan is approved, a survey for spring ladies' tresses will be conducted at Spring Lake and Cahokia Mounds.

Regarding pale false foxglove (*Agalinis skinneriana*) and prairie spiderwort (*Tradescantia bracteata*), no records from IDNR's Natural Heritage Database have been reported for the study area. Remnants of historical natural habitats of these three species, which include dry-mesic silt prairies and hill and sand prairies, are not found within any proposed action area.

Bead grass (*Paspalum dissectum*), small burhead (*Echinodorus tenellus*), and mud plantain (*Heteranthera reniformis*) are all known from the vicinity of the study area, but only from historic records. These three species are obligate wetland species, and are found in either wet floodplain forests, marsh, or at the edges of lakes and ponds. Bead grass is also known from disturbed sites. Because of the lack of recent records, it is unlikely that these three species will be affected by the recommended plan. However, if the recommended plan is approved, surveys for them will be conducted within proposed action areas that involve excavation or clearing in such existing habitats, including Old Cahokia Creek, Dobrey Slough, Brushy Lake, and Spring Lake.

Decurrent false aster (*Boltonia decurrens*) is discussed above in the section on federally-listed species.

B.14.4.3.2.2 Invertebrates. The Illinois cave amphipod (*Gammarus acherondytes*) is discussed above in the section on federally-listed species.

B.14.4.3.2.3 Fishes. The sturgeon chub (*Macrhybopsis gelida*) and flathead chub (*Platygobio gracilis*) are not found in the creeks and drainage canals of the study area, but instead in the Mississippi River. Because the Mississippi River has been isolated from the study area by development, and the recommended plan does not have any feature located in the river, neither of these two fish is likely to be affected.

The pallid sturgeon (*Scaphirhynchus albus*) is discussed above in the section about federally-listed species.

B.14.4.3.2.4 Amphibians. Old Cahokia Creek is the only proposed action area that could potentially affect the Illinois chorus frog (*Pseudacris streckeri illinoensis*). Two tracts of "precision habitat" established for this species overlap with this proposed action area. Within these areas of "precision habitat", the historic floodplain creek channel would be restored to a flowing condition, and cropland adjacent to both sides of the channel would be planted with trees to create a 328-foot wide (100 m) forested zone. In addition, an earthen berm would be placed along the west side of the forested corridor, parallel to the restored creek channel, to contain overflow and prevent stormwater from the Bluff 1 watershed from reaching the vicinity of Sand Road, including the two tracts of "precision habitat" occurring to the west. Replacement of cropland with a forested corridor is expected to benefit this species. Containment of overflow in the forested corridor and adjacent agricultural lands to the east is expected to benefit the species by preventing fish from being carried by floodwaters to the two tracts of "precision habitat" to the west, where they could prey on the frog. If the recommended plan is approved, further refinement of features at this action area would be coordinated with pertinent federal and state natural resource agencies to avoid potential adverse impacts to the Illinois chorus frog.

B.14.4.3.2.5 Reptiles. Three reptiles, the great plains rat snake (*Elaphe guttata emoryi*), flathead snake (*Tantilla gracilis*), and timber rattlesnake (*Crotalus horridus*), are typical of bluffs and cliffs and the relatively dry prairies or forests that historically covered them. Because there are no records of these species in IDNR's Natural Heritage Database, and bluffs in the study area are not cliff-like and lack rocks and limestone features, as well as hill prairies along their crest, the recommended plan is unlikely to adversely affect any of these species.

B.14.4.3.2.6 Birds. Nesting colonies of herons and egrets found in the American Bottom will not be affected by the recommended plan. The Alorton rookery, which supports three state-endangered birds – the snowy egret (*Egretta thula*), little blue heron (*Egretta caerulea*), and black-crowned night-heron (*Nycticorax nycticorax*) - in addition to the great egret and cattle egret (McMullen 2001), is about one-quarter mile south of Indian Lake, a component of the proposed Spring Lake Action Area. Collinsville Road forms the south boundary of Indian Lake.

At this action area, the proposed ditch from Cell 1 to Indian Lake is at least 1.5 miles north and east of the Alorton rookery. The other historic rookery in the American Bottom, along Long Lake east of Granite City, is about one mile northeast of the proposed Dobrey Slough Action Area, but herons or egrets have not used this nesting site for about 10 years (McMullen 2001).

Feeding habitat for the snowy egret, little blue heron, and black-crowned night-heron, as well as the yellow-crowned night-heron (*Nyctanassa violacea*), American bittern (*Botaurus lentiginosus*), least bittern (*Ixobrychus exilis*), king rail (*Rallus elegans*), common moorhen (*Gallinula chloropus*), and pied-billed grebe (*Podilymbus podiceps*), is expected to benefit from the recommended plan by the creation of new marsh habitat. These eight bird species can be expected to feed at marshes proposed at the Dobrey Slough (about 35 acres), and Spring Lake (about 350 acres) Action Areas. Restoration of existing marsh habitat (about 25 acres) at the proposed Brushy Lake Action Area, by plugging adjacent agricultural drainage ditches and permanently raising water levels to previous levels, and establishment of a zone of emergent vegetation along the shore of the 235-acre lake at the proposed Mullens Slough Action Area, are also expected to create feeding opportunities for these species. Widening of existing floodplain channels at the proposed Brushy Lake and Spring Lake Action Areas, including Schoolhouse Branch from IL Route 157 to I-255, and Harding Ditch from IL Route 157 to I-255 and from Cell 1 to St. Clair Farms, is expected to be a temporary adverse impact to feeding habitat of these species. The yellow-headed blackbird (*Xanthocephalus xanthocephalus*), as it passes through the study area during migration, is also expected to benefit from the new marsh habitat.

The osprey *(Pandion haliaetus)*, common tern (*Sterna hirundo*), Forster's tern (*Sterna forsteri*), and black tern (Chlidonias niger) are expected to benefit from the recommended plan. By adding overwintering fish habitat and structural diversity to the 235-acre lake at the proposed Mullens Slough Action Area, the local fisheries resource would be enhanced, providing greater foraging opportunities for these bird species. A similar benefit to these species could occur at the Spring Lake Action Area if a fisheries resource were to become established within the artificial lake (about 125 acres) located there. The addition of emergent vegetation along the margin of the lake at Mullens Slough is also expected to enhance opportunities for Wilson's phalarope (*Phalaropus tricolor*) to feed on aquatic insects.

The brown creeper (*Certhia americana*) , veery (*Catharus fuscescens*), Mississippi kite (*Ictina mississippiensis*), and red-shouldered hawk (*Buteo lineatus*) are expected to benefit from the recommended plan. The creation of additional floodplain forest at the proposed Elm Slough Action Area (about 265 acres), and riparian corridors along restored creeks at the proposed Old Cahokia Creek (about 160 acres), Brushy Lake (about 335 acres), and Spring Lake (about 230 acres) Action Areas, are expected to provide more feeding habitat for the brown creeper, veery, and Mississippi kite, and more nesting habitat for the red-shouldered hawk.

The northern harrier (*Circus cyaneus*), short-eared owl (*Asio flammeus*), and Henslow's sparrow (Ammodramus henslowii) are expected to benefit from the recommended plan because of the creation of open habitats for foraging. At the proposed Judy's-Burdicks Action Area, wet and mesic prairie (about 405 acres) would be established, and marsh would be developed at the Cell 1 (about 80 acres) and St. Clair Farms (about 190 acres) components of the Spring Lake Action Area.

The peregrine falcon (*Falco peregrinus*) is not known to nest within the study area. The recommended plan is likely to benefit this species by establishing or preserving about 5,000 acres of natural areas within an urbanizing environment, over which it can hunt for birds in flight.

Replacement of grassy hay lease areas (about 335 acres) at Cahokia Mounds State Historic Site with tallgrass prairie vegetation could potentially adversely affect the upland sandpiper (*Bartramia longicauda*). Likewise, replacement of inactive hay lease areas at Cahokia Mounds, consisting of old field habitat with scattered shrubs (about 120 acres), with restored prairie could potentially adversely affect the loggerhead shrike (*Lanius ludovicianus*). If the recommended plan is approved, surveys for these two bird species will be conducted at the Cahokia Mounds and Spring Lake Action Areas.

Because six of the state-listed bird species build nests either on or near the ground, there is the potential for occasional large stormwater events introduced into action areas as flood pulses to inundate active nests of these birds, and either destroy eggs or drown young nestlings. The species include the American bittern (*Botaurus lentiginosus*), northern harrier (*Circus cyaneus*), king rail (*Rallus elegans*), pied-billed grebe (*Podilymbus podiceps*), least bittern (*Ixobrychus exilis*), and common moorhen (*Gallinula chloropus*). Although none of these species are known to nest at any of the recommended action areas, marshes often serve as nesting habitat for these species, and some may use prairies as well as emergent vegetation along lakeshores. This potential for flood-induced mortality, a natural phenomenon of historic floodplains, would exist if any of these bird species were to nest in action areas that receive flood pulses, as well as support marsh, prairie, or emergent shoreline vegetation. Such action areas would include Judy's-Burdicks (prairie, shoreline vegetation), Dobrey Slough (new marsh), Elm Slough (new prairie), Spring Lake (existing and new marsh, shoreline vegetation), and Mullens Slough (shoreline vegetation). Maximum flood depths at these sites would vary from 4 to 7 feet.

The likelihood that local populations of these six bird species would decline over the long term due to mortality from flood pulses is expected to be low, for several reasons. First, during most years, depth of flood events introduced into action areas would be much less than the estimated maximum depth, and these lesser events would likely cause no to little mortality. Second, once flooding from large storm events would recede (maximum duration estimated to vary from one to 13 days), adults of most affected bird species probably would re-nest. Lastly, many existing wetlands and other habitats in the study area that are or could be used by these birds for nesting are not incorporated into the recommended plan, and flood pulses would not affect them.

B.14.4.3.2.7 Mammals. The gray bat (Myotis grisescens) and Indiana bat (Myotis sodalis) are discussed above in the section on federally-listed species.

B.14.4.3.3 Summary of Potential Effects on State-Listed Species. Excluding federally-listed species (including the massasauga), state-listed species in general are expected to benefit from the recommended plan. Adverse effects potentially could occur to eight bird species. Conversion of pasture-like grassy areas and shrubby areas to prairie restoration would remove potential habitat for the upland sandpiper and loggerhead shrike. Larger flood pulses introduced into a number of action areas could inundate nests of the American bittern, northern harrier, king rail, pied-billed grebe, least bittern, or common moorhen, if these species were to nest in these areas.

If the recommended plan is approved, this assessment of the plan's effect on state-listed species will be revised and updated as necessary, and will appear again in future NEPA compliance documents prepared for each of the action areas once detailed plans are finalized.

B.15 FORMULATION OF PRAIRIE RESTORATION ALTERNATIVES

B.15.1 Identification of plan features. Quality of restored prairie: A feature potentially subject to manipulation during formulation of plans for prairie restoration is the quality of prairie to be restored. Quality is defined as the number and diversity of prairie plant species chosen for planting, relative to the entire native prairie plant community that existed historically at a particular area. For restoration projects relying on the use of commercially available seed (as opposed to seed produced by the project proponent specifically for the project, often with volunteer help), the cost of seed typically is a significant proportion of the total restoration cost. For example, prairie restorations constrained by a limited budget usually involve the planting of relatively few species, consisting of about half a dozen warm-season grasses and no or few forbs. On the other hand, restoration projects with no funding constraints, or with the capability to produce seed for many species, could conceivably include each and every plant species known to have occurred in the historic prairies of a given area. An example of this approach is the Midewin National Tallgrass Prairie located in the Chicago Metropolitan Area near Joliet, Illinois. There the seed from every prairie plant species known historically from the vicinity (over 300), including many forbs, is being produced and harvested from seed production plots by volunteers, and will be used to plant a 19,000-acre restoration area.

For this study, quality of restored prairie was not chosen as a feature that would vary among project alternatives for plan formulation purposes, such as, for example, "low" versus "medium" versus "high" quality. Rather, the study team of biologists chose a "high" quality as the goal for all proposed prairie restorations, because it seemed most appropriate in terms of ecosystem restoration - returning an area to an historic condition. Yet "high" quality was not meant to represent the replanting of all historically occurring species, because this approach was judged to be beyond the scope of this study. Rather, in terms of total number of species to be planted, "high" quality was equated with roughly 50 to 60 different kinds. They would consist of native warm-season grasses (about a half dozen), many species of forbs (about 40 to 50), a couple of shrubs, and some sedges where appropriate. Number and kind of species would be tailored to local edaphic conditions (i.e., mesic versus wet-mesic versus wet).

Source of prairie seed: For plan formulation purposes, two sources were identified – commercial and "raise your own," such as at Midewin National Tallgrass Prairie. Commercial sources are relatively numerous. Because there is no existing prairie seed production capability in the vicinity of the study area that could supply the demand needed for this study, one would have to be created. It was assumed that this would occur on public lands (such as Cahokia Mounds State Historic Site) using non-volunteer (paid) employees. Dependence on an all-volunteer pool of people to execute a plan to produce the required amount of prairie seed when it would be needed was not judged to be feasible.

Rate of prairie restoration: The rate at which potential lands could be restored to prairie was treated as a feature that would vary among alternatives for plan formulation purposes. This assumes that the total area of all potential restoration sites is so large that any source of seed (commercial or project-specific) would be unable to supply enough to plant all areas at once. Therefore, four rates of restoration were established, and they indicate the amount of time required to complete the planting of a given area: 5 years, 10 years, 25 years, and 50 years. This feature was combined with the seed source feature to yield the following two combinations: commercial sources would be used for the 5- and 10-year rates, and a "grow your own" source would be used for the 25- and 50-year rates.

Type of prairie maintenance: Natural fire was an integral component of the ecology of historic prairies. Periodic burns maintained the integrity of a diverse plant community, suppressed the natural succession of prairie to forest, and released plant-bound nutrients to the soil in the form of ash. In landscapes managed by man, remnant and restored prairies also need maintenance for the same reasons. For purposes of plan formulation, type of prairie maintenance was considered a feature subject to manipulation. Three kinds of prairie maintenance were developed for the restoration areas: burning only, burning and mowing, and mowing only. Factors integral to the development of these options were the potential for a measure to maintain prairie integrity over time and the potential to impair air quality.

"Burning only" consists of using only fire for maintenance, under a schedule of prescribed or planned burns. According to this treatment, the entire restoration area is burned every 3 years on a rotational cycle, such that a portion of the site is burned each year (assuming the site is large enough to divide into smaller segments). "Burning and mowing" denotes the employment of both burning and mowing for maintenance. The entire prairie is mowed once every 2 to 3 years, and burned once every 10 years. Again, portions of the site are treated each year. Under "mowing only", no fire is ever used, and mowing occurs once every 3 years on a rotational cycle, such that part of site is treated each year.

The development of prairie maintenance alternatives that employ less burning than the "burning only" option is a response to potential concerns about air quality, given that the study area is located within an urban region. Although there are existing prairie restoration areas within the study area that currently undergo periodic burns, they are of a small scale relative to the size of the potential restoration areas under consideration in this study.

The study team of biologists assumed that these three options had differing potentials for maintaining the integrity of restored prairie plant communities over time. Because the "burn only" option is the most similar to nature, it was assumed to have the greatest potential to maintain biological integrity. The other two options, "burn and mow" and "mow only", were judged to possess progressively lesser potentials.

B.15.2 Screening of plan features. The "grow your own" measure under the source of prairie seed feature was eliminated from further consideration because it was judged to be infeasible due to cost considerations. A cost comparison was conducted between seed made available from commercial suppliers and from a newly created project-specific source using paid employees. The latter was found to be significantly more expensive. Consequently, in addition to the "grow your own" option, the 25- and 50-year measures were eliminated from the rate of restoration feature.

Table B.16 Soils of Horseradish Fields affected by the Recommended Plan.

Mapping Unit		Acres	% Total
Symbol	**Name**		
	0 - Not prime farmland		
2071L	Darwin-Urban land complex, 0 to 2 percent slopes, occasionally flooded, long duration	0.6	0.2
53B	Bloomfield loamy fine sand, 1 to 3 percent slopes	9.7	3.1
8071L	Darwin silty clay, 0 to 2 percent slopes, occasionally flooded, long duration	41.6	13.5
8122C	Colp silty clay loam, 5 to 10 percent slopes, severely eroded, occasionally flooded	0.2	0.1
	0 Total	52.1	16.9
	1 - All areas are prime farmland		
37A	Worthen silt loam, 0 to 2 percent slopes	21.3	6.9
37B	Worthen silt loam, 2 to 5 percent slopes	0.0	0.0
8078A	Arenzville silt loam, 0 to 2 percent slopes, occasionally flooded	4.8	1.6
8122B	Colp silt loam, 1 to 4 percent slopes, occasionally flooded	3.2	1.0
8150A	Onarga sandy loam, 0 to 3 percent slopes, occasionally flooded	1.7	0.6
8151A	Ridgeville fine sandy loam, 0 to 2 percent slopes, occasionally flooded	6.6	2.1
8180A	Dupo silt loam, 0 to 2 percent slopes, occasionally flooded	10.4	3.4
8183A	Shaffton clay loam, 0 to 2 percent slopes, occasionally flooded	0.9	0.3
81A	Littleton silt loam, 0 to 2 percent slopes	1.3	0.4
8284A	Tice silty clay loam, 0 to 2 percent slopes, occasionally flooded	11.3	3.7
8304B	Landes very fine sandy loam, 2 to 5 percent slopes, occasionally flooded	0.0	0.0
8331A	Haymond silt loam, 0 to 2 percent slopes, occasionally flooded	1.2	0.4
8415A	Orion silt loam, 0 to 2 percent slopes, occasionally flooded	0.4	0.1
8674A	Dozaville _______, 0 to 2 percent slopes, occasionally flooded	21.6	7.0
	1 Total	84.9	27.5
	2 - Only drained areas are prime farmland		
8070A	Beaucoup silty clay loam, 0 to 2 percent slopes, occasionally flooded	11.2	3.6
8333A	Wakeland silt loam, 0 to 2 percent slopes, occasionally flooded	92.6	30.0
8334A	Birds silt loam, 0 to 2 percent slopes, occasionally flooded	45.6	14.8
	2 Total	149.4	48.4
	3 - Only areas protected from flooding or not frequently flooded during the growing season are prime farmland		
3081A	Littleton silt loam, 0 to 2 percent slopes, frequently flooded	0.2	0.1
3331A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	9.4	3.0
3336A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	0.1	0.0
	3 Total	9.7	3.1
	5 - Only drained areas that are either protected from flooding or not frequently flooded during the growing season are prime farmland		
1070A	Beaucoup silty clay loam, 0 to 2 percent slopes, frequently flooded	0.0	0.0
3333A	Wakeland silt loam, 0 to 2 percent slopes, frequently flooded	5.0	1.6
3334A	Birds silt loam, 0 to 2 percent slopes, frequently flooded	7.7	2.5
	5 Total	12.7	4.1
Grand Total		**308.9**	**100.0**

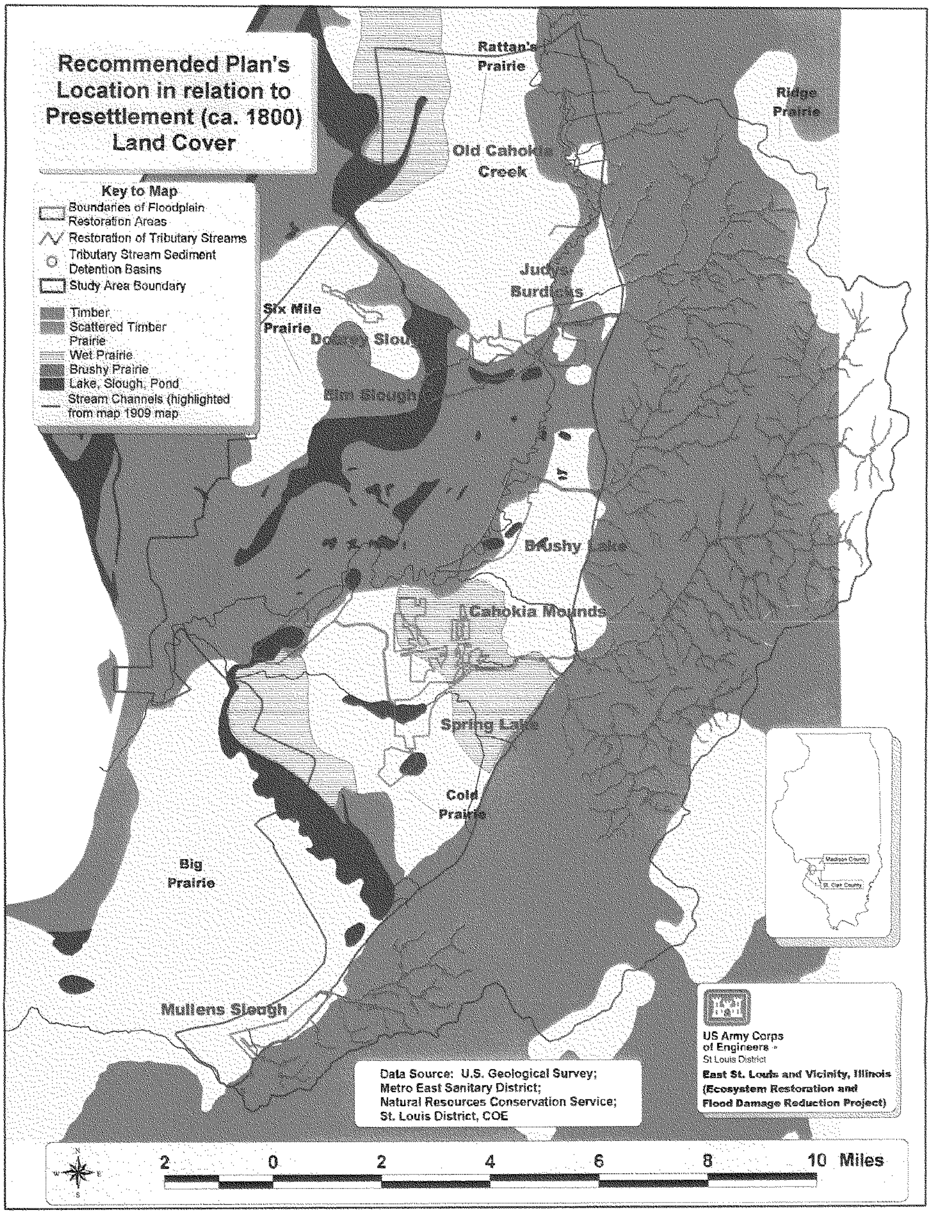

Figure B.17 Boundaries of recommended action areas in relation to predevelopment (ca. 1800) land cover

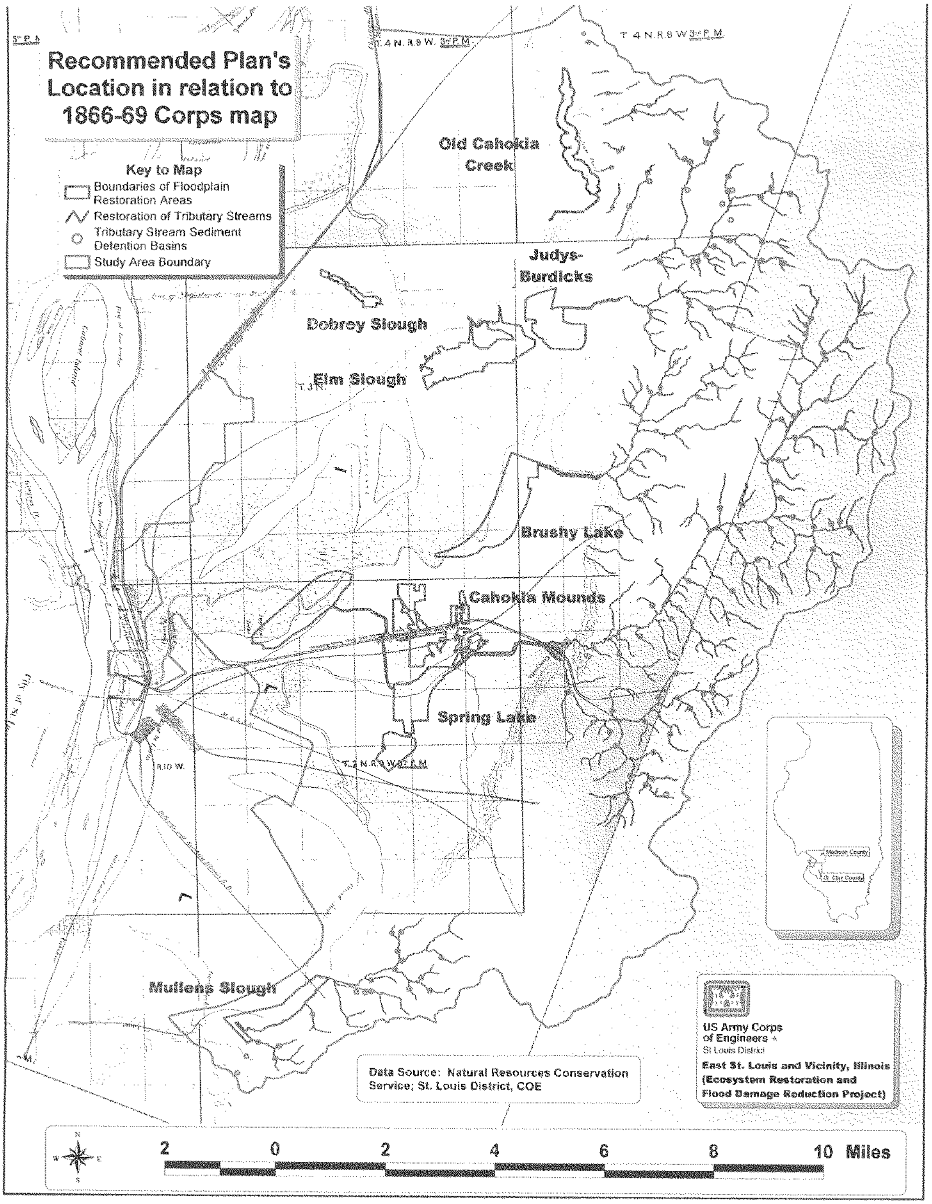

Figure B.18 Boundaries of recommended action areas in relation to 1866 Corps map

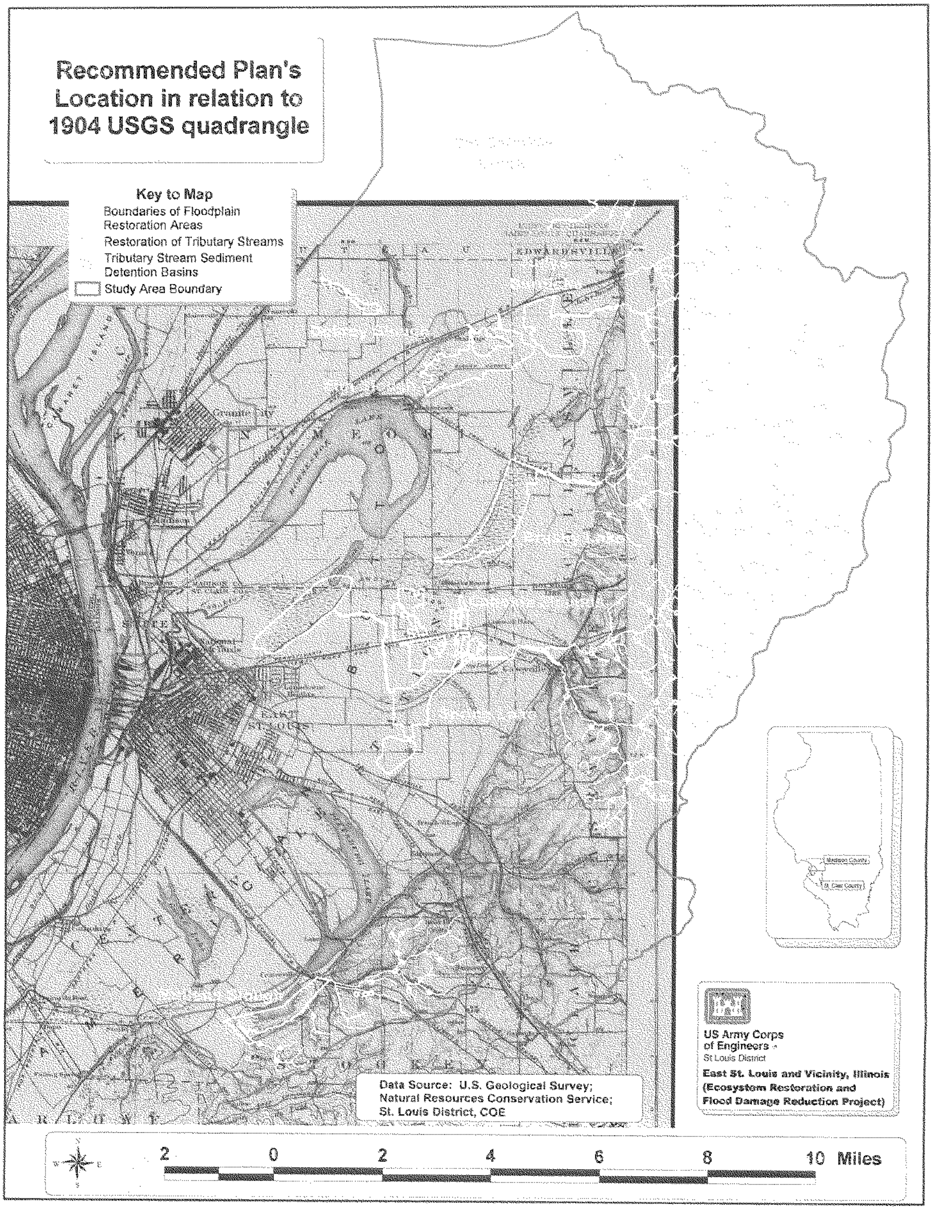

Figure B.19 Boundaries of recommended action areas in relation to 1904 USGS quadrangle map

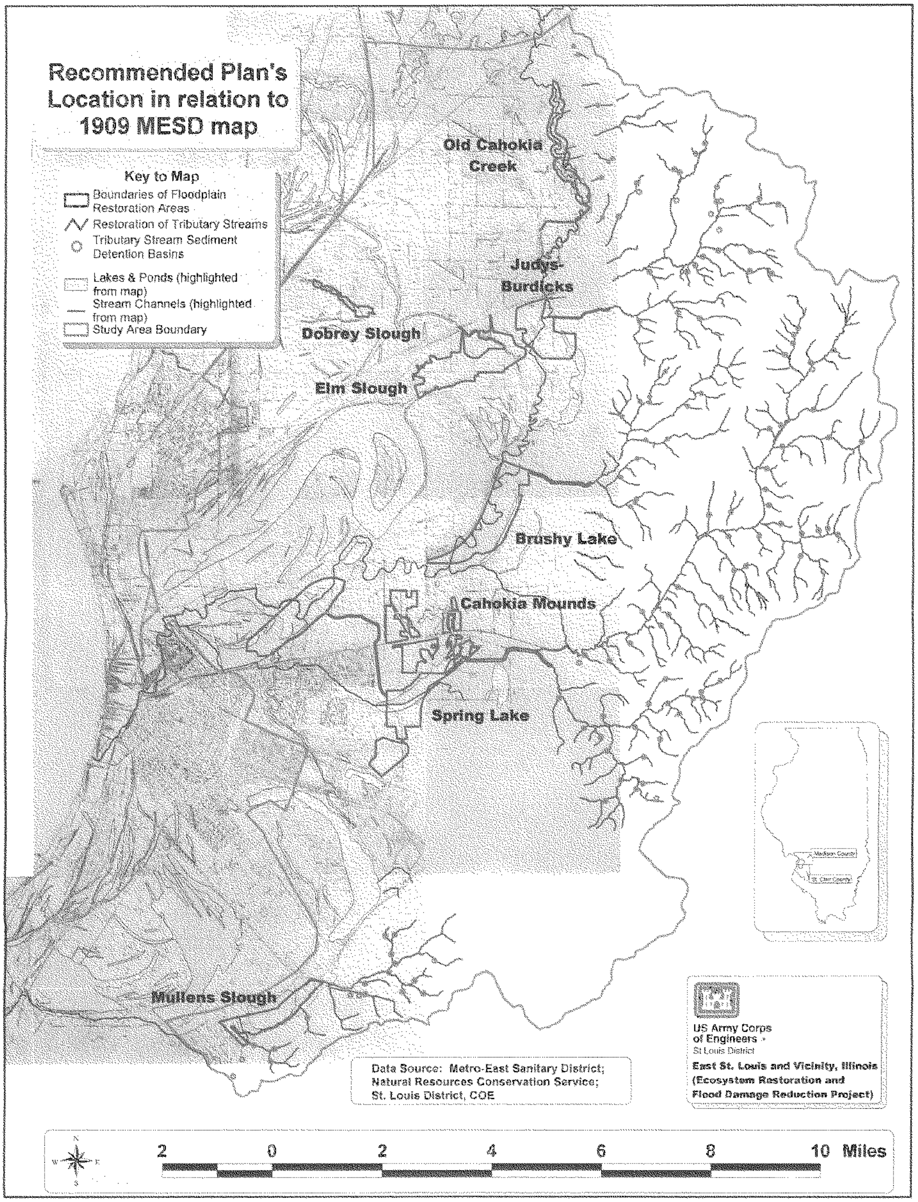

Figure B.20 Boundaries of recommended action areas in relation to 1909 MESD topographic map

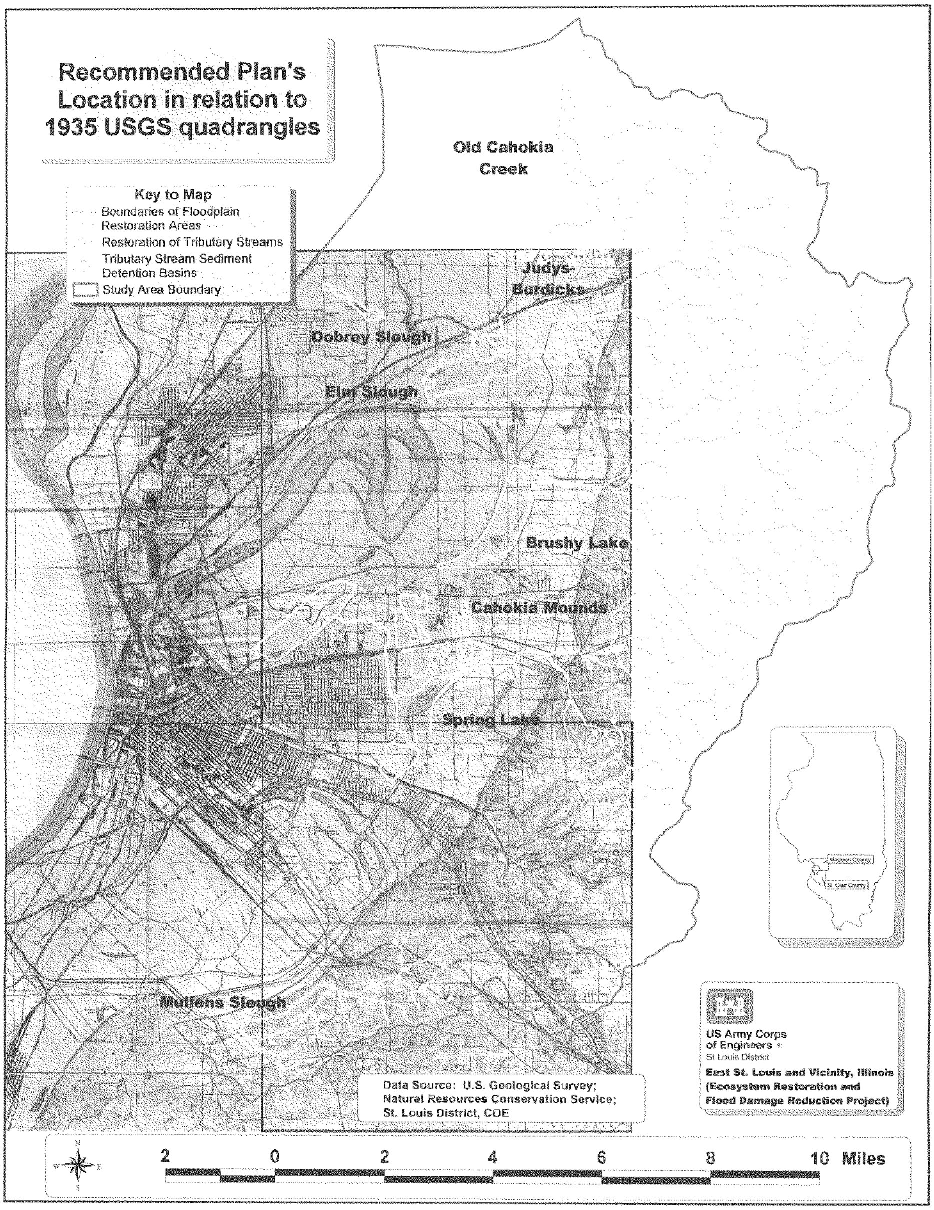

Figure B.21 Boundaries of recommended action areas in relation to 1935 USGS quadrangle map

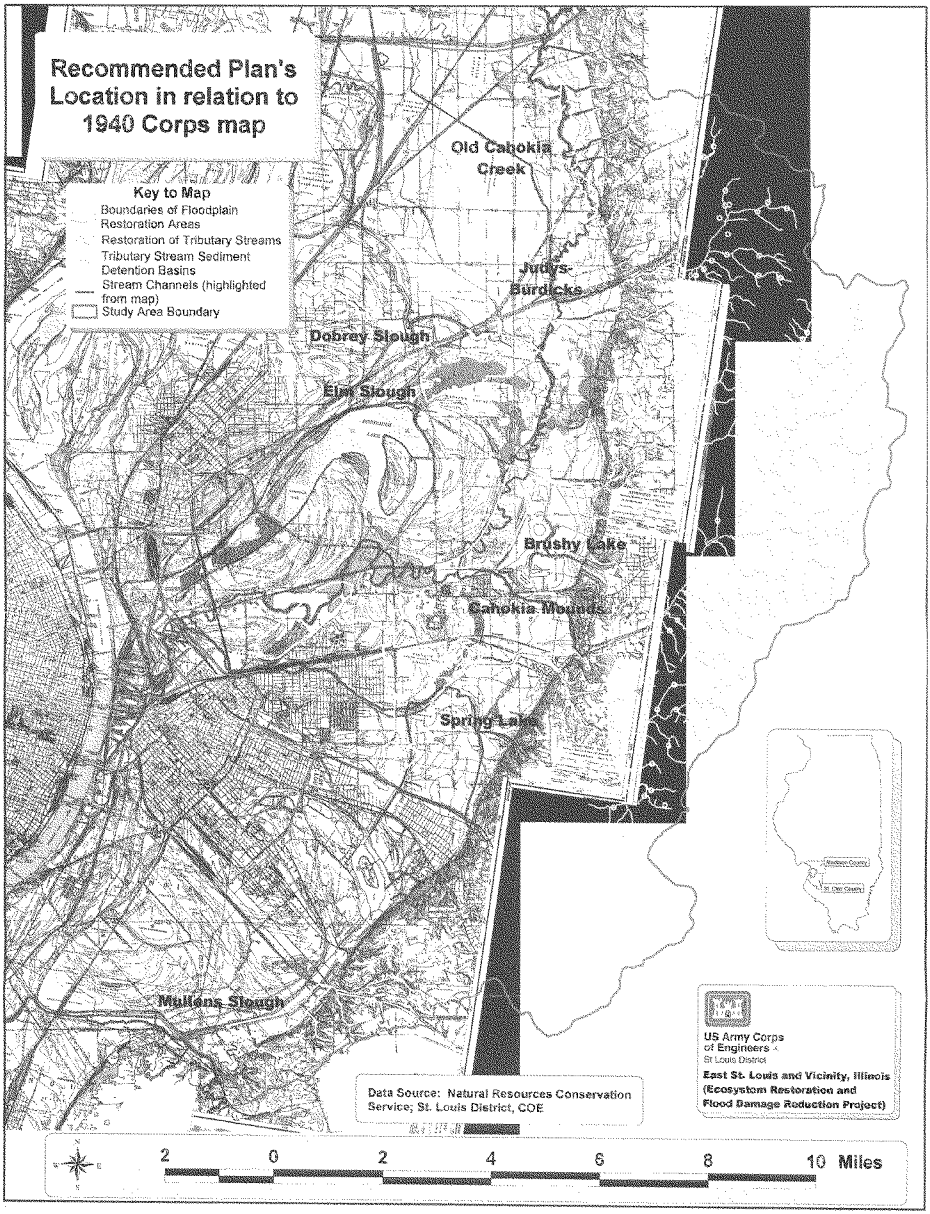

Figure B.22 Boundaries of recommended action areas in relation to 1940 Corps topographic map

B.23 Section 404(b)(1) Guidelines.

SECTION 404(b)(1) EVALUATION

EAST ST. LOUIS AND VICINITY, ILLINOIS (ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT) GENERAL REEVALUATION REPORT

PREFACE The Recommended Plan is likely to involve the placement of dredged and fill materials into waters of the United States. Discharges of dredged and fill material into such waters are regulated under Section 404 of the Clean Water Act. Under Section 404(b) of the Act, proposed discharges of dredged or fill material must conform to guidelines developed by the U. S. Environmental Protection Agency. On 5 September 1975, the Environmental Protection Agency published regulations (40 CFR 230) that outline criteria and procedures for evaluating activities subject to Section 404. On 24 December 1980, revised Section 404(b)(1) guidelines were published, and became effective 30 March 1981. It is mandatory that the guidelines be applied to all proposed discharges of dredged or fill material subject to approval under Section 404.

This document addresses, at a general level, the potential environmental effects of the wetland and aquatic ecosystem alterations expected from the construction of the structural components of the recommended plan. Subsequent site-specific Section 404(b)(1) Evaluations will be done for individual project components, or groups thereof, in sufficient detail for final decision making and for full compliance with the Section 404(b)(1) Guidelines and National Environmental Policy Act requirements.

PROJECT DESCRIPTION

A. Location. The East St. Louis and Vicinity, Illinois Study area encompasses approximately 106,600 acres (166 square miles) in southwestern Illinois in Madison and St. Clair Counties. It lies within the Metro East St. Louis area along the east bank of the Mississippi River. The study area includes two physiographic regions or types of landforms. About 55,100 acres are bottomland on the Mississippi River floodplain (locally called the American Bottom), and tributary watersheds that drain into these bottoms comprise the remaining 51,000 acres of the study area.

B. Background. The East St. Louis and Vicinity, Illinois Flood Protection Project was specifically authorized (and modified) through Congressional actions in 1965 under Section 204 of the Flood Control Act of 1965, (Public Law 89-298) and subsequently under the Water Resources Development Act of 1976 (Public Law 94-587). Section 137 of the Water Resources Development Act of 1976 subsequently modified the Flood Control Act of 1965 by authorizing construction of the Blue Waters Ditch segment independently of the other authorized segments.

A reevaluation of the recommendations contained in the 1965 Report under current conditions was completed for the Blue Waters Ditch in 1976. The results showed that the Blue Waters Ditch portion of the authorized project was still economically justified with a benefit to cost ratio of 1.35 to 1. Blue Waters Ditch was completed in 1989 and includes 4.4 miles of new/improved drainage channels and a 600 c.f.s. pump station which eliminates flooding from an estimated 700 acres of approximately 136,000 acres of the original project area.

A reevaluation of the recommendations contained in the 1965 Report under current conditions was completed for the Cahokia Canal and Harding Ditch Areas in 1984. This evaluation found the recommendations contained in the authorized project to not be economically justified under the existing interest rate at that time of 8 1/8 percent.

Major flooding in the study area resulted in four disaster declarations during the period 1993 to 1996. As a result, the 104th Congress, 2d Session directed via House Report 104-782, Appropriations for Energy and Water Development for the Fiscal Year Ending September 30, 1997, that a reevaluation of the authorized project be conducted.

C. Authority and Purpose. The Water Resources Development Act of 1996 (WRDA) 1996 provided funding to initiate the General Re-evaluation Report for the East St. Louis and Vicinity, Illinois project. The current study was authorized as part of the Water Resource Development Act of December 2000 (Public Law 106-541). Section 304 of this Public Law contains the following wording: "The project for flood protection, East Saint Louis and vicinity, Illinois (East Side levee and sanitary district), authorized by section 204 of the Flood Control Act of 1965 (79 Stat. 1082), is modified to include ecosystem restoration as a project purpose."

The purpose of the reevaluation study is to re-examine the East St. Louis and Vicinity, Illinois Project under current conditions, existing authorities, and Administration priorities with a view towards looking for new solutions to old problems. The principal goal is to identify potential improvements to the natural system for ecosystem restoration that would restore the historic flood pulse to the floodplain in a manner that could also provide needed flood damage reduction.

D. Recommended Plan. The Recommended Plan consists of alternatives selccted from each of the 8 independent project action areas. These project action areas are, in general order from north to south: Old Cahokia Creek, Judy's and Burdicks Branches, Dobrey Slough, Elm Slough, Brushy Lake, Cahokia Mounds, Spring Lake, and Mullens Slough. In general, the Recommended Plan consists of the following measures: the restoration of bottomland forest habitat (1,705 acres), prairie habitat (1,111 acres), marsh and shrub swamp habitat (843 acres), lake habitat (460 acres), upland forest (379 acres), floodplain stream restoration (10.4 miles or 161 acres), placement of wood duck boxes (651 boxes) and prairie bird perches (870 perches), creation of over wintering holes and shoreline plantings (20 acres), and construction of tributary stream detention basins (131), riffle and pool complexes in 178 miles of streams in tributary watersheds, earthen embankments (15.5 miles), and hydraulic control devices (culverts, flap gates, and new channels).

Currently a total of 4,916 acres are included in the Project footprint, of which 4,468 acres are in the Mississippi River's floodplain and 448 acres are along streams in the tributary watersheds.

The 178 miles of tributary stream restoration are not reflected in this Project area footprint. Specific sites at which stream restoration measures would be implemented, other than the tributary sediment detention basins, have yet to be determined.

1. Construction Features. Each of the 8 project action areas has their own individual combination of construction features (measures). Of these measures, several are common to each project action area throughout the Recommended Plan. These common measures consist of tributary stream sediment detention basins, channel improvements (from bluff tributaries to habitat areas), earthen embankments (to direct and contain the desired hydraulic flow/pulse and provide definition/protection to the habitat areas), and the connection and control of hydraulic components by means of elevation changes, culverts, flap gates and new channels.

(a) Channel Improvements. The existing channels that are to be improved have inadequate cross-sectional areas to pass high flows. At times, the high flows with their high velocities produce enough force to break through the non-engineered windrows of excavated channel materials placed there over the years without moisture control and compaction during placement. New channel improvements have been designed to provide adequate drainage ways with minimal adverse impact on the environment. There are three types of channel improvements.

(1) Grass-lined Trapezoidal Channel Improvements. The grass-lined channel slopes will be graded to 1 vertical on 3 horizontal with channel bottom widths ranging between 10 feet and 110 feet.

(2) Concrete-paved Trapezoidal Channel Improvements. There are some channels that require their slopes and channel bottoms to be protected and paved with concrete due to the high velocity flows that will otherwise erode grass-lined earthen slopes. The channel slopes will be graded to 1 vertical on 3 horizontal with channel bottom widths ranging between 10 feet and 75 feet.

(3) Concrete Rectangular Channel Improvements. The channel improvements located under some bridges require concrete channels to avoid bridge replacements. Trapezoidal channels will be transitioned into concrete rectangular channel sections. The rectangular channel sections will be designed as "U"-frame monoliths to optimize the concrete reinforcement and reduce concrete quantities. The rectangular channel bottoms range between 10-foot and 55-foot widths.

(b) Tributary Stream Sediment Detention Basins. Tributary stream sediment detention basins, so-called because they are intended to be constructed to hold back upland runoff flows and to release the flows at a substantially lower rate than would have occurred without the detention basin. Most of the sediments carried into the sediment detention basins by the upland runoff will be allowed to settle out of the ponded water. These structures are to be constructed in the stream valleys within the tributary watersheds. Roller-compacted concrete was selected in the design to minimize the detention dam structures' footprints on the environment.

Roller-compacted concrete detention dams are to be constructed across the stream valleys. The detention dams will have an upstream arched alignment to improve overall stability for sliding and overturning and better control the overtopping events that will occur during the life of the structure.

(c) Earthen Embankments. The earthen embankments will be constructed of clay materials from the channel and detention basin excavations. The embankment will have a 10-foot crown width with 1 vertical on 3 horizontal side slopes. These embankments are designed to retain water and support vehicle and maintenance equipment. The excavated clay materials will be placed with moisture control and compacted. A well-rooted turf will be established on the side slopes.

(d) New Channels. The new grass-lined channel slopes will be graded to 1 vertical on 3 horizontal with channel bottom widths ranging between 10 feet and 110 feet. The excavated channel materials will be hauled off site and stockpiled for future use by state and county government for fill materials. Well-rooted turf will be established to prevent scour and erosion on the side slopes.

(e) Stream Bank and Bottom Stability Control. In the tributary stream channel bottoms, grade controls and channel toe protection are key components to stabilizing the streams. Placement of low height stone protection across the stream will create riffle pools, which provide good aquatic species habitat and also serve as a plunge pool and channel grade control. The riffle pools will be constructed as a series, in increments, dependent upon channel slope and flow velocities. Channel slope toe protection will be required where the soils are susceptible to erosion and scour. Stone armoring has been successful over the long term. Short term solutions are hardwood logs placed along the channel toe and backfilled with compacted erosion resistant clay.

(f) Culverts and Flap Gates. Culverts will be used to convey water through embankments for roadways, railroads, and water retention structures. There will be two basic types considered: concrete box culverts; and, reinforced concrete pipe. Their use will depend upon maintenance requirements as well as highway and railroad loading values at each location. All culvert joints will be wrapped in geotextile to keep fine soils from migrating through the joints.

2. Vegetative Plantings. Plantings of vegetation will be implemented at all action areas. Three kinds of vegetation will be planted – prairie seeds, seedling trees, and marsh seeds and/or plugs.

(a) Prairie Planting. Prairie will be established in cropland areas as well as grassy fields and old fields. Some sites will be in areas that will receive flooding from storm water. Plant species to be used will consist of grasses (about a half dozen), forbs (about 40 to 50), and a few sedges and shrubs.

(b) Tree Planting. All tree species to be used will consist of species native to Illinois. Local ecotypes will also be used. Additionally, source plant materials to be planted in wetland areas will come from wetland genetic stocks. Many planting sites will be in areas that will receive flooding from storm water.

(c) Marsh Planting. Marsh will be established in areas receiving flooding from storm water. Plant species to be used will consist of a few shrubs, a number of grasses, numerous sedges, and many forbs, for a total of about 45 to 50 species.

E. General Description of Dredged or Fill Material. Some of the project components are expected to involve the discharge of dredged or fill material into wetlands or other aquatic resources subject to Section 404 of the Clean Water Act. However, specific information is unknown at this time. The (1) **characteristics**, (2) **quantities**, and (3) **sources** of dredged or fill material will be determined during planning and design activities for each component of the Recommended Plan. Accordingly, this information will be addressed in specific detail in subsequent Section 404(b)(1) Evaluations.

However, a general description of types of fill materials and their sources can be made at this planning stage. Concrete will be a component of several construction features. Stone will be used at others, and wooden logs may be used instead of stone at some sites. Earthen materials are likely to be employed also. Concrete and stone will come from off-site commercial sources. Earthen materials will likely be obtained on-site from project areas.

F. Description of the Proposed Discharge Sites. The **(1) locations** of proposed discharge sites can be described in general terms at this planning stage. These locations are presented by action area.

Old Cahokia Creek. Discharge sites are not likely to be required in association with restoration of the 3.4-mile historic creek channel (removing accumulated sediments from existing remnants, recreating channel in existing cropland), except for sites associated with one or two new channel crossings for farm equipment access. The earthen berm paralleling the west side of the restoration corridor may cross small ditches at a few locations. The need for sites associated with widening of the existing ditch on the south side of I-270 is unknown. Ten tributary stream sediment detention basins, as well as measures for streambank stabilization and bottom stability control, would be built in stream channels of the Bluff 1 watershed.

Judy's and Burdick Branches. The earthen embankment encircling the floodplain habitat area would cross Cahokia Canal at two locations (north and south ends). The new berm along the south side of Burdicks Branch most likely would not require any discharge sites. Twenty-eight tributary stream sediment detention basins would be built in stream channels of Bluff 1, Judy's and Burdick Branch watersheds. In addition, measures for streambank stabilization and bottom stability control would also be implemented in these tributary streams. Rocks and/or wooden logs probably would be placed at various sites in the channel of the floodplain creek restoration.

Dobrey Slough. Discharge sites probably would be limited to the perimeter of the existing man-made "pond" (to create a narrow band of shallow emergent wetland), and the slough on the west side of the railroad tracks (to install a culvert to create a connection with the east side).

Elm Slough. Likely discharge sites include various locations in existing ditches that drain agricultural lands east of the slough (earthen "plugs" to create sheetflow), Long Lake and Mitchell Ditch where they go under Il. Route 162 and adjacent railroad tracks (to replace existing culverts with larger structures), and the perimeter of Elm Slough at a number of locations (to build an earthen berm in low-lying areas to contain storm waters within the habitat area).

Brushy Lake. Likely discharge sites within the floodplain habitat area include several locations in agricultural ditches adjacent to the Levee Lake INAI site (to place earthen "plugs" and raise water levels in adjacent wetlands to previous levels). A discharge site probably would be required at the junction of the floodplain creek restoration and Cahokia Canal; none is likely to be required in association with restoration of the historic creek channel (removing accumulated sediments from existing remnants, recreating channel in existing cropland). The need for required sites associated with the widening of Schoolhouse Branch from Il. Route 157 to the west side of I-255 is unknown (new grassy-bottom channel). Fifteen tributary stream sediment detention basins would be built in stream channels of Schoolhouse and Bluff 3 watersheds, and measures for streambank stabilization and bottom stability control would also be implemented in these tributary streams. Rocks and/or wooden logs probably would be placed at various sites in the channel of the floodplain creek restoration.

Cahokia Mounds. No discharge sites are likely to be required.

Spring Lake. Widening of Harding Ditch from Il. Route 157 to Cell 1 with a new earthen-bottom channel may involve placement of fill materials, depending on the construction method. A discharge site probably would be required at both ends of the new bypass channel linking Canteen Creek and Harding Ditch. In Cell 1, the existing water-filled borrow pit at the sand plant would be used as a discharge site for excavated earthen materials taken from this action area. In St. Clair Farms, a discharge site probably would be required at one or more locations where Harding Ditch is connected with the adjacent habitat area. A discharge site probably would be required at both ends of the new Fairmont City Ditch linking Cell 1 and Indian Lake. At Indian Lake, no discharge site is likely to be required in association with restoration of the historic creek channel (removing accumulated sediments from existing remnants, creating a new channel where none exists), but one would be required to establish a connection between the new creek channel and Lansdowne Ditch. Fifty-eight tributary stream sediment detention basins would be built in stream channels of Canteen and Little Canteen Creek watersheds. In addition, measures for streambank stabilization and bottom stability control would also be implemented in these tributary streams.

Rocks and/or wooden logs probably would be placed at various sites in the channel of the floodplain creek restoration. A discharge site would be required to partially drain a 35-acre area of drowned timber at Cahokia Mounds State Historic Site (install a water control structure in a beaver dam).

Mullens Slough. A discharge site would be required to build a weir in Powdermill Creek to direct storm water from large rain events into floodplain habitat area (lake). Discharge sites would be required at the location of about five islands to be created with excavated material obtained from Mullens Slough (to create deep areas for overwintering fish). Another site would be required at the south end of the action area to connect the lake with Canal No. 1. Twenty tributary stream sediment detention basins would be built in stream channels of Powdermill Creek and Bluff 6 watersheds, and measures for streambank stabilization and bottom stability control would also be implemented in these tributary streams.

The (2) **size** or area of discharge sites is unknown at this planning stage, except for such details that are already provided in the discussion on sites. However, given the ecosystem restoration goals of the Recommended Plan, the area likely to be affected will be quite small compared to the overall footprint of all action areas, collectively. The (3) **types of sites** are expected to include aquatic and wetland areas. The (4) **types of habitats** that would be affected are likely to include man-made floodplain channels, natural tributary stream channels, man-made borrow pit lakes, natural lakes, and natural wetlands. Wetland sites are likely to include forested wetlands, shrub swamps, and marshes. The (5) **timing and duration of the discharges** for many of the components are also unknown at this time. However, at Mullens Slough, the islands created from earthen material excavated from the lake would be developed after the lake has been temporarily drained. The pertinent information will be determined during planning and design activities for each component of the Recommended Plan. Accordingly, this information will be addressed in subsequent Section 404(b)(1) Evaluations.

G. Description of Disposal Method. Specific information is unknown at this time. The disposal method(s) for dredged or fill material will be determined during planning and design activities for each component of the Recommended Plan. Accordingly, this information will be addressed in subsequent Section 404(b)(1) Evaluations.

FACTUAL DETERMINATION

A. Physical Substrate Determination. Specific information is unknown at this time, but a general description of substrates is possible. The (1) **substrate elevation and slope** vary by action area, and whether sites are located in the Mississippi River floodplain or adjacent uplands. Most floodplain sites range in elevation from about 425 to 405 feet NGVD, and are relatively flat. In the uplands, sites in stream channels probably vary in elevation from 500 to 430 feet NGVD, and are relatively steep compared to floodplain sites. Affected (2) **sediment types** are likely to include natural sands, silts, and clays in the floodplain and uplands, as well as cobble-like material in the uplands. At all sites, (3) **dredge/fill material movement** would be undesirable, and materials would be designed to withstand natural forces, especially at sites located in tributary streams. The likely (4) **physical effects on benthos** at the disposal sites for dredged or fill material is expected to be smothering, but specific effects will be determined during planning and design activities for each component of the comprehensive plan. Accordingly, this information will be addressed in subsequent Section 404(b)(1) Evaluations.

B. Water Circulation, Fluctuation and Salinity Determination. Specific information is unknown at this time. Generally, (1) **water column effects** are not likely to be of a concern. Anticipated changes on (2) **current patterns and circulation** would be significant in tributary streams at sites where detention dams are constructed. At these sites, storm water would be temporarily pooled to drop out sediments, but low flows would pass through each structure. At the four sites where historic remnants of Cahokia Creek would be restored, flowing conditions would be reestablished where no water movement now occurs. With regard to (3) **normal water level fluctuations and salinity gradients**, water levels would fluctuate with local storm events, and the range of fluctuating levels with the project would greatly exceed that of current conditions. Details concerning these effects would be determined during planning and design activities for each component of the recommended plan. Accordingly, this information would be addressed in subsequent Section 404(b)(1) Evaluations.

C. Suspended Particulate/Turbidity Determinations.

1. Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. Although site-specific information is unknown at this time, temporary increases in suspended particulates and turbidity levels would be expected during the construction of some of the components. All appropriate measures to reduce and contain turbidity would be employed so State water quality standards would not be violated.

2. Effects on the Chemical and Physical Properties of the Water Column. Specific information is unknown at this time. Effects on (1) **light penetration** (2) **dissolved oxygen**, (3) toxic metals, organics, and pathogens and (4) **aesthetics** of the water column would be determined during planning and design activities for each component of the comprehensive plan. Accordingly, this information would be addressed in subsequent Section 404(b)(1) Evaluations.

3. Effects on Biota. Effects on (1) **primary productivity and photosynthesis**, (2) **suspension/filter feeders**, and (3) **sight feeders** would be determined during planning and design activities for each component of the comprehensive plan. Accordingly, this information would be addressed in subsequent Section 404(b)(1) Evaluations.

D. Contaminant Determinations. The presence of contaminants within the proposed action areas is not indicated at this time. If the project were approved, a phase 1 assessment for contaminants would be completed, and any identified contaminated areas would be avoided. Accordingly, this information would be addressed in subsequent Section 404(b)(1) Evaluations.

E. Aquatic Ecosystem and Organism Determinations. Specific information is unknown at this time. Overall effects on (1) **plankton,** (2) **benthos,** (3) **nekton,** and (4) the **aquatic food web** are expected to be beneficial. Benthos, or small bottom-dwelling organisms, are expected to benefit from reduced levels of sedimentation that currently can smother substrates. Nekton, or larger free-swimming organisms such as fishes, are also expected to benefit because of reduced levels of sediment, and restored streams and lakes. In terms of effects on (5) **special aquatic sites**, no sanctuaries or refuges would be affected. With regard to wetlands, the plan would create about 1,340 acres of new wetlands on the Mississippi River floodplain, thereby increasing the area of wetlands in all action areas from about 1,320 existing acres to about 2,650 proposed acres. An estimated 11 acres would be filled to convert existing wetlands into grassy features, such as earthen berms. Another 64 acres of wetlands would be excavated to convert existing habitats from one type into another, such as forest into new marsh, or marsh into restored stream channel. There would be no requirement to mitigate for the loss of these wetlands because the amount of wetlands to be created greatly exceeds to amount of wetlands to be lost.

Mudflats and coral reefs do not occur in the study area. Vegetated shallows located along the borders of lakes typically have sparse emergent vegetation, but the recommended plan would increase the density of plants in these areas. Rifle and pool complexes occur in the tributary streams, and the plan would enhance the quality of these areas by stabilizing stream banks and eroding channel bottoms. With regard to federally (6) **threatened and endangered species**, it is the St. Louis District's opinion that the recommended plan would not adversely impact any of the federally threatened or endangered species, or species of concern, that may occur in the study area, provided that 1) tree felling is restricted to the time of the year (October 1 through March 31) when Indiana bat maternity colonies are not present, and 2) any potential overlap of proposed features with existing decurrent false aster populations, or USDOT decurrent false aster mitigation areas, is avoided. In addition, (7) **other wildlife** would benefit from the recommended plan because forests, prairies, marshes and scrub-shrub wetlands, lakes and ponds, and streams would all increase in area.

Details concerning these effects would be determined during planning and design activities for each component of the recommended plan. Accordingly, this information would be addressed in subsequent Section 404(b)(1) Evaluations.

F. Proposed Disposal Site Determinations.

1. Mixing Zone Determination. Specific information is unknown at this time. The mixing zone would be determined during planning and design activities for each component of the comprehensive plan. Accordingly, this information would be addressed in subsequent Section 404(b)(1) Evaluations.

2. Determination of Compliance with Applicable Water Quality Standards. Although specific information is unknown at this time, the construction and operation of the project components would comply with State water quality standards.

3. Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supplies. The recommended plan would not affect any municipal or private water supplies.

(b) Recreational and Commercial Fisheries. The project would benefit recreational fisheries. Commercial fisheries are limited to salvage operations at Horseshoe Lake, which would not be directly affected by the plan.

(c) Water Related Recreation. Water related recreation would not be adversely affected by the plan.

(d) Aesthetics. Although specific information is unknown at this time, it is expected that the components would be in keeping with general characteristics of the area.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. The project would not affect any such areas.

G. Determination of Cumulative Effects on the Aquatic Ecosystem. The restoration of hydrology to a series of "islands" of natural habitats in the American Bottom and the increase in spatial extent of protected wetland acreage in the study area would produce extensive cumulative beneficial effects. These beneficial effects substantially outweigh the cumulative adverse effects produced by alterations to the aquatic ecosystem necessary to construct the project components.

FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practicable alternatives exist which meet the study objectives that do not involve discharge of fill into waters of the United States.

c. The discharges of fill materials would not cause or contribute to, after consideration of disposal site dilution and dispersion, violations of any applicable State water quality standards. The discharge operations would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. The placement of fill materials in the project area would not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended.

e. The placement of fill materials would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values would not occur.

f. Subsequent application of the Section 404(b) (1) Guidelines during planning and design activities for each component of the recommended plan would ensure that the proposed disposal sites for the discharge of dredged material would comply with the requirements of these Guidelines.

Table B.24 List of vascular plants (trees, shrubs, vines, grasses, sedges, forbs, ferns) known or likely to occur in the study area,with species ranked by coefficient of wetness, and associated with applicable natural communities (1):

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Trees																	
Tree-of-heaven (I)	*Ailanthus altissima (I)*									x						x	5
False shagbark hickory	*Carya ovalis*	x															5
Black hickory	*Carya texana*		x								x						5
Mockernut hickory	*Carya tomentosa*	X	x	x													5
Blue ash	*Fraxinus quadrangulata*	x	x	x	x												5
Kentucky coffeetree	*Gymnocladus dioicus*				x												5
Iowa crab apple	*Malus ioensis*	x	x					x	x	x							5
Black gum	*Nyssa sylvatica*			x	x												5
American plum	*Prunus americana*	x															5
Blackjack oak	*Quercus marilandica*	x	x							x	X						5
Black oak	*Quercus velutina*	X	X	X					x		X						5
Siberian elm (I)	*Ulmus pumila (I)*									x						x	5
Flowering dogwood	*Cornus florida*	x	x														4
Hop hornbeam	*Ostrya virginiana*	x	x	x	x												4
Chinkapin oak	*Quercus muhlenbergii*	x	X	x						x							4
Post oak	*Quercus stellata*	X	X	x						x	X						4
Black locust	*Robinia pseudoacacia*															x	4
Sugar maple	*Acer saccharum*		x	X	x												3

Table B.24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland		Floodplain				Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Trees																	
Juneberry	*Amelanchier arborea*	x	x							x							3
Pignut hickory	*Carya glabra*	X	x	x							x						3
Shagbark hickory	*Carya ovata*	X	X	X							x						3
Common catalpa (I)	*Catalpa bignonioides (I)*															x	3
Cigar tree	*Catalpa speciosa*					x				x							3
Eastern redbud	*Cercis canadensis*	x	x	x	x	x											3
White ash	*Fraxinus americana*	X	X	X						x							3
Black walnut	*Juglans nigra*	x	x	x	X					x							3
Eastern red cedar	*Juniperus virginiana*		x						x	X							3
Hedge apple (I)	*Maclura pomifera (I)*	x	x		x					x						x	3
Wild sweet crab apple	*Malus coronaria*	x									x						3
Wild black cherry	*Prunus serotina*	x	x	x	X	x			x							x	3
White oak	*Quercus alba*	X	X	X	X						X						3
Northern red oak	*Quercus rubra*	X	X	X	X												3
Sassafras	*Sassafras albidum*	x	x	x	x				x	x							3
American linden	*Tilia americana*	x	x	X	x	x											3
Winged elm	*Ulmus alata*									x							3
Hackberry	*Celtis occidentalis*	x	x	X	x	X	x		x								1
Red mulberry	*Morus rubra*		x	x	x	x											1

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Trees																	
Jack oak	*Quercus imbricaria*	x		x	x	x				x	x						1
Burr oak	*Quercus macrocarpa*			x	x	X					X						1
Red maple	*Acer rubrum*					x							x				0
Pawpaw	*Asimina triloba*			X	x	x											0
Bitternut hickory	*Carya cordiformis*	x	x	x	x												0
Cock-spur thorn	*Crataegus crus-galli*	x				x											0
Persimmon	*Diospyros virginiana*		x		x	x				x							0
Honey locust	*Gleditsia triacanthos*		x		x	X	x			x							0
White mulberry (I)	*Morus alba (I)*	x	x	x	x				x							x	0
Slippery elm	*Ulmus rubra*	x	X	X	x	x			x	x		x					0
Ohio buckeye	*Aesculus glabra*		x	x	x	x											-1
Eastern cottonwood	*Populus deltoides*				x		X		x			x	x				-1
Boxelder	*Acer negundo*				x	X	X										-2
Red haw	*Crataegus mollis*				x	x											-2
American elm	*Ulmus americana*	x	x	X	x	X	X			x							-2
Silver maple	*Acer saccharinum*					x	x									x	-3
River birch	*Betula nigra*				X	x	x						x	x			-3
Pecan	*Carya illinoensis*				x	x	X										-3
Big shellbark	*Carya laciniosa*			x		X	x										-3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Trees																	
Sugarberry	*Celtis laevigata*		x			x	X										-3
Green thorn	*Crataegus viridis*						x										-3
Green ash	*Fraxinus pennsylvanica*		x	x	X	X	X					x	x	x			-3
Sweet gum	*Liquidambar styraciflua*	x	x	x	x	x											-3
Sycamore	*Platanus occidentalis*			x	x	x	x			x							-3
Pin oak	*Quercus palustris*	x			X	X			x		x	x					-3
Peach-leaved willow	*Salix amygdaloides*				x	x	x					x					-3
Swamp white oak	*Quercus bicolor*			x													-4
Swamp privet	*Forestiera acuminata*					x	x						x				-5
Carolina willow	*Salix caroliniana*											x					-5
Black willow	*Salix nigra*				x	x	X		x			x	X	X			-5
Shrubs																	
Lead plant	*Amorpha canescens*							x	x	x	x						5
New jersey tea	*Ceanothus americanus*	x						x	x	x	x						5
Dwarf hackberry	*Celtis tenuifolia*	x	x							x							5
Amur honeysuckle (I)	*Lonicera maackii (I)*	x	x	x	x			x								x	5
Prickly-pear	*Opuntia humifusa*								x	x	x						5
Chickasaw plum	*Prunus angustifolia*									x						x	5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Shrubs																	
Lead plant	*Amorpha canescens*							x	x	x	x						5
New jersey tea	*Ceanothus americanus*	x						x	x	x	x						5
Dwarf hackberry	*Celtis tenuifolia*	x	x							x							5
Amur honeysuckle (I)	*Lonicera maackii (I)*	x	x	x	x			x								x	5
Prickly-pear	*Opuntia humifusa*								x	x	x						5
Chickasaw plum	*Prunus angustifolia*									x						x	5
Aromatic sumac	*Rhus aromatica*	x							x	x							5
Dwarf sumac	*Rhus copallina*	x			x			x		x	x						5
Smooth sumac	*Rhus glabra*	x			x			x	x	x	x						5
Dogberry	*Ribes cynosbati*	x															5
Missouri gooseberry	*Ribes missouriense*	x		x	x								x				5
Illinois rose	*Rosa setigera*					x				x						x	5
Sunshine rose	*Rosa suffulta*							x	x							x	5
Japanese barberry (I)	*Berberis thunbergii (I)*	x			x											x	4
Wild hydrangea	*Hydrangea arborescens*		x	x		x											4
Pasture rose	*Rosa carolina*	x						x	x	x	x						4
Dewberry	*Rubus flagellaris*			x		x		x	x	x	x						4
Common elder	*Sambucus canadensis*				x	x	x		x			x	x	x		x	4

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Shrubs																	
Rusty nannyberry	*Viburnum rufidulum*		x							x							4
Witch-hazel	*Hamamelis virginiana*	x	x	x													3
Japanese fleece flower (I)	*Polygonum cuspidatum (I)*															x	3
Black raspberry	*Rubus occidentalis*	x	x													x	3
Prairie willow	*Salix humilis*							x	x	x	x						3
Buckbrush	*Symphoricarpos orbiculatus*	x	x	x	x	x				x							3
Black haw	*Viburnum prunifolium*	x		x	x	x											3
Wafer ash	*Ptelea trifoliata*				x					x							2
Southern dewberry	*Rubus trivialis*					x											2
Burning bush	*Euonymus atropurpurea*		x	x	x	x											1
Common chokecherry	*Prunus virginiana*	x		x													1
Carolina buckthorn	*Rhamnus caroliniana*		x	x						x							1
Rough-leaved dogwood	*Cornus drummondii*	x	x							X	x					x	0
American filbert	*Corylus americana*	x		x		x		x	x		X						0
Bladdernut	*Staphylea trifolia*		x	x	x	x											0
Lance-leaved buckthorn	*Rhamnus lanceolata*									x							-1
Gray dogwood	*Cornus racemosa*	x		x	x			x	x	x	x		x				-2
Feverbush	*Lindera benzoin*		x	x	x	x							x				-2

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Shrubs																	
Smooth arrowwood	*Viburnum recognitum*				x								x				-2
Swamp holly	*Ilex decidua*		x			x											-3
Swampy dewberry	*Rubus hispidus*	x		x					x			x	x				-3
False indigo bush	*Amorpha fruticosa*				x							x	X				-4
Heart-leaved willow	*Salix rigida*							x	x			x					-4
Meadow-sweet	*Spiraea alba*							x									-4
Buttonbush	*Cephalanthus occidentalis*				x								X	X			-5
Pale dogwood	*Cornus obliqua*							x	x			x	x				-5
Sandbar willow	*Salix exigua*				x		x	x	x			X	x	x	x		-5
Vines																	
Missouri gourd (I)	*Cucurbita foetidissima (I)*															x	5
Small pasion-flower	*Passiflora lutea*	x	x	x	x												5
Kudzu-vine (I)	*Pueraria lobata (I)*									x						x	5
Common carrion flower	*Smilax lasioneuron*	x		x				x	x								5
Bittersweet	*Celastrus scandens*		x					x		x							3
Leather flower	*Clematis pitcheri*		x		x											x	3
Japanese hops (I)	*Humulus japonicus (I)*					x										x	3
Common hops	*Humulus lupulus*				x											x	3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Vines																	
Japanese honeysuckle (I)	*Lonicera japonica (I)*	x	x	x						x						x	3
Large passion-flower	*Passiflora incarnata*															x	3
Poison ivy	*Toxicodendron radicans*	x	x	x	x	x	x		x			x					3
Summer grape	*Vitis aestivalis*		x		x					x							3
Wild yam	*Dioscorea villosa*	x	x														1
Virginia creeper	*Parthenocissus quinquefolia*	x	x	x	x					x						x	1
Hog peanut	*Amphicarpa bracteata*		x		x						x		x				0
Dutchman's pipe	*Aristolochia tomentosa*		x							x							0
Trumpet creeper	*Campsis radicans*				x	x				x						x	0
Virgin's bower	*Clematis virginiana*	x			x												0
Snailseed	*Cocculus carolinus*															x	0
Blue vine	*Cynanchum laeve*		x			x										x	0
Copse bindweed	*Polygonum cristatum*	x			x									x			0
Climbing buckwheat	*Polygonum scandens*				x	x			x			x				x	0
Bristly greenbrier	*Smilax hispida*	x	x	x	x					x							0
Cat briers	*Smilax rotundifolia*									x							0
Raccoon grape	*Ampelopsis cordata*					x				x							-1
Moonseed	*Menispermum canadense*	x	x	x	x												-1

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Vines																	
Bur cucumber	*Sicyos angulatus*				x	x	x										-2
Winter grape	*Vitis cinerea*					x											-2
Riverbank grape	*Vitis riparia*	x		x	X	x	x	x	x								-2
Frost grape	*Vitis vulpina*	x							x								-2
Groundnut	*Apios americana*				x	x			x				x				-3
Catbird grape	*Vitis palmata*		x							x							-5
Grasses																	
False red top (I)	*Tridens flavus (I)*							x	x	X						x	5
Plains three awn grass	*Aristida oligantha*									x						x	5
Arrowfeather	*Aristida purpurascens*								x								5
Slender three awn	*Aristida ramosissima*							x				x					5
Side-oats grama	*Bouteloua curtipendula*							x		X							5
Long-awned wood grass	*Brachyelytrum erectum*		x	x													5
Hairy brome (I)	*Bromus commutatus (I)*		x							x						x	5
Awnless brome grass (I)	*Bromus inermis (I)*							x	x	x	x					x	5
Bald brome (I)	*Bromus racemosus (I)*		x							x							5
Cheat (I)	*Bromus secalinus (I)*							x								x	5
Cheat grass brome (I)	*Bromus tectorum (I)*								x	x						x	5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland				Floodplain		Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Grasses																	
Mat sandbur	*Cenchrus longispinus*								x		x					x	5
Windmill grass (I)	*Chloris verticillata (I)*															x	5
False foxtail (I)	*Crypsis schoenoides (I)*															x	5
Curly grass	*Danthonia spicata*	x	x							x	x						5
Bottlebrush grass	*Elymus hystrix*	x	x	x	x						x						5
Purple love grass	*Eragrostis spectabilis*							x	x	x							5
Ice cream grass	*Eragrostis trichodes*								x								5
Crested hair grass	*Koeleria macrantha*							x	x	x	X						5
Fall witch grass	*Leptoloma cognatum*								x								5
Italian rye grass (I)	*Lolium multiflorum (I)*															x	5
Three-flowered melic grass	*Melica nitens*	x	x	x				x		x							5
Muhly	*Muhlenbergia sobolifera*	x															5
Bearded panic grass	*Panicum boscii*		x	x													5
Smooth lens grass	*Paspalum laeve*															x	5
Common foxtail (I)	*Setaria viridis (I)*									x						x	5
Drop seed	*Sporobolus asper*							x	x	x							5
Puffsheath dropseed	*Sporobolus neglectus*									x						x	5
Northern rush grass	*Sporobolus vaginiflorus*								x	x						x	5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Forest: Upland: d	Forest: Upland: dm	Forest: Upland: m	Forest: Floodplain: m	Forest: Floodplain: wm	Forest: Floodplain: w	Prairie: Prairie: wm	Prairie: Sand: m	Prairie: Hill: l	Sav: Savanna: dm	Wetl: Marsh: ma	Wetl: Swamp: ss	LP: Pond/Lake	Stream: Creek/River	Cultural: Cultural	Coefficient of Wetness (7)
Grasses																	
Needle grass	*Stipa spartea*							x	x	x	X						5
Purple sandgrass	*Triplasis purpurea*								x								5
Bearded wheat (I)	*Triticum aestivum (I)*															x	5
Corn (I)	*Zea mays (I)*															x	5
English bluegrass (I)	*Festuca pratensis (I)*							x	x	x						x	4
Little bluestem	*Schizachyrium scoparium*							X	X	X	X						4
Sand dropseed	*Sporobolus cryptandrus*								x		x					x	4
Northern drop seed	*Sporobolus heterolepis*							X	x								4
Couch grass (I)	*Agropyron repens (I)*							x								x	3
Poverty grass	*Aristida dichotoma*															x	3
Japanese brome (I)	*Bromus japonicus (I)*															x	3
Bahama grass (I)	*Cynodon dactylon (I)*															x	3
Orchard grass (I)	*Dactylis glomerata (I)*															x	3
Smooth crab grass (I)	*Digitaria ischaemum (I)*					x										x	3
Hairy crab grass (I)	*Digitaria sanguinalis (I)*															x	3
Goose grass (I)	*Eleusine indica (I)*															x	3
Hairy wild rye	*Elymus villosus*	x	x	x	x												3
Stink grass (I)	*Eragrostis cilianensis (I)*															x	3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Grasses																	
Crested rye grass (I)	*Lolium perenne (I)*															x	3
Broad leaved panic grass	*Panicum latifolium*					x											3
Prairie panic grass	*Panicum oligosanthes*							X	x	x	x						3
Birdseed grass (I)	*Phalaris canariensis (I)*															x	3
Timothy (I)	*Phleum pratense (I)*							x	x		x					x	3
Annual bluegrass	*Poa chapmaniana*															x	3
Egyptian millet (I)	*Sorghum halepense (I)*															x	3
Canada brome grass	*Bromus pubescens*	x	x								x						2
Nodding fescue	*Festuca obtusa*	x			x												2
Canadian bluegrass (I)	*Poa compressa (I)*							x	x	x						x	2
Giant foxtail (I)	*Setaria faberi (I)*							x	x							x	2
Indian grass	*Sorghastrum nutans*							X	x	X	x						2
Hair grass	*Agrostis hyemalis*							x			x					x	1
Autumn bent grass	*Agrostis perennans*	x	x														1
Big bluestem	*Andropogon gerardii*							X	x	x	x						1
Broom sedge	*Andropogon virginicus*															x	1
Canada wild rye	*Elymus canadensis*			x	x				x	x						x	1
Forked panic grass	*Panicum dichotomum*	x	x	x													1

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)																Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Grasses																	
Annual bluegrass (I)	*Poa annua (I)*		x													x	1
Kentucky bluegrass (I)	*Poa pratensis (I)*		x					x	x	x						x	1
Carolina love grass	*Eragrostis pectinacea*					x	x		x							x	0
Prairie cup grass (I)	*Eriochloa contracta (I)*															x	0
Little barley	*Hordeum pusillum*									x						x	0
Old witch grass	*Panicum capillare*									x						x	0
Woodland bluegrass	*Poa sylvestris*	x	x	x	x	x											0
Bristly foxtail (I)	*Setaria verticillata (I)*															x	0
Prairie wedge grass	*Sphenopholis obtusata*	x											x				0
Wedge grass	*Sphenopholis obtusata* var. *major*		x	x													0
Fox-tail barley (I)	*Hordeum jubatum (I)*															x	-1
Prairie switchgrass	*Panicum virgatum*				x			X	x	x	x					x	-1
Gama grass	*Tripsacum dactyloides*				x											x	-1
Lyme grass	*Elymus virginicus*	x		x	x	x	x		x	x						x	-2
Fall panicum	*Panicum dichotomiflorum*				x											x	-2
Six-weeks fescue	*Vulpia octoflora*	x						x								x	-2
Red top	*Agrostis alba*								x		x					x	-3
Annual foxtail	*Alopecurus carolinianus*											x				x	-3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Grasses																	
Giant cane	*Arundinaria gigantea*					x											-3
Sea oats	*Chasmanthium latifolium*		x	x	x	x											-3
Stoutwood reed	*Cinna arundinacea*	x	x	x	x												-3
Barnyard grass (I)	*Echinochloa crus-galli (I)*					x	x					x		x		x	-3
Lace grass	*Eragrostis capillaris*								x								-3
Sandbar love grass	*Eragrostis frankii*						x									x	-3
White grass	*Leersia virginica*	x		x	x	x						x					-3
Common satin grass	*Muhlenbergia frondosa*		x	x	x												-3
Leafy satin grass	*Muhlenbergia mexicana*	x										x					-3
Green muhly	*Muhlenbergia racemosa*									x							-3
Broad-leaved panic grass	*Panicum clandestinum*			x					x		x			x		x	-3
Munro grass	*Panicum rigidulum*								x		x	x		x			-3
Red sprangle top	*Leptochloa filiformis*											x				x	-4
Slender panic grass	*Panicum flexile*											x				x	-4
Reed canary grass (I)	*Phalaris arundinacea (I)*				x	x		x	x			X		x			-4
Common reed	*Phragmites australis*											x	x				-4
Prairie cord grass	*Spartina pectinata*				x			X	x			X					-4
Canada brome grass	*Bromus ciliatus*											x					-5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Grasses																	
Blue joint grass	*Calamagrostis canadensis*							X				x					-5
Barnyard grass	*Echinochloa muricata*				x	x	x	x	x			x		x		x	-5
Salt-marsh cockspur grass	*Echinochloa walteri*						x					x		x			-5
Creeping love grass	*Eragrostis hypnoides*				x	x	x		x			x		x			-5
Floating manna grass	*Glyceria septentrionalis*											x		x			-5
Fowl manna grass	*Glyceria striata*				x	x			x			x	x	x			-5
Rice cutgrass	*Leersia oryzoides*					x	x					x	x	X			-5
Bearded sprangle top	*Leptochloa fascicularis*					x						x		x		x	-5
Bead grass (SE)	***Paspalum dissectum (SE)***					x	x							x			**-5**
Giant wild rice	*Zizania aquatica*											x		x			-5
Sedges																	
Sedge	*Carex albursina*	x	x	x													5
Sedge	*Carex artitecta*		x							x	x						5
Sedge	*Carex gracilescens*	x	x	x													5
Heavy sedge	*Carex gravida*							x									5
Sedge	*Carex grisea*		x	x	x											x	5
Grass sedge	*Carex jamesii*		x	x													5
Sand bracted sedge	*Carex muhlenbergii*								x	x							5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Sedges																	
Pennsylvania sedge	*Carex pensylvanica*	x	x								X						5
Curly-styled wood sedge	*Carex rosea*	x	x	x		x											5
Sedge	*Carex umbellata*									x							5
Sedge	*Carex hirsutella*	x	x								x					x	4
Mead sedge	*Carex meadii*							x		x							4
Slender sand sedge	*Cyperus filiculmis*							x	x	x						x	4
Short-headed bracted sedge	*Carex cephalophora*		x														3
Schweinitz flatsedge	*Cyperus schweinitzii*								x								2
Bicknell sedge	*Carex bicknellii*							x	x								1
Woodland sedge	*Carex blanda*	x	x	x	x					x						x	0
Fescue sedge	*Carex brevior*								x	x		x					0
Sedge	*Carex festucacea*											x					0
Sedge	*Carex molesta*								x							x	0
Hedgehog club rush	*Cyperus ovularis*								x	x						x	0
Davis sedge	*Carex davisii*			x	x	x											-1
Large yellow fox sedge	*Carex annectens*							x	x			x	x			x	-3
Sedge	*Carex annectens* var. *xanthocarpa*											x					-3
Sedge	*Carex bushii*															x	-3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest — Upland			Forest — Floodplain			Prairie — Prairie	Prairie — Sand	Prairie — Hill	Sav — Savanna	Wetl — Marsh	Wetl — Swamp	LP — Pond/Lake	Stream — Creek/River	Cultural — Cultural	Coefficient of Wetness (7)
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Sedges																	
Green-headed fox sedge	*Carex conjuncta*				x			x									-3
Sedge	*Carex normalis*				x												-3
Broom sedge	*Carex scoparia*								x			x					-3
Chufa	*Cyperus esculentus*					x	x									x	-3
Straw colored flatsedge	*Cyperus strigosus*							x	x			x		x		x	-3
Sedge	*Carex cristatella*											x					-4
Meadow sedge	*Carex granularis*							x				x					-4
Bur sedge	*Carex grayi*					x	x						x				-4
Sedge	*Carex lupuliformis*											x					-4
Sedge	*Carex shortiana*	x	x		x												-4
Sedge	*Carex tribuloides*					x			x			x					-4
Autumn sedge	*Fimbristylis autumnalis*											x		x		x	-4
Sedge	*Carex crus-corvi*						x					x	x				-5
Emory sedge	*Carex emoryi*				x	x						x					-5
Sedge	*Carex frankii*				x							x	x				-5
Sedge	*Carex hyalinolepis*											x		x			-5
Common lake sedge	*Carex lacustris*											X	x	x			-5
Wooly sedge	*Carex lanuginosa*	x							x			x					-5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Sedges																	
Hop sedge	*Carex lupulina*				x	x						x	x				-5
Sedge	*Carex muskingumensis*				x	x							x				-5
Sedge	*Carex squarrosa*												x				-5
Prickly sedge	*Carex stipata*					x						x					-5
Common tussock sedge	*Carex stricta*							x				x	x				-5
Sedge	*Carex typhina*											x					-5
Fox sedge	*Carex vulpinoidea*								x			x		x		x	-5
Taperleaf flat sedge	*Cyperus acuminatus*								x							x	-5
Bearded flat sedge	*Cyperus aristatus*										x	x		x			-5
Red-rooted sedge	*Cyperus erythrorhizos*				x	x			x					x		x	-5
Slender flatsedge	*Cyperus ferruginescens*				x							x		x		x	-5
Blunt spikesedge	*Eleocharis obtusa*											x		x			-5
Common spikerush	*Eleocharis palustris*											x	x	x			-5
Square-stemmed spike rush	*Eleocharis quadrangulata*											x		x			-5
American bulrush	*Scirpus americanus*				x	x	x		x			x		x	x		-5
Dark green rush	*Scirpus atrovirens*							x	x			x	x				-5
River bulrush	*Scirpus fluviatilis*				x	x						X		x			-5
Great bulrush	*Scirpus heterochaetus*											x					-5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Sedges																	
Small-flowered rush	*Scirpus micranthus*					x	x										-5
Red bulrush	*Scirpus pendulus*				x			x	x			x		x			-5
Forbs																	
Slender three-seeded mercury	*Acalypha gracilens*								x	x						x	5
Three-seeded mercury	*Acalypha ostryaefolia*					x										x	5
Doll's-eyes	*Actaea pachypoda*		x	x													5
Rough false foxglove	*Agalinis aspera*							x		x							5
Round-stemmed false foxglove	*Agalinis gattingeri*	x								x							5
Pale false foxglove (ST)	***Agalinis skinneriana (ST)***									x							5
Soft agrimony	*Agrimonia pubescens*	x	x	x	x				x								5
Corn cockle (I)	*Agrostemma githago (I)*															x	5
Prostrate amaranth (I)	*Amaranthus graecizans (I)*								x							x	5
Green amaranth (I)	*Amaranthus hybridus (I)*															x	5
Poor man's weatherglass (I)	*Anagallis arvensis (I)*															x	5
Tall anemone	*Anemone virginiana*	x	x						x	x							5
Cat's foot	*Antennaria neglecta*	x						x	x		x						5
Everlasting	*Antennaria plantaginifolia*	x	x							x							5
Sicklepod	*Arabis canadensis*	x															5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Pale false foxglove (ST)	***Agalinis skinneriana* (ST)**									x							5
Smooth rock cress	*Arabis laevigata*	x															5
American spikenard	*Aralia racemosa*	x	x	x		x											5
Birthwort	*Aristolochia serpentaria*	x	x														5
Canada wild ginger	*Asarum canadense*	x	x	x	x												5
Sand milkweed	*Asclepias amplexicaulis*								x	x	x						5
Whorled milkweed	*Asclepias quadrifolia*		x	x													5
Prairie milkweed	*Asclepias sullivantii*							x	x		x						5
Common milkweed	*Asclepias syriaca*							x	x		x					x	5
Butterflyweed	*Asclepias tuberosa* var. *interior*	x						x	x		x					x	5
Horsetail milkweed	*Asclepias verticillata*		x					x	x	x	x					x	5
Green milkweed	*Asclepias viridiflora*							x	x	x							5
Green-flowered milkweed	*Asclepias viridis*		x														5
Blue aster	*Aster anomalus*	x	x								x						5
Azure aster	*Aster azureus*							x		x							5
Smooth aster	*Aster laevis*							x	x		x						5
Flax-leaved aster	*Aster linariifolius*									x							5
Aromatic aster	*Aster oblongifolius*							x		X							5
Purple daisy	*Aster patens*		x							x	x						5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Pale false foxglove (ST)	***Agalinis skinneriana (ST)***									x							5
Arrow aster	*Aster sagittifolius*	x		x													5
Silky aster	*Aster sericeus*									x							5
Aster (I)	*Aster turbinellus (I)*		x							x	x						5
Smooth false foxglove	*Aureolaria flava*	x								x							5
Yellow false foxglove	*Aureolaria grandiflora pulchra*	x	x														5
Cream wild indigo	*Baptisia leucophaea*								x		x						5
Hoary alyssum (I)	*Berteroa incana (I)*															x	5
Pagoda plant	*Blephilia ciliata*	x				x		x	x								5
Charlock (I)	*Brassica kaber (I)*															x	5
Bird's rape (I)	*Brassica rapa (I)*															x	5
False boneset	*Brickellia eupatorioides*							x		x							5
Pale Indian plantain	*Cacalia atriplicifolia*		x							x	x						5
False flax (I)	*Camelina microcarpa (I)*															x	5
False flax (I)	*Camelina sativa (I)*															x	5
Musk bristle thistle (I)	*Carduus nutans (I)*									x						x	5
Blue cohosh	*Caulophyllum thalictroides*		x	x													5
Bachelor's button (I)	*Centaurea cyanus (I)*															x	5
Clammy chickweed (I)	*Cerastium glomeratum (I)*															x	5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Pale false foxglove (ST)	***Agalinis skinneriana (ST)***									x							**5**
Dwarf snapdragon (I)	*Chaenorrhinum minus (I)*															x	5
Garden chamomile (I)	*Chamaemelum nobilis (I)*															x	5
Round-leaved spurge	*Chamaesyce serpens*													x			5
Milk spurge	*Chamaesyce supina*															x	5
Narrow-leaved goosefoot	*Chenopodium desiccatum*								x								5
Maple-leaved goosefoot	*Chenopodium gigantospermum*	x			x											x	5
Goosefoot	*Chenopodium missouriense*															x	5
Goosefoot	*Chenopodium standleyanum*	x			x												5
Blue sailors (I)	*Cichorium intybus (I)*										x					x	5
Tall thistle	*Cirsium altissimum*	x	x													x	5
Field thistle	*Cirsium discolor*	x							x		x					x	5
Day flower	*Commelina erecta*								x		x						5
Field bindweed (I)	*Convolvulus arvensis (I)*															x	5
Dwarf fleabane	*Conyza ramosissima*															x	5
Large-flowered coreopsis (I)	*Coreopsis grandiflora (I)*															x	5
Prairie coreopsis	*Coreopsis palmata*							x	x	x	x						5
Slender corydalis	*Corydalis micrantha*	x	x	x	x					x							5
Rattlebox	*Crotalaria sagittalis*	x														x	5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Pale false foxglove (ST)	***Agalinis skinneriana (ST)***									x							5
Capitate croton	*Croton capitatus*									x							5
Sand croton	*Croton glandulosus* var. *septentrionalis*								x	x						x	5
Croton	*Croton monanthogynus*									x						x	5
Rushfoil	*Crotonopsis elliptica*															x	5
Dittany	*Cunila origanoides*	x															5
Dodder	*Cuscuta campestris*						x							x		x	5
Buttonbush dodder	*Cuscuta cephalanthi*		x									x	x	x			5
Dodder	*Cuscuta pentagona*											x				x	5
Smartweed dodder	*Cuscuta polygonorum*						x					x	x				5
White prairie clover	*Dalea candida*							x	x	X	x						5
Foxtail dalea (I)	*Dalea leporina*					x											5
Purple prairie clover	*Dalea purpurea*							x	x	X							5
Dwarf larkspur	*Delphinium tricorne*		x	x													5
Tansy mustard (I)	*Descurainia pinnata* var. *brachycarpa (I)*		x													x	5
Flixweed (I)	*Descurainia sophia (I)*															x	5
Hoary tick trefoil	*Desmodium canescens*		x							x							5
Hairy tick trefoil	*Desmodium ciliare*							x		x							5
Hairy bracted tick trefoil	*Desmodium cuspidatum* var. *longifolium*		x														5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Pale false foxglove (ST)	***Agalinis skinneriana (ST)***									x							5
Beggar's lice	*Desmodium glutinosum*	x	x	x							x						5
Illinois tick trefoil	*Desmodium illinoense*							x	x								5
Sessile-leaved ticktrefoil	*Desmodium sessilifolium*							x	x	x	x						5
Deptford pink (I)	*Dianthus armeria (I)*								x		x					x	5
Dutchman's-breeches	*Dicentra cucullaria*	x	x	x	x												5
Pale purple coneflower	*Echinacea pallida*		x					x		x	x						5
Broad-leaved purple coneflower	*Echinacea purpurea*	x	x					x			x						5
Harbinger-of-spring	*Erigenia bulbosa*			x	x												5
Dog mustard (I)	*Erucastrum gallicum (I)*															x	5
Treacle mustard (I)	*Erysimum repandum (I)*															x	5
White adder's tongue	*Erythronium albidum*	x		x	x	x											5
Flowering spurge	*Euphorbia corollata*	x						x	x	x	x						5
Buckwheat (I)	*Fagopyrum esculentum (I)*															x	5
Cottonweed (I)	*Froelichia gracilis (I)*								x		x					x	5
Peruvian daisy (I)	*Galinsoga quadriradiata (I)*															x	5
Wild cranesbill	*Geranium carolinianum*							x	x	x						x	5
Catfoot	*Gnaphalium obtusifolium*							x	x	x							5
Rough pennyroyal	*Hedeoma hispida*							x	x	x							5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Pale false foxglove (ST)	***Agalinis skinneriana (ST)***									x							5
American pennyroyal	*Hedeoma pulegioides*	x															5
Long-leaved bluets	*Hedyotis longifolia*		x	x													5
Narrow-leaved bluets	*Hedyotis nigricans*		x							X							5
Slender-leaved bluets	*Hedyotis nuttalliana*		x														5
Broad-leaved bluets	*Hedyotis purpurea* var. *calycosa*		x					x									5
Small bluets	*Hedyotis pusilla*		x														5
Blueweed sunflower (I)	*Helianthus ciliaris*															x	5
Divergent sunflower	*Helianthus divaricatus*	x	x					x	x	x	x						5
Bristly sunflower	*Helianthus hirsutus*							x	x	x							5
Ashy sunflower	*Helianthus mollis*							x	x								5
Kansas sunflower (I)	*Helianthus petiolaris (I)*								x							x	5
Prairie sunflower	*Helianthus rigidus*							x	x	x	x						5
Pale-leaved sunflower	*Helianthus strumosus*	x						x	x	x							5
False sunflower	*Heliopsis helianthoides*	x	x		x			x	x	x							5
Day lily (I)	*Hemerocallis fulva (I)*	x	x		x			x								x	5
Golden aster	*Heterotheca camporum*		x						x	x						x	5
Hairy hawkweed	*Hieracium gronovii*	x							x	x	x						5
Hairy hawkweed	*Hieracium longipilum*							x		x	x					x	5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Pale false foxglove (ST)	***Agalinis skinneriana (ST)***									x							5
Jagged chickweed (I)	*Holosteum umbellatum (I)*															x	5
Golden seal	*Hydrastis canadensis*		x	x													5
Great waterleaf	*Hydrophyllum appendiculatum*	x	x	x	x												5
Spotted cat's-ear (I)	*Hypochaeris radicata (I)*															x	5
Henbit (I)	*Lamium amplexicaule (I)*															x	5
Narrow-leaved pinweed	*Lechea tenuifolia*	x								x	x						5
Motherwort (I)	*Leonurus cardiaca (I)*				x	x					x					x	5
Field cress (I)	*Lepidium campestre (I)*															x	5
Bush clover	*Lespedeza intermedia*	x															5
Trailing bush clover	*Lespedeza procumbens*									x							5
Bush clover	*Lespedeza stuevei*	x	x							x							5
Violet bush clover	*Lespedeza violacea*	x															5
Slender bush clover	*Lespedeza virginica*	x						x	x	x							5
Rough blazing star	*Liatris aspera*							x	x	x							5
Cylindrical blazing star	*Liatris cylindracea*							x	x	x							5
Grooved yellow flax	*Linum sulcatum*							x	x	x							5
Common flax (I)	*Linum usitatissimum (I)*															x	5
Hoary puccoon	*Lithospermum canescens*								x	x							5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Pale false foxglove (ST)	***Agalinis skinneriana (ST)***									x							5
Fringed puccoon	*Lithospermum incisum*									x							5
False aloe	*Manfreda virginica*									x							5
German chamomile (I)	*Matricaria chamomilla (I)*															x	5
Alfalfa (I)	*Medicago sativa (I)*															x	5
Narrow-leaved umbrella-wort (I)	*Mirabilis linearis (I)*															x	5
Wild four-o'clock (I)	*Mirabilis nyctaginea (I)*							x	x							x	5
Monarda	*Monarda bradburiana*	x	x			x				x							5
Apple-of-peru (I)	*Nicandra physalodes (I)*															x	5
Long-flowered tovacco (I)	*Nicotiana longiflora (I)*															x	5
Crow poison	*Nothoscordum bivalve*				x	x											5
Downy marbleseed	*Onosmodium molle* var. *occidentale*									x							5
Cancer-root	*Orobanche uniflora*	x	x	x				x									5
Purple oxalis	*Oxalis violacea*	x	x	x	x			x	x	x							5
Ginseng	*Panax quinquefolius*		x	x													5
Forked chickweed	*Paronychia canadensis*	x							x		x						5
Forked chickweed	*Paronychia fastigiata*								x								5
Wild quinine	*Parthenium integrifolium*	x						x	x								5
Parsnip (I)	*Pastinaca sativa (I)*							x	x		x					x	5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Pale false foxglove (ST)	***Agalinis skinneriana (ST)***									x							5
Pale beard tongue	*Penstemon pallidus*									x							5
Leafy phacelia	*Phacelia bipinnatifida*		x	x													5
Wild kidney bean	*Phaseolus polystachios*	x	x	x													5
Lopseed	*Phryma leptostachya*		x	x													5
Ground cherry	*Physalis heterophylla*							x	x	x						x	5
Tomatillo (I)	*Physalis ixocarpa (I)*															x	5
Narrow-leaved ground cherry (I)	*Physalis lanceolata (I)*															x	5
Annual ground cherry	*Physalis pubescens*	x				x										x	5
Smooth ground cherry	*Physalis subglabrata*							x	x	x							5
Garden pea (I)	*Pisum sativum (I)*															x	5
Bracted plantain (I)	*Plantago aristata (I)*								x	x							5
Clammyweed	*Polanisia dodecandra*								x							x	5
Whorled milkwort	*Polygala verticillata*							x		x	x						5
Slender knotweed	*Polygonum tenue*								x							x	5
Leafcup	*Polymnia canadensis*		x	x													5
Prairie parsley	*Polytaenia nuttallii*							x		x							5
Sulfur cinquefoil (I)	*Potentilla recta (I)*							x	x	x	x					x	5
Sampson's snakeroot	*Psoralea psoralioides* var. *eglandulosa*	x						x									5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Pale false foxglove (ST)	***Agalinis skinneriana (ST)***									**x**							**5**
Scurfy-pea	*Psoralea tenuiflora*									x							5
Hairy mountain mint	*Pycnanthemum pilosum*							x		X							5
False dandelion	*Pyrrhopappus carolinianus*															x	5
Drooping coneflower	*Ratibida pinnata*							x	x	x	x						5
Green dock (I)	*Rumex cristatus (I)*													x		x	5
Rocky mountain sage (I)	*Salvia reflexa*															x	5
Downy skullcap	*Scutellaria incana*	x															5
Sleepy catchfly	*Silene antirrhina*							x	x	x						x	5
Glaucous campion (I)	*Silene cserei (I)*															x	5
Royal catchfly (SE)	***Silene regia (SE)***							**x**	**x**		**x**						**5**
Starry campion	*Silene stellata*	x	x	x	x			x	x								5
Wholeleaf rosinweed	*Silphium integrifolium*							x	x	x	x						5
Hedge mustard (I)	*Sisymbrium officinale (I)*									x						x	5
Prairie blue-eyed grass	*Sisyrinchium campestre*							x		x							5
Upright carrion flower	*Smilax ecirrhata*	x	x	x	x												5
Buckley's goldenrod	*Solidago buckleyi*	x	x							x							5
Drummond's goldenrod	*Solidago drummondii*	x								x							5
Early goldenrod	*Solidago juncea*		x					x	x		x						5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Royal catchfly (SE)	***Silene regia (SE)***							x	x		x						5
Missouri goldenrod	*Solidago missouriensis*							x	x	x							5
Dyersweed goldenrod	*Solidago nemoralis*	x						x	x	x	x					x	5
Rough goldenrod	*Solidago radula*									x							5
Showy goldenrod	*Solidago speciosa*							x	x	x	x						5
Elm-leaved goldenrod	*Solidago ulmifolia*		x		x					x	x						5
Wild bean	*Strophostyles leiosperma*								x							x	5
Celandine poppy	*Stylophorum diphyllum*			x	x	x											5
Pencil flower	*Stylosanthes biflora*		x							x							5
Goat's rue	*Tephrosia virginiana*								X	x	x						5
Meadow parsnip	*Thaspium trifoliatum*			x	x			x	x	x							5
Field penny cress (I)	*Thlaspi arvense (I)*							x	x							x	5
Hedge parsley (I)	*Torilis japonica (I)*									x						x	5
Spiderwort	*Tradescantia subaspera*	x	x	x													5
Spiderwort	*Tradescantia virginiana*	x	x	x				x	x		x					x	5
Goat's beard (I)	*Tragopogon dubius (I)*								x	x						x	5
Vegetable oyster salsify (I)	*Tragopogon porrifolius (I)*															x	5
Common goat's beard (I)	*Tragopogon pratensis (I)*								x		x					x	5
Puncture-weed (I)	*Tribulus terrestris (I)*															x	5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Royal catchfly (SE)	***Silene regia (SE)***							x	x		x						5
False pennyroyal	*Trichostema brachiatum*									x							5
Blue curls	*Trichostema dichotomum*								x		x					x	5
Low hop clover (I)	*Trifolium campestre (I)*															x	5
Late horse gentian	*Triosteum perfoliatum*	x		x					x	x							5
Big merry bells	*Uvularia grandiflora*		x	x			x									x	5
Cow herb (I)	*Vaccaria pyramidata (I)*															x	5
Woolly mullein (I)	*Verbascum thapsus (I)*							x	x	x						x	5
Narrow-leaved vervain	*Verbena simplex*							x		x							5
Hoary vervain	*Verbena stricta*							x	x	x	x					x	5
Yellow crownbeard	*Verbesina helianthoides*	x	x	x	x					x							5
Baldwin's ironweed	*Vernonia baldwinii*		x							x							5
Corn speedwell (I)	*Veronica arvensis (I)*									x						x	5
Bird vetch (I)	*Vicia cracca (I)*															x	5
Winter vetch (I)	*Vicia villosa (I)*															x	5
Bird's foot violet	*Viola pedata*								x	x	x						5
Johnny-jump-up (I)	*Viola rafinesquii (I)*								x	x						x	5
Cleft violet	*Viola triloba*	x	x	x										x			5
Buttonweed (I)	*Abutilon theophrastii (I)*					x										x	4

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Royal catchfly (SE)	***Silene regia (SE)***							x	x		x						5
False pennyroyal	*Trichostema brachiatum*									x							5
Lanceleaf ragweed	*Ambrosia bidentata*															x	4
Androsace	*Androsace occidentalis*								x							x	4
Heath aster	*Aster ericoides*							x	x	x	x						4
Hairy aster	*Aster pilosus*		x					x	x	x	x					x	4
Pagoda plant	*Blephilia hirsuta*		x	x													4
Golden cassia	*Cassia fasciculata*	x							x	x	x						4
Wild sensitive plant	*Cassia nictitans*								x	x						x	4
Short-pedicelled chickweed	*Cerastium brachypodum*									x							4
Nodding spurge	*Chamaesyce maculata*								x							x	4
Mullein foxglove	*Dasistoma macrophylla*	x	x														4
Jimsonweed (I)	*Datura stramonium (I)*															x	4
Queen-anne's-lace (I)	*Daucus carota (I)*							x	x	x	x					x	4
Pepper-root	*Dentaria laciniata*	x	x	x	x												4
Snow-on-the-mountain (I)	*Euphorbia marginata (I)*												x			x	4
Wild licorice	*Galium circaezans*	x	x					x		x							4
Butterfly-weed	*Gaura biennis*							x	x	x						x	4
Western sunflower	*Helianthus occidentalis*							x	x	x	x						4

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Royal catchfly (SE)	***Silene regia (SE)***							x	x		x						5
Tall alumroot	*Heuchera americana* var. *hirsuticaulis*		x	x						x							4
Common morning-glory (I)	*Ipomoea purpurea (I)*															x	4
Belvedere summer cypress (I)	*Kochia scoparia (I)*															x	4
Common peppergrass	*Lepidium virginicum*								x	x						x	4
Indian tobacco	*Lobelia inflata*		x														4
Anise-root	*Osmorhiza longistylis*	x	x	x	x												4
Miami mist	*Phacelia purshii*		x	x	x											x	4
Dwarf plantain	*Plantago virginica*								x	x						x	4
Bears foot	*Polymnia uvedalia*		x	x													4
Common cinquefoil	*Potentilla simplex*	x	x	x				x	x		x					x	4
Hairy ruellia	*Ruellia humilis*							x	x	x							4
Pale dock	*Rumex altissimus*							x	x			x					4
Bloodroot	*Sanguinaria canadensis*	x	x	x													4
Late figwort	*Scrophularia marilandica*	x	x	x	x				x								4
Virginia rock cress	*Sibara virginica*															x	4
Compass plant	*Silphium laciniatum*							x	x		x						4
Horse-nettle	*Solanum carolinense*							x	x	x						x	4
Black nightshade	*Solanum ptycanthum*				x											x	4

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Royal catchfly (SE)	***Silene regia (SE)***							x	x		x						5
Rigid goldenrod	*Solidago rigida*							x	x		x						4
Prairie spiderwort (ST)	***Tradescantia bracteata (ST)***							x									4
Red trillium	*Trillium recurvatum*	x	x	x	x	x				x							4
Moth mullein (I)	*Verbascum blattaria (I)*															x	4
Three-seeded mercury	*Acalypha rhomboidea*				x												3
Three-seeded mercury	*Acalypha virginica*									x						x	3
Common milfoil (I)	*Achillea millefolium (I)*							x	x	x	x					x	3
Yellow giant hyssop	*Agastache nepetoides*			x													3
Woodland agrimony	*Agrimonia rostellata*	x						x		x							3
Wild garlic	*Allium canadense*	x	x	x	x	x		x		x							3
Field garlic (I)	*Allium vineale (I)*									x						x	3
Tumbleweed	*Amaranthus albus*								x							x	3
Spiny pigweed (I)	*Amaranthus spinosus (I)*					x										x	3
Bitterweed	*Ambrosia artemisiifolia*				x		x	x	x	x	x					x	3
Dog fennel (I)	*Anthemis cotula (I)*					x										x	3
Hairy rock cress	*Arabis hirsuta* var. *pycnocarpa*		x							x							3
Goat's-beard	*Aruncus dioicus*		x	x													3
Garden asparagus (I)	*Asparagus officinalis (I)*							x		x	x					x	3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Prairie spiderwort (ST)	***Tradescantia bracteata (ST)***							x									4
Drummond's aster	*Aster drummondii*	x	x							x	x	x					3
White wild indigo	*Baptisia lactea*							x	x		x						3
Terrestrial starwort	*Callitriche terrestris*											x				x	3
Common mouse-ear chickweed (I)	*Cerastium vulgatum (I)*								x		x					x	3
Enchanter's nightshade	*Circaea lutetiana var. canadensis*	x	x	x	x												3
Spring beauty	*Claytonia virginica*	x	x	x	x	x		x									3
Bastard toad-flax	*Comandra umbellata*							x	x	x							3
Lance coreopsis	*Coreopsis lanceolata*							x	x	x							3
Blue waxweed	*Cuphea viscosissima*		x		x											x	3
Tumble ringwing	*Cycloloma atriplicifolium*					x			x							x	3
Tick trefoil	*Desmodium glabellum*	x	x							x						x	3
Panicled tick trefoil	*Desmodium paniculatum*							x		x							3
Poorjoe	*Diodia teres*								x	x						x	3
Shooting star	*Dodecatheon meadia*	x	x	x				x	x		x						3
Fire weed	*Erechtites hieracifolia*															x	3
Robin's plantain	*Erigeron pulchellus*	x	x			x		x	x	x							3
Tall boneset	*Eupatorium altissimum*							x	x	x	x						3
White snakeroot	*Eupatorium rugosum*	x	x	x	x					x							3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Prairie spiderwort (ST)	***Tradescantia bracteata (ST)***							x									**4**
Blunt-leaved spurge	*Euphorbia obtusata*					x											3
Annual bedstraw	*Galium aparine*	x	x		x	x	x		x	x						x	3
Shining bedstraw	*Galium concinnum*	x		x					x								3
Wild geranium	*Geranium maculatum*	x	x	x	x	x		x	x	x							3
Rock bitterweed	*Helenium amarum*															x	3
Round-fruited St. Johns-wort	*Hypericum sphaerocarpum*							x	x	x							3
Wild sweet potato vine	*Ipomoea pandurata*			x	x												3
False dandeloin	*Krigia biflora*	x	x	x				x	x		x						3
Dwarf dandelion	*Krigia dandelion*								x								3
Korean clover (I)	*Kummerowia stipulacea*							x		x						x	3
Japanese lespedeza (I)	*Kummerowia striata (I)*															x	3
Bush clover	*Lespedeza capitata*							x	X	X	x						3
White sweet clover (I)	*Melilotus alba (I)*							x	x	x	x					x	3
Yellow sweet clover (I)	*Melilotus officinalis (I)*							x		x	x					x	3
Wild bergamot	*Monarda fistulosa*							x	x	x	x						3
Evening primrose	*Oenothera biennis*							x	x	x	x					x	3
Ragged evening primrose	*Oenothera laciniata*								x	x						x	3
Yellow wood sorrel	*Oxalis dillenii*				x					x						x	3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland		Floodplain				Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Prairie spiderwort (ST)	***Tradescantia bracteata (ST)***							x									4
Yellow wood sorrel	*Oxalis stricta*				x	x			x							x	3
Pennsylvania pellitory	*Parietaria pensylvanica*	x			x					x						x	3
Blue phlox	*Phlox divaricata* var. *laphamii*	x	x	x	x	x											3
Small plantain	*Plantago pusilla*		x														3
Mayapple	*Podophyllum peltatum*	x	x	x	x	x											3
Field milkwort	*Polygala sanguinea*							x	x			x					3
Great solomon seal	*Polygonatum commutatum*	x	x	x	x			x	x								3
Early buttercup	*Ranunculus fascicularis*	x						x									3
Black-eyed susan	*Rudbeckia hirta*		x					x	x	x	x					x	3
Sour dock	*Rumex hastatulus*								x		x					x	3
Bouncing bet (I)	*Saponaria officinalis (I)*								x							x	3
Heart-leaved skullcap	*Scutellaria ovata*	x	x	x						x							3
Prickly sida (I)	*Sida spinosa (I)*				x				x						x	x	3
Tumble mustard (I)	*Sisymbrium altissimum (I)*															x	3
Blue-eyed grass	*Sisyrinchium albidum*							x	x	x	x						3
False solomon seal	*Smilacina racemosa*	x	x	x													3
Canada goldenrod	*Solidago canadensis*	x				x		x	x	x	x					x	3
Common sowthistle (I)	*Sonchus oleraceus (I)*															x	3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Prairie spiderwort (ST)	***Tradescantia bracteata (ST)***							x									4
Common chickweed (I)	*Stellaria media (I)*						x									x	3
Common dandelion (I)	*Taraxacum officinale (I)*							x	x							x	3
Creeeping vervain	*Verbena bracteata*															x	3
Rough pigweed (I)	*Amaranthus retroflexus (I)*															x	2
Fat-hen saltbush (I)	*Atriplex patula (I)*											x				x	2
Nodding mouse-ear chickweed	*Cerastium nutans*															x	2
Wild chervil	*Chaerophyllum tainturieri*				x	x										x	2
Coral root	*Corallorhiza wisteriana*		x	x													2
Pale corydalis	*Corydalis flavula*		x	x													2
Green violet	*Hybanthus concolor*		x	x	x												2
Canada lettuce	*Lactuca canadensis*	x	x					x	x	x						x	2
Lousewort	*Pedicularis canadensis*			x	x			x		x			x				2
Canadian black snakeroot	*Sanicula canadensis*	x	x	x	x				x	x							2
Spiderwort	*Tradescantia ohiensis*							x	x	x	x						2
Red clover (I)	*Trifolium pratense (I)*							x	x							x	2
White clover (I)	*Trifolium repens (I)*										x					x	2
Western ragweed	*Ambrosia psilostachya*								x	x						x	1
Columbine	*Aquilegia canadensis*	x	x	x													1

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Prairie spiderwort (ST)	***Tradescantia bracteata (ST)***							x									4
Blue hearts	*Buchnera americana*									x							1
Sheperd's-purse (I)	*Capsella bursa-pastoris (I)*															x	1
Lamb's quarters (I)	*Chenopodium album (I)*								x							x	1
American wormseed (I)	*Chenopodium ambrosioides (I)*					x										x	1
Horseweed	*Conyza canadensis*								x	x	x					x	1
Illinois bundleflower	*Desmanthus illinoensis*							x	x	x							1
Showy tick trefoil	*Desmodium canadense*							x	x								1
Elephant's-foot	*Elephantopus carolinianus*		x	x	x												1
Annual fleabane	*Erigeron annuus*							x	x		x					x	1
Daisy fleabane	*Erigeron strigosus*							x	x	X						x	1
Wild strawberry	*Fragaria virginiana*							x	x		x						1
Stickseed	*Hackelia virginiana*	x		x	x	x										x	1
Common sunflower (I)	*Helianthus annuus (I)*					x										x	1
Prairie alumroot	*Heuchera richardsonii*	x						x	x	x							1
Blue lettuce	*Lactuca floridana*	x			x						x						1
Prairie blazing star	*Liatris pycnostachya*							x	x								1
Black medic (I)	*Medicago lupulina (I)*									x						x	1
Scorpion grass	*Myosotis verna*								x	x						x	1

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Forest: Upland			Forest: Floodplain			Prairie: Prairie	Prairie: Sand	Prairie: Hill	Sav: Savanna	Wetl: Marsh	Wetl: Swamp	LP: Pond/Lake	Stream: Creek/River	Cultural: Cultural	Coefficient of Wetness (7)
Natural Community (6)		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Prairie spiderwort (ST)	***Tradescantia bracteata (ST)***							x									4
Catnip (I)	*Nepeta cataria (I)*										x					x	1
Prairie sundrops	*Oenothera pilosella*							x	x		x						1
Common star-of-bethlehem (I)	*Ornithogalum umbellatum (I)*															x	1
Foxglove beard-tongue	*Penstemon digitalis*		x					x								x	1
Sand prairie phlox	*Phlox pilosa*		x					x	x	x							1
Pokeweed	*Phytolacca americana*	x				x			x							x	1
Knotweed (I)	*Polygonum aviculare (I)*															x	1
Black birdweed (I)	*Polygonum convolvulus (I)*															x	1
Bushy knotweed	*Polygonum ramosissimum*				x												1
Purslane (I)	*Portulaca oleracea (I)*															x	1
Brown-eyed susan	*Rudbeckia triloba*				x	x		x									1
Dock rosin-weed	*Silphium terebinthinaceum*							x	x	x	x						1
Starry false solomon seal	*Smilacina stellata*	x	x	x													1
Alsike clover (I)	*Trifolium hybridum (I)*															x	1
Woolly blue violet	*Viola sororia*	x	x	x	x			x	x								1
Dogbane	*Apocynum cannabinum*							x	x	x	x					x	0
Horseradish (I)	*Armoracia rusticana (I)*															x	0
Ontario aster	*Aster ontarionis*		x		x								x				0

Natural Community Class (4): Forest, Prairie, Sav, Wetl, LP, Stream, Cultural. Natural Community Sub-class (5): Upland, Floodplain, Prairie, Sand, Hill, Savanna, Marsh, Swamp, Pond/Lake, Creek/River, Cultural.

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)																Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural		
		Natural Community Sub-class (5)																
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural		
		Natural Community (6)																
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss					
Prairie spiderwort (ST)	***Tradescantia bracteata (ST)***							x										4
Winter cress (I)	*Barbarea vulgaris (I)*							x	x		x					x		0
Prairie indian plantain	*Cacalia plantaginea*							x		x								0
American bindweed	*Calystegia sepium*							x								x		0
American bellflower	*Campanula americana*	x	x		x	x										x		0
Hashish (I)	*Cannabis sativa (I)*															x		0
Small-flowered bitter cress	*Cardamine parviflora* var. *arenicola*								x			x				x		0
Balloon-vine (I)	*Cardiospermum halicacabum (I)*					x										x		0
Common day flower (I)	*Commelina communis (I)*				x						x	x				x		0
Tall coreopsis	*Coreopsis tripteris*							x	x	x	x							0
Honewort	*Cryptotaenia canadensis*	x	x	x	x	x	x											0
Dodder	*Cuscuta glomerata*				x		x	x	x			x						0
Dodder	*Cuscuta indecora*						x					x						0
Green-stemmed joe-pye weed	*Eupatorium purpureum*											x						0
White avens	*Geum canadense*	x	x	x	x	x	x									x		0
Jerusalem artichoke	*Helianthus tuberosus*				x			x	x	x								0
Common goldstargrass	*Hypoxis hirsuta*	x						x	x		x							0
Ivy-leaved morning glory (I)	*Ipomoea hederacea (I)*		x													x		0
False rue anemone	*Isopyrum biternatum*	x	x	x	x													0

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Prairie spiderwort (ST)	***Tradescantia bracteata (ST)***							x									4
Marsh elder	*Iva annua*															x	0
Dudley rush	*Juncus dudleyi*							x	x			x		x			0
Path rush	*Juncus tenuis*	x	x			x										x	0
Canker-root (I)	*Kickxia elatine (I)*															x	0
Prickly lettuce (I)	*Lactuca serriola (I)*								x							x	0
Peppergrass (I)	*Lepidium densiflorum (I)*							x	x							x	0
Spiked lobelia	*Lobelia spicata* var. *leptostachys*							x	x	x	x					x	0
Lance-leaved loosestrife	*Lysimachia lanceolata*							x	x			x					0
Common horehound (I)	*Marrubium vulgare (I)*															x	0
Carpetweed (I)	*Mollugo verticillatus (I)*						x									x	0
Beefsteak plant (I)	*Perilla frutescens (I)*	x	x			x										x	0
Ground cherry (I)	*Physalis angulata (I)*															x	0
Buckhorn (I)	*Plantago lanceolata (I)*							x	x							x	0
Red-stalked plantain	*Plantago rugelii*													x		x	0
Jacob's-ladder	*Polemonium reptans*	x		x	x	x		x	x		x						0
Virginia knotweed	*Polygonum virginianum*	x	x	x	x												0
Rough cinquefoil (I)	*Potentilla norvegica (I)*															x	0
Self-heal (I)	*Prunella vulgaris (I)*							x	x	x	x					x	0

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Prairie spiderwort (ST)	***Tradescantia bracteata (ST)***							x									4
Slender mountain mint	*Pycnanthemum tenuifolium*					x		x	x		x						0
Bristly buttercup	*Ranunculus hispidus*		x	x													0
Common sorrel (I)	*Rumex acetosella (I)*							x	x		x					x	0
Prickly sowthistle (I)	*Sonchus asper (I)*															x	0
Spring ladies' tresses (SE)	***Spiranthes vernalis (SE)***							x	x								0
Waxy meadow rue	*Thalictrum revolutum*				x			x	x								0
Venus' looking-glass	*Triodanis perfoliata*		x						x	x						x	0
Golden crownbeard (I)	*Verbesina encelioides (I)*															x	0
Tall iron weed	*Vernonia gigantea*		x						x			x	x			x	0
Culver's root	*Veronicastrum virginicum*		x					x	x	x	x						0
Cockle bur	*Xanthium strumarium*				x	x	x									x	0
Buffalo weed	*Ambrosia trifida*				x		x	x	x							x	-1
Indian hemp	*Apocynum sibiricum*							x	x	x							-1
Canadian milk vetch	*Astragalus canadensis*		x					x	x	x	x						-1
Wild hyacinth	*Camassia scilloides*			x	x					x	x						-1
Wild chervil	*Chaerophyllum procumbens*				x	x										x	-1
Aunt lucy	*Ellisia nyctelea*				x	x										x	-1
Rattlesnake master	*Eryngium yuccifolium*							x	x	x							-1

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Spring ladies' tresses (SE)	***Spiranthes vernalis (SE)***							x	x								0
Blue bonset	*Eupatorium coelestinum*									x						x	-1
Late boneset	*Eupatorium serotinum*				x	x	x	x	x			x		x			-1
Purple-headed sneezeweed	*Helenium flexuosum*															x	-1
Spotted St. Johns-wort	*Hypericum punctatum*		x						x	x	x					x	-1
Inland rush	*Juncus interior*							x	x				x				-1
Michigan lily	*Lilium michiganense*							x	x								-1
Devilsclaw (I)	*Proboscidea louisianica (I)*															x	-1
Smooth ruellia	*Ruellia strepens*			x	x												-1
Curly dock (I)	*Rumex crispus (I)*							x	x		x	x				x	-1
Dock (I)	*Rumex mexicanus (I)*															x	-1
Marsh pink	*Sabatia angularis*											x				x	-1
Common snakeroot	*Sanicula gregaria*	x	x	x	x	x			x								-1
Rough goldenrod	*Solidago rugosa*		x														-1
Wild bean	*Strophostyles helvula*								x	x						x	-1
Stinging nettle	*Urtica dioica*	x	x		x	x	x										-1
Corn salad	*Valerianella radiata*					x										x	-1
White vervian	*Verbena urticifolia*		x		x				x	x						x	-1
Missouri ironweed	*Vernonia missurica*				x			x	x	x		x					-1

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Spring ladies' tresses (SE)	***Spiranthes vernalis (SE)***							x	x								0
Golden alexanders	*Zizia aurea*	x	x	x				x	x								-1
Indian turnip	*Arisaema triphyllum*		x	x	x	x											-2
Side-flowered aster	*Aster lateriflorus*		x		x	x				x						x	-2
Spanish needles (I)	*Bidens bipinnata (I)*															x	-2
Grassleaf goldenrod	*Euthamia graminifolia*							x	x		x						-2
Sawtooth sunflower	*Helianthus grosseserratus*							x	x		x	x				x	-2
Little-leaf buttercup	*Ranunculus abortivus*	x			x											x	-2
Cup plant	*Silphium perfoliatum*				x			x			x						-2
Common blue-eyed grass	*Sisyrinchium angustifolium*	x	x					x		x							-2
American germander	*Teucrium canadense* var. *virginicum*				x	x		x	x	x	x	x					-2
Purple meadow rue	*Thalictrum dasycarpum*		x	x	x			x				x					-2
Slender false foxglove	*Agalinis tenuifolia*								x	x							-3
Tamarisk waterhemp	*Amaranthus rudis*				x		x					x			x	x	-3
Blue star	*Amsonia tabernaemontana*			x													-3
Green dragon	*Arisaema dracontium*		x	x	x	x											-3
Swamp marigold	*Bidens aristosa*											x				x	-3
Common beggar-ticks	*Bidens frondosa*	x			x	x	x		x			x	x		x	x	-3
False aster	*Boltonia asteroides*				x				x			x					-3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Spring ladies' tresses (SE)	***Spiranthes vernalis (SE)***							x	x								0
Maryland senna	*Cassia marilandica*				x			x									-3
Milk spurge	*Chamaesyce humistrata*					x			x							x	-3
Day flower (I)	*Commelina diffusa (I)*				x												-3
Dodder	*Cuscuta gronovii*				x		x			x							-3
Yerba de tajo	*Eclipta prostrata*				x	x	x					x	x	x		x	-3
Marsh fleabane	*Erigeron philadelphicus*	x			x				x							x	-3
Indian heliotrope (I)	*Heliotropium indicum (I)*									x						x	-3
Dwarf St. Johns-wort	*Hypericum mutilum*								x			x	x	x			-3
Jewelweed	*Impatiens capensis*		x			x	x					x	x				-3
Pale touch-me-not	*Impatiens pallida*			x	x								x				-3
Small white morning-glory	*Ipomoea lacunosa*					x										x	-3
Rush	*Juncus brachycarpus*							x	x			x		x			-3
Grass-leaved rush	*Juncus marginatus*								x			x					-3
Torrey rush	*Juncus torreyi*							x	x					x			-3
Canada wood nettle	*Laportea canadensis*			x	x	x											-3
Field mint	*Mentha arvensis* var. *villosa*					x		x				x	x				-3
Bluebells	*Mertensia virginica*	x	x	x	x	x											-3
Mousetail	*Myosurus minimus*						x									x	-3

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland		Floodplain				Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Spring ladies' tresses (SE)	***Spiranthes vernalis (SE)***							x	x								0
False dragonhead	*Physostegia virginiana*							x	x	x	x						-3
Canada clearweed	*Pilea pumila*			x	x	x	x					x					-3
Spotted lady's thumb (I)	*Polygonum persicaria (I)*	x			x							x				x	-3
Spreading yellow cress	*Rorippa sinuata*				x							x					-3
Fragrant coneflower	*Rudbeckia subtomentosa*							x	x								-3
Bitter dock (I)	*Rumex obtusifolius (I)*					x										x	-3
Late goldenrod	*Solidago gigantea*		x		x			x	x	x							-3
Great plaines ladies' tresses	*Spiranthes magnicamporum*							x		x							-3
Wing stem	*Verbesina alternifolia*	x			x											x	-3
Common ironweed	*Vernonia fasciculata*							x	x			x					-3
Missouri violet	*Viola missouriensis*				x	x	x										-3
Common white violet	*Viola striata*		x	x	x												-3
Bitter cress	*Cardamine pensylvanica*				x				x			x				x	-4
Hare's-ear mustard (I)	*Conringia orientalis (I)*															x	-4
Wild madder	*Galium obtusum*						x	x	x			x	x	x			-4
Autumn sneezeweed	*Helenium autumnale*				x	x		x			x	x					-4
Hairy rose mallow	*Hibiscus lasiocarpus*											x	x	x		x	-4
Toad rush	*Juncus bufonius*															x	-4

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland		Floodplain				Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Spring ladies' tresses (SE)	***Spiranthes vernalis (SE)***							x	x								0
Obe-eye daisy	*Leucospora multifida*					x	x		x			x		x		x	-4
Blue cardinal-flower	*Lobelia siphilitica*						x	x				x					-4
Spearmint (I)	*Mentha spicata (I)*															x	-4
Curttop lady's thumb	*Polygonum lapathifolium*				x	x	x	x				x					-4
Pinkweed	*Polygonum pensylvanicum*		x		x	x		x				x				x	-4
Cinquefoil	*Potentilla paradoxa*					x			x					x			-4
Common mountain mint	*Pycnanthemum virginianum*							x	x		x						-4
Swamp buttercup	*Ranunculus septentrionalis*				x	x						x					-4
Cutleaf coneflower	*Rudbeckia laciniata*				x		x										-4
Golden dock	*Rumex maritimus*													x		x	-4
Smooth buttonweed	*Spermacoce glabra*											x					-4
Blue vervain	*Verbena hastata*				x			x	x		x	x					-4
Purslane speedwell	*Veronica peregrina*							x	x			x					-4
Common water plantain	*Alisma subcordatum*											x	x	x			-5
Tall waterhemp	*Amaranthus tuberculatus*				x		x					x			x	x	-5
Long-leaved ammannia	*Ammannia coccinea*				x	x						x		x			-5
Lake cress	*Armoracia aquatica*											x		x			-5
Swamp milkweed	*Asclepias incarnata*				x				x			x	x	x			-5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Spring ladies' tresses (SE)	***Spiranthes vernalis (SE)***							x	x								**0**
Panicled aster	*Aster simplex*		x		x	x	x					x	x	x	x		-5
Water hyssop	*Bacopa rotundifolia*											x		x			-5
Nodding beggar-ticks	*Bidens cernua*				x	x	x					x	x		x		-5
Beggartick	*Bidens tripartita*					x			x			x	x				-5
False nettle	*Boehmeria cylindrica*				x	x	x		x			x	x	x			-5
Decurrent false aster (ST, FT)	***Boltonia decurrens (ST, FT)***				x	x								x		x	**-5**
Large water starwort	*Callitriche heterophylla*				x							x			x		-5
Coontail	*Ceratophyllum demersum*												x	x			-5
Water hemlock	*Cicuta maculata*				x			x	x			x	x				-5
Lance-headed burhead	*Echinodorus berteroi*						x						x	x			-5
Creeping burhead	*Echinodorus cordifolius*											x					-5
Small burhead (SE)	***Echinodorus tenellus (SE)***													x			**-5**
Clammy hedge hyssop	*Gratiola neglecta*				x	x	x					x	x	x		x	-5
Round-fruited hedge hyssop	*Gratiola virginiana*				x	x	x						x	x	x		-5
Seaside heliotrope (I)	*Heliotropium curassavicum (I)*															x	-5
Ducksalad	*Heteranthera limosa*											x	x				-5
Mud plantain (SE)	***Heteranthera reniformis (SE)***						x					x		x			**-5**
Halberd-leaved rose mallow	*Hibiscus laevis*						x					x	x	x	x		-5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Mud plantain (SE)	***Heteranthera reniformis (SE)***						x					x		x			-5
Southern blue flag	*Iris shrevei*				x		x					x	x	x			-5
Knotty-leaved rush	*Juncus acuminatus*												x	x			-5
Rush	*Juncus nodatus*													x			-5
Water willow	*Justicia americana*														x		-5
Common duckweed	*Lemna minor*											x	x	X			-5
False pimpernel	*Lindernia dubia*				x	x						x	x	x	x		-5
Slender false pimpernel	*Lindernia dubia* var. *anagallidea*					x							x	x			-5
Cardinal-flower	*Lobelia cardinalis*				x	x	x					x	x				-5
Seedbox	*Ludwigia alternifolia*							x	x			x		x			-5
Marsh purslane	*Ludwigia palustris* var. *americana*				x							x		x			-5
Creeping primrose willow	*Ludwigia peploides* var. *glabrescens*					x						x		x			-5
False loosestrife	*Ludwigia polycarpa*											x		x			-5
Common water horehound	*Lycopus americanus*				x			x	x			x		x			-5
Bugle weed	*Lycopus virginicus*				x							x					-5
Winged loosestrife	*Lythrum alatum*							x	x			x					-5
Winged monkey flower	*Mimulus alatus*				x	x	x					x		x	x		-5
Water milfoil	*Myriophyllum heterophyllum*													x			-5
Southern naiad	*Najas guadalupensis*													x			-5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland		Floodplain				Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Mud plantain (SE)	***Heteranthera reniformis (SE)***						x					x		x			**-5**
American lotus	*Nelumbo lutea*											X		x			-5
Spatterdock	*Nuphar luteum*				x									X	X		-5
Arrow arum	*Peltandra virginica*												x	x			-5
Ditch stonecrop	*Penthorum sedoides*								x			x	x	x			-5
Fog-fruit	*Phyla lanceolata*						x		x			x		x			-5
Water knotweed	*Polygonum amphibium*				x				X			x	X	X			-5
Common smartweed (I)	*Polygonum hydropiper (I)*		x				x		x			x		x			-5
Mild water pepper	*Polygonum hydropiperoides*						x					x	x	x		x	-5
Dotted smartweed	*Polygonum punctatum*		x				x					x	x	x	x		-5
Arrowleaf tearthumb	*Polygonum sagittatum*											x	x	x			-5
Bristly smartweed	*Polygonum setaceum interjectum*											x					-5
Waterthread pondweed	*Potamogeton diversifolius*													x			-5
Leafy pondweed	*Potamogeton foliosus*													x			-5
American pondweed	*Potamogeton nodosus*													x	x		-5
Comb pondweed	*Potamogeton pectinatus*													x	x		-5
Mermaid weed	*Proserpinaca palustris*								x			x		x			-5
Yellow water buttercup	*Ranunculus flabellaris*											x		x			-5
Cursed crowfoot	*Ranunculus sceleratus*								x			x		x			-5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Mud plantain (SE)	***Heteranthera reniformis (SE)***						x					x		x			**-5**
Marsh yellow cress	*Rorippa islandica* var. *fernaldiana*					x			x			x					-5
Sessile-flowered cress	*Rorippa sessiliflora*				x	x						x		x	x		-5
Tooth-cup	*Rotala ramosior*					x						x		x			-5
Orange coneflower	*Rudbeckia fulgida*								x		x					x	-5
Swamp dock	*Rumex verticillatus*				x				x			x	x	x	x		-5
Arrowleaf	*Sagittaria calycina*													x			-5
Grass-leaved arrowhead	*Sagittaria graminea*											x		x			-5
Common arrowhead	*Sagittaria latifolia*						x					x		x	x		-5
Brookweed	*Samolus valerandii*				x												-5
Lizard's tail	*Saururus cernuus*				x	x	x						x	x			-5
Mad-dog skullcap	*Scutellaria lateriflora*				x	x						x					-5
Butterweed	*Senecio glabellus*													x		x	-5
Water parsnip	*Sium suave*							x				x	x	x			-5
Common bur reed	*Sparganium eurycarpum*											x	x	x	x		-5
Great duckweed	*Spirodela polyrhiza*											x	x	x			-5
Woundwort	*Stachys palustris*				x	x				x		x					-5
Smooth hedge nettle	*Stachys tenuifolia*				x	x	x						x	x	x		-5
Cattail	*Typha latifolia*							X	x			x	x	x	x		-5

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4): Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	Coefficient of Wetness (7)
		Natural Community Sub-class (5): Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6): d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Mud plantain (SE)	***Heteranthera reniformis (SE)***						x					x		x			-5
Humped bladderwort	*Utricularia gibba*													x			-5
Commom bladderwort	*Utricularia vulgaris*											x		x			-5
Common watermeal	*Wolffia columbiana*											x	x	x			-5
Duckweed	*Wolffiella gladiata*												x	x			-5
Water star-grass	*Zosterella dubia*													x			-5
Ferns																	
Walking fern	*Asplenium rhizophyllum*	x	x	x													5
Baby lip fern	*Cheilanthes feei*									x							5
Christmas fern	*Polystichum acrostichoides*		x	x													5
Common woodsia	*Woodsia obtusa*	x	x	x	x												5
Ebony spleenwort	*Asplenium platyneuron*	x	x							x							3
Rattlesnake fern	*Botrychium virginianum*	x	x	x													3
Hybrid fragile fern	*Cystopteris protrusa*	x	x	x	x	x											3
Tennessee fragile fern	*Cystopteris x tennesseensis*		x														3
Maindenhair fern	*Adiantum pedatum*		x	x													1
Broad beech fern	*Phegopteris hexagonoptera*		x	x													1
Common horsetail	*Equisetum arvense*				x	x	x		x			x				x	0
Berry bladder fern	*Cystopteris bulbifera*		x	x													-2

Table B-24 Continued

Common name (2, 3)	Scientific Name (2, 3)	Natural Community Class (4)															Coefficient of Wetness (7)
		Forest						Prairie			Sav	Wetl		LP	Stream	Cultural	
		Natural Community Sub-class (5)															
		Upland			Floodplain			Prairie	Sand	Hill	Savanna	Marsh	Swamp	Pond/Lake	Creek/River	Cultural	
		Natural Community (6)															
		d	dm	m	m	wm	w	wm	m	l	dm	ma	ss				
Ferns																	
Tall scouring rush	*Equisetum hyemale affine*				x	x	x		x	x		x				x	-2
Smooth scouring rush	*Equisetum laevigatum*				x				x	x		x					-3
Sensitive fern	*Onoclea sensibilis*				x			x	x			x	x				-3
Northern adder's tongue fern	*Ophioglossum vulgatum* var. *pseudopodum*			x	x			x									-3
Cinnamon fern	*Osmunda cinnamomea*	x						x	x				x				-3
Mexican azolla	*Azolla mexicana*											x		x			-5

(1) Compiled from IDNR (1998a) and Iverson et al. (no date). List consists of those species listed by Iverson et al. (no date) as occurring in Madison and/or St. Clair Counties, which are also included in IDNR (1998a). Species classified into physiognomic groups according to Taft et al. (1997) and Wilhelm and Masters (2000).

(2) Common and scientific names follow those in the Illinois database used in Wilhelm and Masters (2000). Bold type indicates Illinois threatened (ST), Illinois endangered (SE), Illinois watch list (WL), possible Illinois extirpated species (EXT), and Federally threatened (FT) species.

(3) (I) indicates introduced or adventive species.

(4) Natural community classes: Forest, Prairie, Savanna (Sa), Wetland (Wetl), Lake and Pond (L), Stream (S), and cultural (C).

(5) Natural community subclasses: Upland and Floodplain - Forest; Prairie (typical) and Sand - Prairie; Savanna (typical) - Savanna; Marsh and Swamp - Wetland; Pond and Lake (combined) - Lake and Pond; Creek and River (combined) - Stream; Cultural (no subclass).

Table B-24 Continued

(6) Natural communities and species associations: these have been taken from IDNR (1998a); some natural communities that historically occurred in study area are not included in this table beccause they were not present in IDNR (1998a) and development of associations for these "missing" communites was beyond the scope of this study; ommitted communities include wet-mesic upland forest, dry prairie, dry-mesic prairie, mesic prairie, and wet prairie.

Natural Communties in table include:

dry upland forest (d), dry-mesic upland forest (dm), mesic upland forest (m), mesic floodplain forest (m)
wet-mesic floodplain forest (wm), wet floodplain forest (w)
wet-mesic prairie (wm), mesic sand prairie (m), loess hill prairie (l)
dry-mesic savanna (dm)
marsh (ma) and shrub swamp (ss). No communities specified for Lake and Pond, Stream, and Cultural classes

Species associations taken from IDNR (1998a), "x" indicates presence in a community, bold and upper case "**X**" represents a dominant species.

(7) Coefficient of wetness values taken from Illinois database in Wilhelm and Masters (2000); values represent estimates of species occurrence in wetlands, and range from 5 to -5:

5 - less than 1% probability of occuring in wetland
3 - 1%-33% probablility of occurring in wetland
0 - 34%-66% probability of occurring in wetland
-3 - 67%-99% probability of occurring in wetland
-5 - greater than 99% probability of occurring in wetland

B.25 RESOURCE SIGNIFICANCE

This section presents a series of narrative statements describing significant resources that occur in the study area. These statements focus primarily on those resources that are significant from a national or regional perspective, and they communicate important information to decision makers within and outside the Corps of Engineers (COE) to evaluate individual project plans formulated during this study, support project justification, and assist in allocating resources among different projects proposed across the nation.

Background. Environmental restoration and protection is now a "priority" output, similar to flood control and navigation, in the COE budgeting process for the Civil Works water resources development program. However, in contrast to more traditional project outputs, many of the outputs of environmental restoration projects cannot be measured in monetary terms. Without the option of quantifying environmental outputs in monetary terms, other criteria must be considered for evaluating and justifying environmental restoration projects in the COE's planning and budgeting processes. One criterion is the "significance" of the environmental resource(s) associated with such projects. For this purpose, resource significance can be described in terms of institutional, public, and technical significance, as defined in the Water Resources Council's *Principles and Guidelines.*

The significance protocol for feasibility studies like this report involves developing a detailed list or inventory of potentially significant resources. Based on this inventory, planners should conduct a detailed analysis to identify individual sources of recognition of the institutional, public, and technical significance of these resources. The analytical phase involves examining the significance of each resource through analyzing levels of significance (e.g., national/international, regional, state, and local). The evaluation phase involves determining the most significant resources by further prioritizing resource significance and evaluating the significance determinations against Corps policy, planning, and budgetary guidance. A detailed list of resources developed for the study area, along with sources and levels of significance, is filed with the St. Louis District, and available upon request.

Significance based on institutional recognition means that the importance of an environmental resource is acknowledged in the laws, adopted plans, and other policy statements of public agencies, tribes, or private groups. Sources of institutional recognition include 1) public laws, executive orders, rules and regulations, treaties, and other policy statements of the Federal government; 2) plans and constitutions, laws, directives, resolutions, gubernatorial directives, and other policy statements of states with jurisdiction in the planning area; and 3) laws, plans, codes, ordinances, and other policy statements of regional and local public entities with jurisdiction in the planning area.

Significance based on public recognition means that some segment of the general public recognizes the importance of an environmental resource. Public recognition may take the form of controversy, support, conflict, or opposition and may be expressed formally (as in official letters) or informally. For environmental restoration projects, willingness to cost share or evidence of local public support (e.g., volunteer efforts to restore urban streams) are also indicators of public significance. Environmentally related customs and traditions should also be considered.

Significance based on technical recognition means that the importance of an environmental resource is based on scientific or technical knowledge or judgement of critical resource characteristics. Examples are spawning areas for native fish in a channelized stream, summer roosting areas for bald eagles, and nesting areas for colonial shorebirds considered scarce due to loss of habitat. Scientific and technical criteria or concepts that can assist in determining and describing technical significance include scarcity, representativeness, status and trends, landscape considerations and connectivity, critical habitat, and biodiversity.

Narrative Statements. The narrative statements presented below discuss significant habitats and significant species in the study area. Significance of habitats is based primarily upon four sources of institutional significance. They include the North American Waterfowl Management Plan, Upper Mississippi River System Environmental Management Program, Clean Water Action Plan, and Action Plan of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. Significance of species is also based primarily upon sources of institutional significance. In addition to the North American Waterfowl Management Plan, these sources include the North American Waterbird Conservation Plan, U.S. Shorebird Conservation Plan, Neotropical Migratory Bird Conservation Program, and Endangered Species Act.

North American Waterfowl Management Plan

About 30 species of waterfowl, including swans, geese, and ducks, use aquatic resources on the Mississippi River's floodplain for resting and feeding while in transit in the study area during fall and spring migration. Waterbodies such as Horseshoe Lake at Horseshoe Lake State Park and surrounding wetlands serve as migratory habitat. A few species, such as the mallard and wood duck, also use these aquatic resources as breeding habitat.

Aquatic resources of the study area are located in southwestern Illinois within a region designated by the North American Waterfowl Management Plan as a waterfowl habitat area of major concern. Approved in 1993 under the NAWMP, the Upper Mississippi River/Great Lakes Region Joint Venture encompasses this area of concern and addresses its waterfowl status and habitat needs. Illinois is one of six states participating in this Joint Venture. The Upper Mississippi River/Great Lakes Region Joint Venture Implementation Plan establishes priority or focus areas of migratory habitat in Illinois, including a band along the Mississippi River representing the Mississippi flyway. The study area occurs in two contiguous migratory focus areas along the river.

One of the goals for Illinois under the Joint Venture's Implementation Plan is to increase by about one-third the amount of wetlands serving as mid-migrational habitat within designated focus areas. The Implementation Plan calls for an increase of about 16,000 acres of wetland habitat in the Mississippi River Focus Area (Madison County and north), and about 20,000 acres in the Southern Illinois Focus Area (St. Clair County and south), by the year 2013. Accomplishing Illinois' portion of the migratory habitat goal will contribute to the Joint Venture's goal in the six-state area of conserving 532,711 acres of habitat within migration focus areas capable of supporting 266 million duck use days during annual fall migration, under average environmental conditions, by the year 2013.

The Illinois Natural History Survey conducts annual censuses of waterfowl populations during the fall and spring along Illinois' major rivers, and Horseshoe Lake at Horseshoe Lake State Park is one of the state's census areas visited on a biweekly basis up and down the Mississippi River. The lake includes a waterfowl management area, and waterfowl hunting opportunities are available to the public over most of the lake. The Illinois Chapter of Ducks Unlimited, Inc., has supported wetland enhancement projects at Horseshoe Lake, and was a partner in a cost-shared enhancement proposal submitted for approval under the North American Wetlands Conservation Act.

Resource Significance: Because the study area's aquatic resources are within a waterfowl habitat area of major concern designated under the North American Waterfowl Management Plan, and within a joint venture area approved under the Plan, their institutional significance is recognized from both a national and international perspective. Additionally, the study area's aquatic resources exist within a priority or focus area designated in the Upper Mississippi River/Great Lakes Region Joint Venture Implementation Plan, which recognizes their institutional significance from a regional perspective. Based on technical recognition, Horseshoe Lake and surrounding wetlands are significant from a state perspective because they are important resources for migratory waterfowl in terms of connectivity. At the landscape level, the lake and its surrounding wetlands serve as an important link in a chain of habitats used by migratory waterfowl along the Mississippi flyway. Based on public recognition, Horseshoe Lake is locally significant because of the hunting opportunities it offers to the public, and because the Illinois Chapter of Ducks Unlimited, Inc., supports wetland enhancement opportunities at the lake.

Recommended Plan: The recommended plan will contribute to the North American Waterfowl Management Plan's goals for conservation and management of waterfowl species and habitat by protecting and restoring mid-migrational and breeding habitat along the Mississippi River flyway. The proposed habitat restoration on the Mississippi River's floodplain will occur within one of the Plan's waterfowl habitat areas of major concern on the North American continent, and within a migratory focus area designated at the regional scale under the Upper Mississippi River/Great Lakes Region Joint Venture's Implementation Plan. This habitat restoration will contribute to the Joint Venture Implementation Plan's goal of increasing wetland habitats by about 36,000 acres in migratory focus areas along the Mississippi River in Illinois. The plan will contribute significantly by providing about 1,350 acres of new wetlands through reestablishment of historic vegetation and functions to former wetlands. It will also restore about 1,325 acres of existing wetlands by improving natural conditions and returning historic functions to degraded wetlands. About 30 species of migratory swans, geese, and ducks should benefit from the restoration of these 2,700 acres of affected wetlands.

The recommended plan will also provide additional benefits to migratory and resident waterfowl species at lake and pond habitats. Within the proposed habitat restoration areas, improving natural conditions and replacing historic functions will restore about 460 acres of lake and pond habitat, which is expected to provide more feeding opportunities for waterfowl by increasing production of aquatic organisms. In addition, indirect benefits to lake and pond habitat are expected outside the proposed restoration areas at the 2,000-acre Horseshoe Lake at Horseshoe Lake State Park. The proposed restoration of 178 miles of tributary streams is expected to reduce excessive sediment loads carried from the bluffs into Horseshoe Lake by the study area's interior drainage system during storm events, and similarly improve feeding opportunities for migratory and resident waterfowl.

Upper Mississippi River System Environmental Management Program

Aquatic resources of the study area are on the floodplain of the Upper Mississippi River System, which consists of the commercially navigable reaches of the Upper Mississippi and Illinois Rivers. As the UMRS is the only inland waterway in the U.S. formally recognized by Congress as a nationally significant ecosystem and commercial navigation system, the Upper Mississippi River System Environmental Management Program was established in 1986 to monitor, research, and restore habitats in the river system. The first in a periodic series of Habitat Needs Assessments was completed in 2000 to provide a system-wide analysis of historic, existing, and forecasted future habitat conditions in the river and adjacent floodplain. The HNA also identifies habitat needs on a system-wide and river reach basis, which constitute a set of objectives for aquatic habitat protection and restoration.

Within the Open River Reach of the Upper Mississippi River, which extends from St. Louis to the Ohio River and includes the study area, over half of the terrestrial floodplain consisted of forest in the early 1800s. Marsh, prairie, and swamp comprised the remaining historic terrestrial cover types, and they were interspersed by floodplain lakes and seasonally flooded backwaters. Under contemporary conditions, much of the terrestrial floodplain has been leveed for agricultural production and replaced by cropland, and remaining natural habitats are degraded. Habitat degradation is expected to continue, while future changes in geomorphic features of the river are expected to be relatively small. For the Open River Reach, the HNA calls for an increase in the amount of prairie, marsh, and forest by about 100,000 acres. There is a broadly recognized need among natural resource managers and scientists for improved habitat quality, habitat diversity, and a closer approximation to the pre-development hydrological regime. These scientists and resource managers rated floodplain prairies, hardwood forests, marshes, and deep backwaters as the most threatened habitats of the UMRS. River regulation, sedimentation, and floodplain development were cited as the primary stressors affecting these habitats.

Resource Significance: Because the study area's aquatic resources on the Mississippi River's floodplain are located within the floodplain of the Upper Mississippi River System, they can be recognized as part of a nationally significant ecosystem. Also, because these resources are within an area of the UMRS targeted for habitat restoration under the Upper Mississippi River Environmental Management Program, its natural resources can be recognized as institutionally significant from a regional perspective. In addition, floodplain prairies, hardwood forests, marshes, and deep backwaters within the study area can be recognized as technically significant from a regional perspective based on status and trends as described in the Habitat Needs Assessment.

Recommended Plan: The recommended plan will contribute to the goal of the Habitat Needs Assessment of the Upper Mississippi River System Environmental Management Program of increasing by about 100,000 acres the amount of prairie, marsh, and forest on the Mississippi River's floodplain within the river reach extending from St. Louis to Cairo. The plan will significantly increase the area of prairie, marsh, and forest in this river reach by about 2,365 acres. The plan is also expected to meet the need for three specific habitat improvements identified in the Habitat Needs Assessment. First, the plan is expected to restore existing degraded habitats by improving natural habitat conditions, thereby improving habitat quality. Second, the plan will restore a flood pulse to floodplain habitats, thereby returning the current hydrological regime to a closer approximation of pre-development conditions. Lastly, the plan will restore historically typical floodplain habitats that are now uncommon, such as floodplain prairies and streams, thereby increasing floodplain habitat diversity.

Clean Water Action Plan

Small watersheds for which restoration priorities have been established under the Clean Water Action Plan encompass the study area. The Clean Water Action Plan is a comprehensive plan initiated in 1998 to revitalize the nation's commitment to water resources. The U.S. Army Corps of Engineers is a partner to this national interagency program consisting of nine federal agencies. One of the key actions identified in the Action Plan is the opportunity for states and tribes to provide unified watershed assessments. Unified or standardized procedures for states and tribes to assess water quality and report results can better identify priorities for watershed restoration and protection on a nation-wide basis.

The Illinois Environmental Protection Agency, along with the Natural Resources Conservation Service, conducted a unified watershed assessment and established watershed restoration priorities for Illinois in 1998. Major stakeholders participating in this effort included the Illinois Department of Agriculture, Illinois Department of Natural Resources, U.S. Army Corps of Engineers, and The Nature Conservancy. Each of 820 watersheds in the state was categorized according to the condition of its waters and the overall health of its aquatic system. Watersheds were considered to be in need of restoration if they met any of the following criteria: 1) small watersheds with water quality limited waters listed by the IEPA under Section 303(d) of the Clean Water Act; 2) priority watersheds recently identified under the Environmental Quality Incentives Program (EQIP) administered by the U.S. Department of Agriculture; 3) watersheds with water quality projects funded under the Watershed and Flood Prevention Act (Public Law 83-566) and administered by the Natural Resources Conservation Service, and approved or under implementation; 4) watersheds having degraded aquatic communities in need of restoration according to the aquatic community classification system of The Nature Conservancy. Watersheds in need of restoration were assigned Category I status.

Five watersheds identified in Illinois' unified watershed assessment envelop the study area, and each one has been classified as a Category I watershed in need of restoration. These watersheds, by ID number, are ILJ81, ILJMA01, ILJMAC02, ILJN02, and ILJNA01. Boundaries of these five Category I watersheds correspond roughly with those of the major watersheds defined for this study. Watershed restoration measures can improve water quality and also restore aquatic systems.

Resource Significance: Because the watersheds in the study area are designated as priority watersheds for restoration in Illinois under the Clean Water Action Plan, they can be recognized as institutionally significant from a national perspective.

Recommended Plan: The recommended plan will contribute toward the goals of the Clean Water Action Plan by restoring 178 miles of streams in five small watersheds identified as priority watersheds for restoration in Illinois. The plan's proposed restoration of tributary streams in these five watersheds is expected to correct silt and sedimentation problems that have degraded in-stream habitat. Improving the quality of in-stream habitat should restore conditions that can support a diverse food web of animals by improving substrate quality, restoring channels and pool and riffle complexes, and encouraging recolonization by benthic invertebrates. Restoration of riparian forest along tributary streams at the 131 proposed sediment detention basins is expected to improve degraded habitat conditions by reintroducing uncommon native tree species such as oaks. Under the plan, storm water carried by the tributary streams proposed for restoration is to serve as the source of the flood pulse to be reintroduced into the proposed habitat restoration areas on the Mississippi River's floodplain. An expected secondary effect of tributary stream restoration is improvement of conditions in the floodplain habitats, by reducing excessive sediment loads currently reaching the floodplain.

Action Plan of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force

The Mississippi River/Gulf of Mexico Watershed Nutrient Task Force is a partnership of Federal and state agencies and tribes committed to the development of a national strategy to reduce the frequency, duration, size and degree of oxygen depletion of the hypoxic zone of the northern Gulf of Mexico. The Corps of Engineers is a participating agency. An overabundance of nutrients, primarily nitrogen, carried by the Mississippi and Atchafalaya Rivers is believed to be a primary cause of excessive algal growth in Gulf waters in the Texas-Louisiana area. Algal die-off and resulting depletion of dissolved oxygen create hypoxic conditions that are unable to support sustainable populations of fish, shrimp, crabs, zooplankton, and other important aquatic species. Excess nutrients entering the Gulf from the Mississippi River result from human activities occurring within the river's basin, primarily in the form of nonpoint sources.

In accordance with The Harmful Algal Bloom and Hypoxia Research and Control Act of 1998, the task force released an action plan describing the problem and a strategy for reducing the hypoxic zone and restoring and protecting waters throughout the Mississippi and Atchafalaya River drainage basins (MR/GMWNTF 2001). Over half of the nitrate load reaching the Gulf enters the Mississippi River above the Ohio River, and comes from wastewater discharges and drainage from agricultural lands in Illinois and other Midwestern states. The primary approach to reduce hypoxic conditions in the Gulf is reducing the movement of nitrogen into streams and rivers in the river basins, and increasing denitrification and nitrogen retention within these basins. Federal agencies are to consider the potential for benefits to the Gulf of Mexico, and identify opportunities to restore floodplain wetlands (including restoration of river inflows) along and adjacent to the Mississippi River.

Resource Significance: Because the study area is located on the floodplain of the Mississippi River north of the Ohio River, it occurs in an area highlighted by the Action Plan of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force as potentially important to contributing to the Action Plan's goals of reducing nitrogen loads to the Gulf of Mexico and improving waters within the river's basin. As such, the study area and its aquatic resources can be recognized as institutionally significant from a regional perspective. Given the potential to implement one of the Action Plan's recommended actions in the study area, namely the restoration of floodplain wetlands, further significance is associated with study area and its aquatic resources.

Recommended Plan: The plan's proposed restoration of wetlands on the Mississippi River's floodplain in Illinois supports the Action Plan of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. The proposed restoration of about 2,700 acres of floodplain wetlands is expected to promote nitrogen retention within the study area's watersheds, reduce nitrogen loads of inflow from the interior drainage system to the Mississippi River, and contribute to the eventual improvement of the hypoxic condition in the northern Gulf of Mexico.

Species of Concern

Aquatic resources within the study area serve as migratory, wintering, or breeding habitat for 34 bird species of concern. Declining population levels are the cause of concern for these species. The study area's aquatic resources also support two Federally threatened species (a bird and a plant).

The federal government recognizes and supports various conservation efforts promoting the well-being of these bird species of concern. Among the federal agencies, the U.S. Fish and Wildlife Service is the principal agency participating in these efforts. The North American Wetlands Conservation Act of 1989 authorized significant federal funding in the form of a grant program to encourage partnership efforts among government agencies and other interested parties to protect, enhance, restore, and manage an appropriate distribution and diversity of wetland ecosystems and other habitats of migratory birds, fish, and other wildlife in North America. This grant program awards funding to partnerships that conserve wetland ecosystems and the wildlife they support in the U.S., Canada, and Mexico. The federal government has entered into international obligations contained in these bird conservation efforts with Canada, Mexico, and other countries.

The species addressed by these bird conservation efforts include the 34 bird species of concern for the study area, which comprise four major groups: waterfowl, waterbirds, shorebirds, and land birds.

Bird Conservation Initiatives

Bird species of concern have been the focus of a number of ongoing bird conservation initiatives and partnerships in North America. These efforts aim to protect declining species before they become endangered or threatened. Protection efforts include the identification of habitat needs. Habitat goals to meet those needs are most effectively established at the local and regional level.

These bird initiatives and partnerships are coordinated under the North American Bird Conservation Initiative. Under this umbrella initiative, the land area of Canada, the U.S., and Mexico has been divided into 37 bird conservation units or regions. The study area occurs in Bird Conservation Region 22 (Eastern Tallgrass Prairie), which includes most of Illinois and portions of eight adjacent states (NABCI undated).

Waterfowl are the focus of the North American Waterfowl Management Plan. Waterfowl species of concern have been designated by the U.S. Fish and Wildlife Service at the national scale to facilitate implementation of waterfowl conservation efforts, including the North American Wetlands Conservation Act's grant program for 2003 (USFWS 2003). Waterfowl species of concern that are present in the study area and listed by the Service for implementation of this grant program are discussed below.

Waterbirds are addressed in the North American Waterbird Conservation Plan, which provides a broad continental approach for the conservation of waterbird species occurring in 29 nations ranging from Alaska and Arctic Canada to Central America, the Caribbean, and Pacific Islands such as Hawaii (Kushlan et al. 2003). This broad area is divided geographically into 16 conservation planning regions. The Plan identifies the conservation status of waterbird species at continental and regional scales. The Upper Mississippi Valley/Great Lakes region contains the study area, and it corresponds closely with the Upper Mississippi Valley/Great Lakes Joint Venture area for waterfowl. Regional habitat needs have yet to be established, but a primary goal for waterbirds in the UMVGL region is "to ensure the availability of waterbird nesting and foraging sites by protecting, restoring, and managing a variety of habitat types throughout the region (Kushman et al. 2003:48). The U.S. Fish and Wildlife Service has developed several regional lists of bird species of concern that include waterbirds (USFWS 2002, USFWS 2003), including a list of wetland-associated waterbird species of concern for the Eastern Tallgrass Prairie region (USFWS 2003). Waterbird species of concern that are present locally and included in the latter list are discussed below.

Shorebirds are the focus of the U.S. Shorebird Conservation Plan. Although many species frequent intertidal mudflats, estuaries, and ocean beaches, many also use freshwater wetlands, mudflats, and lakeshores in the interior of the U.S. Implementation of this plan at the regional scale follows the joint venture boundaries developed for the North American Waterfowl Management Plan. A shorebird conservation plan has been developed for the Upper Mississippi Valley/Great Lakes Joint Venture, and it adopts the same wetland habitat restoration goals established for the joint venture under the NAWMP (de Szalay et al 2000). Shorebird species of concern are identified in de Szalay et al. (2000) for the joint venture's area. Shorebirds are also included among wetland-associated bird species of concern designated for the Eastern Tallgrass Prairie region by the U.S. Fish and Wildlife Service (USFWS 2003). Local shorebird species that are included in this latter list are discussed below.

Land birds are addressed under the Neotropical Migratory Bird Conservation Program, more commonly called "Partners in Flight". Under this program, bird conservation planning units have been delimited in the U.S. and part of Canada. The study area occurs in Physiographic Unit 31, called the Prairie Peninsula. This unit envelops most of Illinois and portions of three adjacent states. Fitzgerald et al. (2000) identified landbird species of concern for the Prairie

Peninsula unit, and provided conservation recommendations for high priority grassland, savanna, and forest bird species. To conserve high priority grassland species, patches of grassland are to be restored of sufficient size to support self-sustaining populations. Recommendations for high priority forest species include maintenance of existing small forest patches to support migrating individuals and to produce some offspring, and expansion of forest patches to sizes at which brood parasitism and rates of predation on forest interior nesting species are extensively reduced. The U.S. Fish and Wildlife Service has identified wetland-associated nongame land bird species of concern for the larger Eastern Tallgrass Prairie region (USFWS 2003). Local landbird species of concern that are included in this latter list are discussed below.

Resource Use by Bird Species of Concern

Waterfowl. Ten priority species of dabbling and diving ducks use aquatic resources on the Mississippi River's floodplain in the study area as migratory, wintering, or breeding habitat. Waterbodies such as Horseshoe Lake, and herbaceous wetlands such as marshes in its vicinity, serve as migratory feeding areas for the wood duck, American black duck, American wigeon, mallard, northern pintail, canvasback, redhead, ring-necked duck, greater scaup, and lesser scaup. Some individuals of these species, except for the wood duck, black duck, and wigeon, also use lake and marsh habitats when they overwinter in this area. Additionally, local forested wetlands also serve as migratory habitat for the wood duck, mallard, and black duck, and some wood ducks and mallards use local aquatic habitats for breeding.

Waterbirds. Four priority species of herons and rails use aquatic resources on the Mississippi River's floodplain in the study area as migratory and breeding habitat. They include three herons (least bittern, black-crowned night-heron, yellow-crowned night-heron) and one rail (common moorhen). Some local herbaceous wetlands such as marshes serve as breeding habitat for these species, and a rookery near East St. Louis supports the black-crowned night-heron. Because none of these species overwinter in this area, they use the same types of breeding habitat during migration. The black-crowned and yellow-crowned night-herons also use floodplain and tributary streams in the uplands adjacent to the floodplain for feeding habitat where they catch animals such as aquatic invertebrates, frogs, fish, and salamanders.

Shorebirds. Eight priority species of sandpipers use aquatic resources on the Mississippi River's floodplain in the study area as migratory habitat. They include the greater yellowlegs, Hudsonian godwit, marbled godwit, white-rumped sandpiper, stilt sandpiper, buff-breasted sandpiper, short-billed dowitcher, and American woodcock. These species are neotropical migrants, and all but the woodcock use only herbaceous wetlands such as marshes in the study area for feeding during migration. The American woodcock also uses forested wetlands for feeding during migration; some individuals breed in the area and use upland and wetland forests as well as herbaceous wetlands for breeding habitat. The study area's Horseshoe Lake, at Horseshoe Lake State Park, is technically significant from a statewide perspective because it receives consistent use from year to year by thousands of migrating shorebirds. The U.S. Fish and Wildlife Service has included the lake in a preliminary list of important shorebird migratory stopovers in Illinois.

Landbirds. One species of hawk and ten species of songbirds use aquatic resources on the Mississippi River's floodplain in the study area as migratory and/or breeding habitat. They include the northern harrier, Acadian flycatcher, willow flycatcher, sedge wren, marsh wren, cerulean warbler, prothonotary warbler, Louisiana waterthrush, grasshopper sparrow, Le Conte's sparrow, and rusty blackbird. All but the last two birds are neotropical migrants. The northern harrier has been observed using herbaceous wetlands and cropland near Horseshoe Lake for feeding during migration. Grasslands such as prairies can also serve as migratory habitat, and individuals that overwinter in the area may also use these same habitats. Of the songbirds, herbaceous wetlands provide breeding and/or migratory habitat for the willow flycatcher, sedge and marsh wrens, Le Conte's sparrow, and rusty blackbird. Forested wetlands serve as breeding and/or migratory habitat for the Acadian flycatcher, cerulean warbler, prothonotary warbler, Louisiana waterthrush, and rusty blackbird. The sedge wren, grasshopper sparrow, and Le Conte's sparrow use grasslands or prairies, including those with wet conditions. Among the eleven species, the marsh wren and prothonotary warbler are wetland-specific in their habitat requirements, whereas the others are more generalists and also use drier habitats that are not wetlands. The Louisiana waterthrush also uses tributary streams in the uplands adjacent to the floodplain for feeding habitat where it eats aquatic insects and invertebrates.

Resource Use by Federally Threatened Species

The bald eagle, a federally threatened species, is associated with forested wetlands and waterbodies such as lakes and rivers. Details concerning this species are provided in Table B.13 and Annex B.14 in Appendix B. This species has been observed infrequently in the winter within the study area on the Mississippi River's floodplain along the shore of Mullens Slough, a lake-like waterbody. The primary goal of the Northern States bald eagle recovery plan is to reestablish sustainable bald eagle populations in suitable habitats throughout the northern states area (USFWS 1983). Objectives developed to achieve this goal include the assessment of current status of populations and habitat, determination of population levels and habitat base required to attain recovery, fostering of populations through protective and enhancement measures, and coordination and implementation of recovery efforts.

The decurrent false aster, a federally threatened plant, is a perennial Mississippi River floodplain plant of open, wetland habitats. Historically it occurred in wet prairies, shallow marshes, and shores of rivers, creeks, and lakes on the floodplain of the Illinois and Mississippi Rivers. Currently it is found within the project area at a number of locations, including two near Horseshoe Lake (a marsh and an old field), and along two canals (Cahokia Canal and Landsdowne Ditch) where alluvial soils have been disturbed. Additional information concerning this plant is provided in Annex B.14 in Appendix B. Objectives of the recovery plan for this species include the determination of life history requirements, protection of existing populations, enhancement of existing populations through appropriate management practices, and the reintroduction of populations into suitable protected areas (USFWS 1990).

Resource Significance: The listing of certain migratory birds as species of concern by the U.S. Fish and Wildlife Service demonstrates that the Federal government recognizes them as highly significant. Their institutional significance is further supported by various international agreements the Federal government has entered into with Canada, Mexico, and other countries to foster continental and regional bird conservation strategies. Aquatic habitats in the Project area are technically significant because they provide connectivity for the seasonal movements of these 34 migratory bird species of concern. They are also technically significant because of their potential for recovery of of two federally threatened species.

Recommended Plan: The recommended plan is expected to benefit 34 priority species of birds and two federally threatened species (one plant and one bird) through the restoration of about 4,300 acres of aquatic habitats on the Mississippi River's floodplain, 178 miles of tributary streams, and about 380 acres of riparian forest along the tributary streams. Migratory and breeding habitat for 10 priority species of ducks is expected to be provided by the proposed restoration of 2,700 acres of wetlands and 460 acres of lake habitat within eight proposed floodplain habitat restoration areas. The proposed plan will support the North American Waterbird Conservation Plan by providing migratory and breeding habitat for four heron and rail species of concern through the proposed wetland restoration, along with the proposed restoration of about 11 miles of floodplain streams. Feeding opportunities for two of these heron species are also expected to improve from the proposed restoration of 178 miles of tributary streams. The recommended plan will contribute to the U.S. Shorebird Conservation Plan by providing migratory habitat to eight sandpiper species of concern through the proposed floodplain wetland restoration. Horseshoe Lake at Horseshoe Lake State Park, recognized under the Shorebird Plan as an important stopover in Illinois for migratory shorebird species, is expected to indirectly benefit from the proposed plan through reduced levels of sedimentation, which is expected to provide improved feeding opportunities to shorebirds. The Neotropical Migratory Bird Conservation Program (Partners in Flight) and 11 landbird species of concern are expected to benefit from the recommended plan through the proposed restoration of forested wetlands, marshes, wet prairies, and floodplain and tributary streams, and restoration of riparian forest along tributary streams. Restoration of forested wetland habitat at the proposed Brushy Lake action area is expected to meet the size requirements for breeding habitat of some area-sensitive landbird species of concern, such as the Acadian flycatcher and Louisiana waterthrush. Similarly, area-sensitive grassland breeding species of concern like the grasshopper sparrow and sedge wren are expected to benefit from restoration of floodplain prairie at the Judy's-Burdick and Cahokia Prairie action areas. The federally threatened bald eagle is expected to benefit from improved feeding opportunities through proposed restoration of 460 acres of lake habitats. The proposed plan will contribute to the recovery plan of the federally threatened decurrent false aster through restoration of about 1,500 acres of marsh and wet prairie habitats where it can be introduced.

APPENDIX C - HYDROLOGY

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APPENDIX C - HYDROLOGY

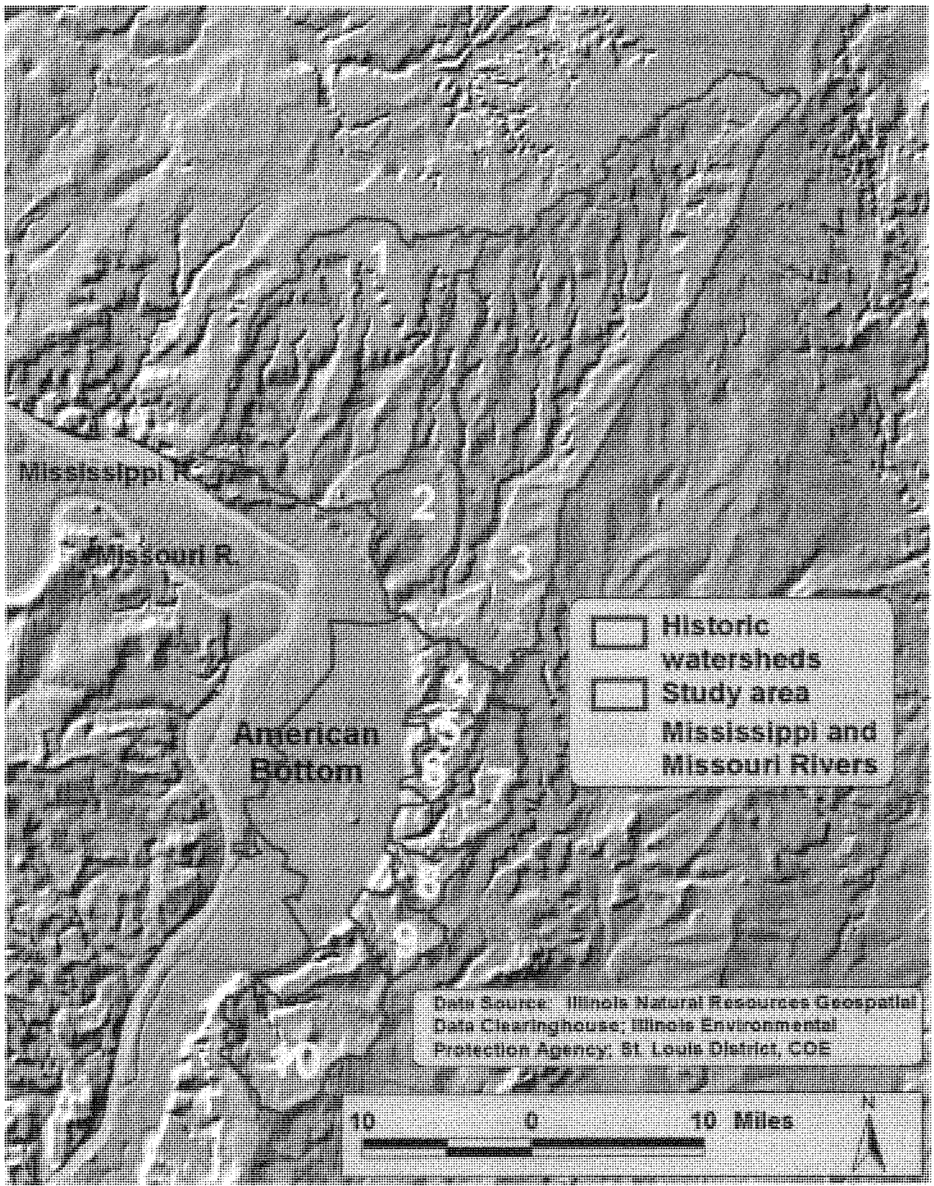
C.1 HYDRAULIC HISTORY OF THE STUDY AREA

An analysis of the historic watersheds that drained into the study area in pre-settlement times indicates that some 326,016 acres contributed stormwater runoff to the floodplain. Historic mapping of the period showed the effects of floods from these watersheds on the floodplain, some of which still occur today in spite of man's efforts to reduce flooding within the area.

Watershed number (in Figure C-1)	Watershed name	Area (acres)	Area (sq. miles)	Percent area of all watersheds
1	Wood River *	77,702	121.4	0.24
2	Indian Creek *	25,734	40.2	0.08
3	Cahokia Creek *	138,880	217.0	0.43
	Bluff 1	2,895	4.5	0.01
4	Judy's Branch	5,453	8.5	0.02
5	Burdick Branch	1,829	2.9	0.01
	Bluff 2	666	1.0	< 0.01
6	Schoolhouse Branch	4,546	7.1	0.01
	Bluff 3	1,026	1.6	< 0.01
	Bluff 3/4	24	<0.1	< 0.01
7	Canteen Creek	14,538	22.7	0.04
8	Little Canteen Creek	5,069	7.9	0.02
	Bluff 4	960	1.5	< 0.01
9	Schoenberger Creek	7,741	12.1	0.02
	Bluff 5	979	1.5	< 0.01
(10)	Powdermill Creek	840	1.3	< 0.01
(10)	Bluff 6	1,178	1.8	< 0.01
10	Prairie du Pont Creek (including Hickman Creek)*	35,955	56.2	0.11
Total		**326,016**	**509.4**	**1.00**

* Area of watershed obtained from IEPA (2000), all others from this study

Figure C-1 Historic Watersheds



During the settlement of the floodplain the first priority of those attempting to live and farm in this fertile area was to control the unpredictable effects of the Mississippi River. Settlers constructed dikes, berms and like structures during this period to protect themselves from being flooded by the river and in some instances by the tributary streams. The settlement that is now East St. Louis was moved to high ground to protect it from flooding. Eventually, a main line levee system similar to the one that now protects the area from the effects of the river became a reality. Because of its location and access to the river this area became a transportation hub and manufacturing center. Over time the levee system we see today was constructed and now provides an urban level of protection (500 year) from the flooding by the river. Since its completion this area has not been affected directly by the Mississippi River.

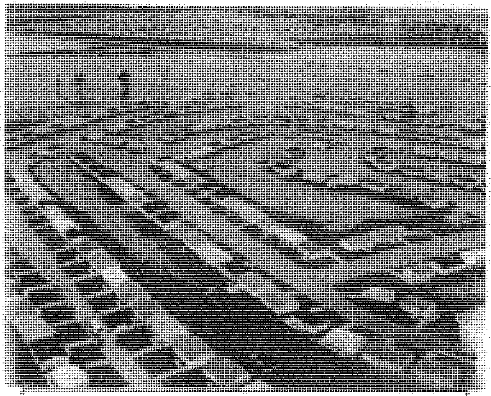
During this era the interior drainage system seen today had to be engineered to supplement the river levee system. The diversion canals to the north (Cahokia Diversion Canal) and south (Prairie Dupont) of the system eliminated drainage from 220,576 acres, approximately 61% of the bluff area that historically drained into the floodplain. The construction in the early 1900s of the Cahokia Canal and Harding Ditch system removed the remnants of creeks from the floodplain and ensured interior drainage was taken as directly as possible to the levee for removal. These engineering accomplishments changed the character of the hydraulic system forever.

C.2 INTERIOR FLOODING

Although the bottomlands in the East St. Louis vicinity are well protected from direct flooding from the Mississippi River by a series of levees and floodwalls the area has a long history of serious interior flooding caused by storms producing flows that exceed the capacity of the canals in the bottomlands area. Rainfall events producing widespread damages across the floodplain occurred in the study area as a result of the storms of August 1915, July 1942, August 1946, July 1952, June 1957, May 1961, and May 1995. The most damaging event occurred in August 1946 when some 19 ½ inches of rain fell over Madison and St. Clair Counties during an eight day period that produced an average depth of 15.1 inches over the entire study area. Flood damage from this event was estimated to be $6 million (approximately $56,800,000 in 2001 dollars) and the event was estimated to be more rare than the 100-year storm in terms of inches of rainfall. Flooding, caused by a 14-inch rainfall over a two-day period in June 1957 caused approximately $4 million ($25,000,000 in 2001 dollars) in damages. This event and the 1995 event produced approximately a 100-year rainfall with average depths of over 8 inches across the study area.

Surface water flooding has increased in severity due to upland development, which increases runoff of stormwater into the bottomlands. As the higher flows follow the natural tributary watercourses and enter the man-made ditches in the bottomland, flooding can occur due to overtopping these existing ditches or due to failures of their spoilbank levees. Natural ponding areas in the bottomlands can also fill to capacity and spill into adjacent developed low areas.

Most interior flooding in the bottomlands occurs from intense thunderstorms over the upland (bluff) areas. In May 1961, excessive runoff caused just this type of damage to the study area. This type of flooding occurs when the capacity of the drainage canals is exceeded and/or when interior ponding in low-lying areas occurs with no system in place to get the ponded water into the drainage canals. Interior ponding occurs in low-lying areas (eg: old sloughs and shallow lake beds) within, which surface water runoff collects. Most of these areas are undeveloped or partially farmed and the water which collects during most small rain events causes very little or minor crop damage.



Homes Flooded by Impounded Rainfall Runoff, May 1961, State Highway 3 is in Background

More frequent storm events affecting a specific drainage area create damages limited to a particular watershed. This watershed specific type flooding was seen in the area most recently in 1993, 1994, 1995 and 1996. These problems are widespread across the area. Interior floods that cause some damage occur typically every two to five years.

Table C-1 is a display from the 1965 Corps' study of acres flooded and damages versus flood events of various recurrence intervals for the existing condition. Table C-1 and C-2 show acres flooded and damages to several categories of property versus flood events of various recurrence intervals taken from the Re-evaluation Report prepared in 1984.

Table C-1 Damages Without Project – 1965 Report

TABLE B-1

Acres subject to damage, without improvements

Damage area	5-year storm			10-year storm			50-year storm		
	Agricul*	Developed	Non-prod	Agricul*	Developed	Non-prod	Agricul*	Developed	Non-prod
Cahokia Canal	3,895	475	567	4,657	524	686	6,144	676	1,041
Blue Waters Ditch	115	305	312	160	358	364	302	486	651
Upper Harding Ditch	468	246	208	585	298	273	985	443	431
Canal No. 1	2	0	0	2	0	0	58	0	0
Total	4,480	1,026	1,087	5,404	1,180	1,323	7,489	1,605	2,123

*Area subject to 48-hour inundation.

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Table C-2 Existing Conditions Without Improvements 1984 Report

TABLE 1
EXISTING CONDITION FLOOD DAMAGE

Event (Recurrence Interval)	Acres Flooded	Agricultural Damage ($-'82 P.L.)	Residential Structures Flooded	Residential Damage ($-'82 P.L.)	Commercial/ Industrial Structures Flooded	Commercial/ Industrial Damage ($-'82 P.L.)	Total Damage ($-'82 P.L.)
Cahokia Canal Area							
2-years	4,097	516,100	34	3,400	6	52,100	571,600
5-years	6,536	823,400	100	35,000	12	119,400	977,800
10-years	8,137	1,025,100	340	563,500	78	1,545,200	3,133,800
25-years	10,352	1,304,100	523	748,700	125	6,110,500	8,163,300
50-years	11,414	1,437,900	617	1,008,100	127	9,537,100	11,983,100
100-years	12,486	1,572,900	679	1,398,000	144	13,472,800	16,443,700
500-years	15,202	1,915,100	880	2,307,100	169	19,064,100	23,286,300
SPF	29,409	3,704,900	1,406	4,241,100	208	21,541,400	29,487,400
Harding Ditch Area							
2-years	1,476	185,800	21	131,000	0	0	316,800
5-years	2,362	297,500	140	752,800	2	18,600	1,068,900
10-years	3,139	428,000	160	1,115,500	5	77,700	1,621,200
25-years	3,874	488,000	206	1,804,700	7	164,300	2,457,000
50-years	4,387	552,700	227	2,761,800	8	284,600	3,599,100
100-years	4,977	626,900	286	3,448,600	13	434,600	4,510,100
500-years	5,943	748,100	627	6,076,600	22	805,000	7,629,700
SPF	8,025	1,010,600	1,001	12,770,400	33	1,855,400	15,636,400

Table C-3 Future Conditions Without Improvements 1984 Report

TABLE 2
FUTURE CONDITION FLOOD DAMAGE WITHOUT IMPROVEMENTS

Event (Recurrence Interval)	Acres Flooded	Agricultural Damage ($-'82 P.L.)	Residential Structures Flooded	Residential Damage ($-'82 P.L.)	Commercial/ Industrial Structures Flooded	Commercial/ Industrial Damage ($-'82 P.L.)	Total Damage ($-'82 P.L.)
Cahokia Canal Area							
2-years	4,097	565,000	34	3,900	6	52,100	721,000
5-years	6,536	1,060,900	100	40,300	12	119,400	1,220,600
10-years	8,137	1,320,800	340	648,000	78	1,545,200	3,514,000
25-years	10,352	1,680,300	523	861,000	125	6,110,500	8,651,800
50-years	11,414	1,852,700	617	1,159,300	127	9,537,100	12,549,100
100-years	12,486	2,026,700	679	1,607,700	144	13,472,800	17,107,200
500-years	15,202	2,467,600	880	2,653,200	169	19,064,100	24,184,900
SPF	29,409	4,773,700	1,406	4,877,300	208	21,541,400	31,192,400
Harding Ditch Area							
2-years	1,476	239,400	21	150,600	0	0	390,000
5-years	2,362	383,400	140	865,700	2	18,60	1,267,700
10-years	3,139	551,600	160	1,282,800	5	77,700	1,912,100
25-years	3,875	628,900	206	2,075,400	7	164,300	2,868,600
50-years	4,387	712,300	227	3,176,100	8	284,600	4,173,000
100-years	4,977	807,900	286	3,965,900	13	434,600	5,208,400
500-years	5,943	964,100	627	6,988,100	22	805,000	8,757,200
SPF	8,025	1,302,400	1,001	14,686,000	33	1,855,400	17,843,800

Between 1993 and 1996 the area experienced both widespread and specific drainage area flooding which prompted a federal disaster area declaration in each of these years. In 1993, the declaration covered both Madison and St. Clair County while in the spring of 1994 it covered St. Clair County. In the spring of 1995 and the spring of 1996, the declaration covered Madison and St. Clair Counties. Table C-4 and C-5 shows rainfall figures for the 1995 and 1996 events.

Table C-4 1995 Rainfall

Gage	Date	Rainfall
Belleville, IL	16 May 1995	3.2 inches
	17 May 1995	4.4 inches
	18 May 1995	1.2 inches
Total		**8.8 inches***
St. Louis Airport	16 May 1995	5.59 inches
	17 May 1995	3.95 inches
Total		**9.54 inches***

*In Metro-East Area 1995 Storm considered 100-year event

Table C-5 1996 Rainfall

Gage	Date	Rainfall
Belleville	28-29 April 1996	6.40 inches*
Mel Price Lock and Dam	28-29 April 1996	7.70 inches*

* In Metro-East Area 1996 Storm considered 50-year event

The following two tables show the relief provided during this period through the State Emergency Management Agency.

Table C-6 IFG Assistance Totals – Madison and St. Clair Counties

Disaster Relief #	Madison County	St. Clair County	Total
997 (1993)*	$332,257.00	$273,411.00	$605,668.00
1025 (1994)	Not IA Declared	$502,415.00	$502,415.00
1053 (1995)	$111,242.00	$1,843,585.00	$1,954,827.00
1112 (1996)	$29,725.00	$1,139,696.00	$1,169,421.00
Total	**$473,224.00**	**$3,759,107.00**	**$4,232,331.00**

*1993 may include some relief for Mississippi Flooding not addressed by this study.

Table C-7 Public Assistance Sub-Grant Summary

Disaster Relief #*	Madison County	St. Clair County	Total
1025 (1994)	Not IA Declared	$1,557,405	$1,557,405.00
1053 (1995)	$2,320,197.00	$4,114,258.00	$6,434,455.00
1112 (1996)	$3,958,553.00	$3,506,913.00	$7,465,466.00
Total	**$6,278,750.00**	**$9,178,576.00**	**$15,457,326.00**

*1993 not included classified as Great Midwest Flood and damages included Mississippi River flooding not addressed by this study.

Since the Corps was not involved in any analysis of the study area at the time these damage figures were determined by the state, they are the only documentation of the devastation created by these flooding events and must therefore be generalized as being the type seen by the area with some frequency.

C.3 SUMMARY OF HYDRAULIC ANALYSIS OF PROJECT ACTION AREAS

Hydrology played a key role in the formation and characteristics of the pre-settlement floodplain ecosystem. The analysis of the hydrologic and hydraulic regime provided the Re-study Team insights into the potential for restoration in the study area. Recent scientific documentation of the benefits of a flood pulse on natural areas led to the concept of using stormwater, the only remaining source of water to the floodplain, as a beneficial component to restoration. As described in Section 2, the historic Cahokia Creek drained approximately 257 square miles onto the floodplain. Historic mapping documents the action of the unleveed Mississippi River on the floodplain. The River left lakes, sloughs and meander scars across the study area. These overbank flooding events in turn created the ridge and swale soil characteristics that are found today. All of these water related dynamics are central to the understanding of the pre-settlement condition and the potential for ecosystem restoration under today's conditions.

The current problem of interior flooding became an opportunity to study the partial restoration of the pre-settlement hydraulic conditions. However, since the restoration project would only address a fraction of the area that was once influenced by the hydraulic regime of the Mississippi River and of the historic Cahokia Creek, the biology team realized that re-creation of hydraulic events had to be controlled to ensure that destruction of newly restored ecosystems was prevented. While the completely natural pre-settlement state would have included total periodic destruction in addition to natural succession across the floodplain, this was not considered desirable for the restoration project based on its limited size. For this reason, the re-study team established hydraulic objectives that identified beneficial periodic recharging of the areas in order to diminish the potential hazard for destroying the restored areas.

One of the objectives, restore flood pulse, utilized criteria to maximize flood pulse depth not to exceed that of the 1844 flood event, and, a duration not to exceed 14 days. These criteria were used to guide the formulation process through the establishment of the flood pulse restoration criteria for the action areas used during the iterative process described in Section 6. As a part of this process, each action area was analyzed for its ability to contribute to overall study objectives. Table C-8 provides a comparison of the hydraulic study targets at each site.

Table C-8 Hydraulic Study Targets

Proposed Action Area	Maximum Stage, 1844 Flood	
	Surface elevation, feet NGVD	Range of water depth across site, feet
Old Cahokia Creek	428	0-3
Judy's-Burdick	426	6-8
Dobrey Slough	426	1-15
Elm Slough	426	10-20
Brushy Lake	424	5-20

Hydraulic analysis began by determining volumes in acre-feet that are generated today from bluff run-off for different storm events. This volume was then compared to the capacity of the targeted habitat area and the desired flood pulse disturbance it could beneficially utilize. As will be reiterated throughout this Appendix, the major limiting factors for this analysis became the size of the existing flood control system and the infrastructure of the study area. Depth and duration analysis was performed to ensure a balance between inundation levels and duration at that level. The duration needing to be controlled in order to ensure that habitat areas are not adversely impacted.

All hydraulic analysis contained in this appendix is related to the modifications required to the existing flood control system (drainage ditches) leading to and from selected habitat areas, containment requirements to re-introduce a flood pulse regimen to the area, and elevation changes required across existing sites to ensure desired hydraulic connections are made and maintained.

With the exception of restoration of the Old Cahokia Creek, all channel modifications discussed in this Appendix are related to alterations required for the existing flood control system to carry the desired volume of water from the bluff line to habitat areas. Restored creek channels contained within the habitat areas such as those recommended at Brushy Lake, Indian Lake, and Judy's-Burdick Branch action areas are strictly environmental features to recreate flowing streams through these sites. For this reason, hydraulic analysis or design studies attempting to define or mimic the original natural systems at these selected action areas have been made. Channel modifications for the Old Cahokia Creek action area are designed to re-connect the remaining remnant of the historic creek on a very reduced scale in order to recreate a riverine overflow regime at this location. The decision will allow this remnant to re-connect to the existing drainage system as the drainage in this area without causing any induced flood damages.

As is detailed in Section 5, 6 and Appendix E of the Report, sediment within the study area is a problem. Two scenarios were completed in the environmental assessment for addressing the problem of sediment. One design method is to capture sediment in the bluffs and stabilize bluff tributaries as detailed in Appendix E and another design method is to capture sediment on the floodplain in advance of the habitat areas is detailed in this Appendix. The goal is to ensure that whatever method is eventually used will protect habitat areas from being adversely effected by the large sediment loads coming from the bluff tributaries annually.

C.3.1 Old Cahokia Creek. The creek's history and extent of urbanization in the area today dictated the hydraulic characteristics that could be recreated for this action area. The area had historically provided a riverine overflow regime when the Cahokia Creek flowed from the hillside across the floodplain to the Mississippi River. By restoring a flowing channel in the footprint area of the historic channel through its original reach and placing an earthen berm on the west side of the creek, an overflow regime could be re-created without inducing damages on the existing urbanized area. During certain storm events, the agricultural areas to the east of the old creek currently pond water. As a result, there is no intent to prevent or restrict this hydraulic ponding action with the Project.

C.3.2 Judy's/Burdick Branch. Three habitat area sizes were analyzed at this location during the alternative development process in order to determine the optimum area for restoration. Different habitat development scenarios were considered as a part of this process with the flood pulse restoration objective primarily influencing the habitat configurations for each of the three sizes.

The flow line of Cahokia Canal (the existing floodplain drainage ditch) through this reach is approximately 409.4 NGVD and the Canal's capacity to carry a maximum of approximately 2700 cubic feet per second (cfs) needs to be maintained to ensure no induced flooding is created as a result of project actions. Additionally, the spoil bank elevation along the Canal is approximately 425 NGVD and is a limiting factor for any flood pulse ponding area. Considering inflow/outflow and peak storage requirements, 1,758 acre-feet of water can be used to create a flood pulse. The depth of water in this location during the 1844 event was between 6-8 feet. Each of the three sizes analyzed would be surrounded by a perimeter berm at 425 NGVD because of the constraints established by the existing in-place flood control project and to protect the surrounding urbanized areas.

The first size analyzed was a 131-acre area located on the west side of the Canal. This site was restricted by urban development to the west. The second size analyzed was 230 acres. This allowed the area to span the Canal on both the west and east sides so that the spoil bank through this reach could be removed and a remnant of the historic Cahokia Creek, which falls to the east of the existing canal, could be restored. The third size analyzed was 350 acres. It was also designed to span the canal on both the west and east sides and to permit the restoration of the historic creek channel. Each of these alternatives required different actions to achieve a restored flood pulse using available hydrology. For example, for the smallest size, excavation down to an elevation equal to the flow line of the canal, from an existing average of 419' NGVD would be required across the Judy's/Burdick Branch project site. The medium size required excavation to 416 NGVD in order to allow for an 8-foot maximum flood pulse. The largest size created a 6-foot maximum flood pulse. Duration calculations were done for each size and indicated that the 1758 acre-feet of water being temporarily stored would still stay within the 14-day duration planning requirement.

C.3.3 Brushy Lake. The Brushy Lake floodplain habitat site has a natural perimeter area that is significantly elevated when compared to the average elevation across the site. The 412 NGVD contour, which encloses approximately 600 acres, was chosen initially for the maximum ponding limits for the initial calculation of hydraulic disturbance. It was determined that approximately 1,920 acre-feet could be stored with no alteration to the site itself. Further calculations showed that approximately 3,248 acre-feet would be utilized at the site at the 414 NGVD contour. This represents about 650 acres.

Each of these volumes was determined to provide beneficial hydraulic disturbance for habitat improvement at the site when compared to the 1844 flood event. An average depth fluctuation across the area of approximately 4 feet would be achieved with the restoration of a pulse using 3,248 acre-feet of water. This would still be below the lowest level experienced at the site during the 1844 event. The analysis was then extended to determine the ability of bringing flow volumes between 1,920 and 3,248 acre-feet to the site from the bluffs based on urban constraints and cost. A number of configurations were investigated to improve the existing flow capacity of the Schoolhouse Branch channel downstream of Highway 157 that would ensure the desired disturbance volume could reach the habitat area. The biggest limiting factor became the four bridges that span the Schoolhouse Branch. These include the Highway 157 bridge, the Black Lane bridge, and the two bridges serving Interstate 255. The analysis of capacities through these bridges indicated that only the bridge at Black Lane would require replacement to accommodate a flow event that would bring 1,920 acre feet to the habitat site. However, three of the four bridges would require alteration to accommodate the desired 3,248 acre-feet of water reaching the habitat site. The cost implications of replacing two major bridges (I-255) and one minor bridge (Black Lane) rendered the improvement of the conveyance system to handle flow volumes up to 3,248 acre feet to the habitat area infeasible. Therefore, Schoolhouse Branch was sized to deliver 1,920 acre-feet of water to the habitat area.

C.3.4 Spring Lake. The Spring Lake combined habitat area on the flood plain totals approximately 1248 acres and is divided into three separate, but connected ecosystem areas. The ability to bring stormwater runoff from the Canteen Creek watershed into this area was also key to being able to provide runoff to the Indian Lake site. In order to adequately convey the flows of the natural creeks entering from the bluff area, the original engineering of the canal system in the 1900's across the floodplain required the construction of a ditch that had a bottom elevation much lower than the original natural creeks. Under natural conditions, the creek bottoms on the floodplain would have been shallow when compared to natural ground elevation because of the flatness of the area that slows the flow velocity. However, the engineered Harding Ditch system is an average of approximately 6-8 feet below natural ground elevation, not taking into consideration the spoil banks lining the ditches above natural ground. When considering the spoil banks, this gives the ditches an actual depth of approximately 10-12 feet. The man-made situation in the Spring Lake area complicates the analysis and creates a challenge for bringing back the more natural hydrology to the combined habitat areas required to support healthy ecosystem development and sustainability.

In the area of Spring Lake Cell 1, the Harding Ditch flow line is approximately at 409 NGVD and the limiting overtopping elevation of the railroad to the west and Bunkum Road to the South is at approximately 416 NGVD. The elevation within the habitat area at Cell 1 varies from 408 to 422 NGVD. Unfortunately, the area at the 408 NGVD elevation is less than 50 acres of the total 370 acres in the Cell 1 habitat area. In order to ensure that the entire Cell 1is naturally hydrated in a consistent manner and to permit periodic flows to reach both Indian Lake and St Clair Farms, it was apparent that some earthwork would have to be accomplished to permit flows into, and across Cell 1.

The next step was to determine the desired, feasible hydraulic disturbance levels and the depth/duration relationships for the areas in combination. Based on existing flow line elevations, potential backwater effects, and existing ground elevations, it was determined that no excavation was required at Indian Lake other than that already anticipated to re-create the historic Cahokia Creek Channel remnant that once flowed across this area.

In St Clair Farms, it was determined that earthwork to achieve an elevation of 411 NGVD from the existing average of 414 NGVD would be required in order to prevent backwater effects at the Spring Lake Cell. A number of ditch configurations were investigated to bring water from the bluff line to the habitat sites. The biggest limiting factor became the road and railroad bridges that cross the area. Included are the bridges at Highway 157, Long Street, Black Lane, I-255 Northbound, I-255 South Bound, Forest Blvd, Bunkum Road, I-64 East bound, and I-64 Westbound as well as the CSX Railroad. The analysis of capacities through these bridges indicated that the bridges at Long Street, Black Lane and the CSX would require replacement to allow 2,221 acre-feet of runoff volume to reach Spring Lake. However, these bridges plus the I-255 north and southbound bridges along with several homes between Highway 157 and Long Street, would require either alteration or removal to allow 4,908 acre-feet of runoff volume to reach Spring Lake. The cost implications of replacing the additional major interstate bridges and relocation of homes made this improvement of the conveyance system infeasible and no further investigations were conducted for this level. Plans were investigated and selected that would only bring 2,221acre-feet of run off volume to the action area in order to create a desired flood pulse disturbance.

C.3.5 Wedgewood. Wedgewood, like many of the habitat sites, is bounded on one side by an existing drainage ditch (Harding Ditch). The Harding Ditch runs along the east side of the site and the confluence of the altered Schoenberger Creek is formed at the upper end of the area. Wedgewood was a Federal Emergency Management Agency buy out area in the late 1990's as a result of persistent flooding of residences from the Harding Ditch and interior drainage. Below Highway 157, Schoenberger Creek is a man-made canal carrying water across the floodplain to Harding Ditch from a tributary area of approximately 7,700 acres. Summit Road and I-255 divide the Wedgewood project area into four approximately equal sub-areas.

The only potential way to bring runoff to the western side of the area, which represents the majority of available acres, is through the Summit Road opening under Interstate I-255. All other options of getting under I-255 were considered too expensive for the potential benefits to be gained. After coordination with the city of East St Louis and the Illinois Department of Transportation, it was determined that they would consider closing Summit Road if a viable plan could be formulated for the site. For the flood pulse creation on this site, it was assumed that the Spring Lake project would be in place and that the Wedgewood would be dependent on flows from Schoenberger Creek. The elevation of Harding Ditch's top of spoil bank became the determining factor for the height of the earthen berm required to surround the Wedgewood site in order to prevent induced flooding. The top of Harding Ditch is at elevation 422 NGVD. Therefore, the top of the surrounding berm needs to be at approximately elevation 422 NGVD in order to maintain the integrity of the system. Since much of the surrounding area to the west of the Interstate is at elevation 414 NGVD, this means that an 8.5-foot tall berm would be required to surround the site.

Next, the disturbance elevations and storage volumes were analyzed for the different frequency storm events on Schoenberger Creek. The new habitat area could theoretically contain 676.5 acre-feet of storage without further modification to the site. However, the flow line of the Harding Ditch is at approximately 406.5 NGVD and the adjacent ground within the habitat area east of I-255 and west of Harding Ditch is at elevation 417 NGVD to 422 NGVD. This topography will preclude water from flowing into and out of the eastern-side of the site that has elevations at 410 NGVD to 413 NGVD. Degrading the site to the 410 NGVD elevation would allow water movement throughout the site from normal Harding Ditch flows.

This modification would also allow 3,394 acre-feet of water to be brought into the habitat area providing a water depth similar to that experienced during the 1844 flood event. The location of I-255 through the site precluded the evaluation of larger runoff volume events because of the height of the ponding against the existing interstate embankment. The protection of this embankment would have required significant additional costs and resulted in a reduction of habitat area. Future design analyses will investigate additional wetland acreage on the eastside of the existing Harding Ditch to determine the viability of adding additional habitat area to the site.

C.3.6 Mullen's Slough. Alteration of the flow hydraulics for this site involved the re-connection of Powdermill Creek to the historic meander scar known as Pittsburg, or Big Lake, a portion of which remains today as Mullen's Slough. The drainage of the site has been segmented due to urbanization in the area and the excavation of the Canal No.1 drainage ditch. The slough that remains holds water year round but does not provide for the biological qualities that enhance fisheries. In order to provide the storm runoff to the area, needed to improve fish habitat, a connection between the slough to the south and a marsh that connects to Powdermill Creek to the north needs to be improved under Highway 163. A low flow structure also needs to be created at the southern end of the Slough to allow excess water to flow into Canal No. 1.

C.3.7 Dobrey Slough. Dobrey Slough is an historic remnant of a Mississippi River meander scar that was a depressional wetland in pre-settlement times. The goal was to re-create this function to the greatest extent possible. Since pre-settlement days, the slough has been developed as an urban area. Subdivision streets and a railroad embankment now segment what remains of the historic slough. While flow under the streets is maintained by culverts, a flow-through structure is required to re-connect to the slough remnant that is located to the east of the railroad track. Water from the slough is currently evacuated to Nameoki Ditch by means of a small pump that is located on the east side of the railroad track. Following storm events after the Nameoki Ditch recedes, the pump activates for the Dobrey Slough drainage so that water is pumped into Nameoki Ditch. During this interim receding period, the Dobrey Slough urban area is subjected to surface water flooding. The restoration goal for this site was to use available storm water to recreate the depressional wetland regime.

A maximum water surface elevation for the slough of 415 NGVD was determined by using the elevation of the adjacent urban development, which is between 416 NGVD and 418 NGVD. The flow line of the existing slough was determined to be approximately 410 NGVD. However, the evaluation range of the adjacent ground to the west side of the railroad track is from 421 NGVD to 414 NGVD. In order to provide connectivity between the existing and historic sloughs, earthwork will be required. With the water surface limitation of 415 NGVD for the existing slough due to urbanization, the historic depressional wetland to the east could not be restored without excavation. Although the flow line of the existing slough is at 410 NGVD, it was determined that the entire eastside site did not have to be lowered to this level in order to achieve the desired re-creation of a depressional wetland. The 1844 flood event would have been 15 feet deep at this location and there would not be enough available storm runoff to achieve a fraction of this depth. The depression level desired for the slough was established by creating a connecting flow line to allow water to reach acreage on the east side of the railroad tracks. This action would require the excavation of the 31-acre site by an average of 4 feet.

C.3.8 Elm Slough. The 410 NGVD contour was selected as the natural high ground connectivity level for this action area in order to ensure that restricting the natural drainage patterns did not adversely impact areas outside of the project site. The 1844 flood event produced water depths from 10 to 20 feet in this location. However, there is no longer stormwater runoff volume available on the floodplain to recreate such a disturbance event. Additionally, the use of large berms in this area would negatively impact the aesthetic qualities of the project site. Instead of producing a large attractive green space to be visually enjoyed by surrounding residents and people commuting on the highway system, this approach would provide only a view of a large earthen structure. Raising berms around the site would also reduce available acreage from the habitat area. For these reasons, it was determined that minor excavation of the 410 NGVD and 408 NGVD contour areas would better allow the desired water level disturbance effects to be achieved while ensuring the aesthetic integrity of the site and permitting flows to benefit the entire habitat area.

C.3.9 Hydraulic Alternative Analysis Summary. Table C-9 provides summary level information regarding this analysis, which is addressed above and in further detail in each site's summary of engineering calculations. Additional information regarding project hydraulics is contained in Section 2, 6 and 7 as it relates to the formulation of the environmental project.

Table C-9 TargetComparison Summary

Proposed Action Area	Maximum Stage, 1844 Flood		Maximum Stage, Recommended Plan						
	Surface elevation, feet NGVD	Range of water depth across site, feet	Surface elevation, feet NGVD	Range of water depth (ponding) across site, feet	Total duration of ponding, hours (days)	Area of ponding, acres	Volume of ponded water, acre-feet	% of habitat area flooded by ponded water	Dominant habitat type
Old Cahokia Creek	428	0-3	431	0-6	140 (5.8)	410	1,237	79	forest
Judy's-Burdick	426	6-8	424	4-6	15 (0.6)	356	1,787	81	prairie
Dobrey Slough	426	1-15	415	0-5	not estimated	53	158	66	marsh
Elm Slough	426	10-20	410	0-5	60 (2.5)	548	1,272	85	forest
Brushy Lake	424	5-20	412	0-7	20 (0.8)	600	1,920	86	forest

C.4 SUMMARY OF ENGINEERING CALCULATIONS

C.4.1 Old Cahokia Creek

Summary of Engineering Calculations

Old Cahokia Creek Restoration

East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project

Prepared for:
St. Louis District Army Corps of Engineers

Prepared by:
PARSONS
St. Louis, Missouri

May 2001

Old Cahokia Creek Restoration Site

Description

The Old Cahokia Creek Restoration site is one of the potential project sites of the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project for the St. Louis District Army Corps of Engineers (District). It is located just west of Edwardsville, Illinois between I-270 to the south and the Cahokia Diversion Channel to the north. The engineering objectives for this site were to restore the historical creek alignment and flood pulse.

The Cahokia Diversion Channel was built just downstream of the confluence of Cahokia Creek from the bluffs and Indian Creek from the bottoms. It conveys the combined flow directly west to the Mississippi River instead of allowing it to continue south along its historical alignment flanking the bluffs near Edwardsville. The railroad embankment just south of the Cahokia Diversion Channel levee forms the northern limits of the remainder of the creek, now known as Old Cahokia Creek. The total length of Old Cahokia Creek between the railroad and the creek's confluence with County Ditch south of I-270 is approximately 29,500 feet. Old Cahokia Creek channel has, over time, been divided into disconnected fragments by areas of sediment deposition from the uplands, fill placed by farmers and redirection for flood control purposes. An abandoned railroad that has been converted into a bike trail bisects the creek approximately 3,400 feet upstream of Chain of Rocks Road, acting as a hydraulic control that divides the floodplain area of the creek.

Runoff from the bluffs still enters a portion of the Old Cahokia Creek area, but is not conveyed by the creek to County Ditch. The lack of significant elevation change in the bottoms area combined with blockage of the creek, have created flooding problems for property along Sand Road, which lies directly west of Old Cahokia Creek. An existing levee borders the western edge of the creek area for approximately 5,150 feet through the north-central section of the creek, but does not protect all of the Sand Road development. A drainage ditch has been built south of the southern limits of the levee that conveys inflow from the bluffs directly west through existing development, presumably to prevent stormwater ponding on farmland east of the creek. This additional inflow overloads the drainage ditch that had previously conveyed mainly stormwater from area west of the levee, exacerbating flooding problems in this vicinity. Under the proposed creek restoration, this drainage ditch would be disconnected from the creek; Old Cahokia Creek to County Ditch would convey runoff from the bluffs wholly while the drainage ditch would remain to serve the local area west of the creek.

Available mapping for the site included the following: aerial photomaps with 2-foot contours produced for the District in 1973, recent survey data with 1-foot contours provided by the Illinois Department of Natural Resources (IDNR) and 1998 NAPP aerial photomaps without topographic information, provided by the District.

Existing Hydraulics

The existing channel bottom profile of Old Cahokia Creek was reproduced from the IDNR survey data and is included in the Appendix. It was evident from the surveyed flowline that approximately 18,500 feet of the creek still flows in a southerly direction. The southernmost 13,000-foot section of the creek drains south under Chain of Rocks Road, I-270 and Sand Road before its confluence with County Ditch. The surveyed flowline of the creek approximately 13,000 feet to 24,000 feet north of the confluence was interrupted by fill or sediment deposition, creating ponding areas with no outlet.

The surveyed flowline of the northernmost section of the creek, approximately 5,500 feet long, was shown to drain in a southerly direction, crossing under both New Poag Road and Poag Road. The existing bottom width of the creek was assumed to be 40 feet, an approximate value provided by the District. A remnant of the existing creek maintained this bottom width, but the majority of the creek had been greatly reduced in size over time.

One of the constraints for the proposed site layout was that the existing capacity of the culvert structures at I-270 and Chain of Rocks Road be utilized. The number, size, type and invert elevation of the structures at each location was determined from the survey data. Rating tables relating headwater elevation with outflow were computed for the existing double 9'x 6' RCB's at I-270 and the double 8'x 6' RCB's at Chain of Rocks Road using inlet control nomographs. Rating tables were also computed for the 36-inch RCP at Poag Road and the 72-inch RCP at New Poag Road for use in the revised hydrologic models. These rating tables were computed using Haestad Methods' CulvertMaster program, which also computes the potential roadway overtopping flows. The computed rating tables for the existing culverts are included in the Appendix. The existing creek crossing at the bike trail consisted of double 48-inch RCP's and a 24-inch RCP. The capacity of this crossing was not computed because it was evident that a re-established channel through this reach would require replacement of these structures at a lower flowline elevation than the existing inverts of these pipes.

Existing Hydrology

An existing HEC-1 base model for the entire Cahokia Canal watershed was provided by the District, as well as a drainage area map and tables identifying the sub-basins and their characteristics. The base model provided an approximation of total runoff volumes contributing to County Ditch and Cahokia Canal from the adjoining watersheds. At the confluence of Old Cahokia Creek with County Ditch, a single hydrograph was computed to represent the entire 7.28-square mile drainage area for Old Cahokia Creek. This total area was the sum of the following ten contributing sub-basins: Sub-basins 79 through 85, which represented bluff areas, and sub-basins 6, 7 and 10, which represented drainage areas in the bottoms. A runoff volume of 1896 acre-feet was computed for the Old Cahokia watershed design storm event. HEC-1 input and output for the base model are included in the Appendix, as well as the base drainage area map.

The HEC-1 base model did not provide enough detail for the purposes of the project site analysis. Additional peak flows and runoff volumes were required at intermediate points along the creek in order to size the proposed overflow area and proposed restoration of the channel. Revised HEC-1 models were created to include additional hydrologic points of interest as well as modified sub-basin runoff data; these revisions were dependent on the site layout, and are therefore described in detail in the Revised Hydrology section for each alternative.

Alternative Analysis

Two alternatives were evaluated for the site, as directed by the District. Alternative 1 proposed the restoration of the Old Cahokia Creek alignment with no hydraulic connection to the Cahokia Diversion Channel (Short Channel Option). This alternative would carry flow after rainfall events, and would be able to drain completely to County Ditch. Alternative 2 proposed the restoration of the Old Cahokia Creek alignment with a pump station at the Cahokia Diversion Channel that would provide a continuous base flow through the creek (Long Channel Option). Both alternatives proposed greenway corridors along the length of the restored creek in order to enhance the environmental aspect of the site. Analyses for these two alternatives are summarized separately as follows.

Alternative 1:
The objective of Alternative 1 was to restore a flood pulse while also restoring the historical alignment of the creek. The necessary storage volume for overflow was provided by the existing topography of the farmland east of the creek, the creek itself and the greenway area to the west of the creek. The proposed greenway for Alternative 1 extended from Chain of Rocks Road north to the downstream end of the existing remnant of creek south of Poag Road. Greenway corridors of 50-meter, 75-meter and 100-meter widths were evaluated, measured from the toe of the proposed creek banks. The proposed width of greenway affected the area included in the ponding calculations because the proposed levee was located just outside of the greenway along the western bank of the creek. The existing levee along the western side of the creek bed would be removed; it was not sufficiently high, nor consistent along the creek and did not allow enough room to accommodate the proposed greenway. Poag Road, which is elevated above the natural ground elevation adjacent to the creek, was used as the northern boundary for the overflow area. The bike trail embankment , which forms an existing levee across the farmland and creek, served as the southern boundary. The low point along Poag Road was estimated to be at elevation 432.5 NGVD, according to the survey, so the proposed top of levee to the west of the creek and the limits of the overflow area easement to the east or the creek were set at elevation 432 NGVD. This allowed a minimum of 1-foot of freeboard from the maximum ponding elevation of 431 NGVD.

Revised Hydraulics
Alternative 1 proposed the restoration of the Old Cahokia Creek alignment with no hydraulic connection to the Cahokia Diversion Channel. The objective included not only restoring the horizontal location of the creek but also modifying the channel bottom flowline to slope consistently from north to south. According to the surveyed profile, the creek north of Poag Road is functional and conveys flow from north to south from near the railroad to the upstream side of Poag Road, precluding a need for channel improvements north of Poag Road. Downstream of Poag Road, a remnant of the historical creek exists for a length of approximately 2,670 feet and maintains a 40-foot bottom width. This was chosen to be the bottom width of the restored creek for the remainder of the channel downstream. The location of the downstream end of the existing creek remnant south of Poag Road is identified as the "reconnection point."

The historical alignment of Old Cahokia Creek was determined from a topographic map provided by the District. It was decided by the District project team that the proposed alignment would follow the historic meander in the vicinity of the inflow from sub-basin 82, which currently flows northwest via an improved ditch that crosses Old Cahokia Creek and continues west to County Ditch. The creek would maintain its existing alignment just north of the bike trail, since realigning it to its historical location to the east would necessitate substantial cut and fill. The creek downstream of the bike trail would be redirected around existing development in order to address current flooding problems in that area. After the proposed creek alignment was delineated, the total length from the reconnection point to the upstream inverts of the Sand Road culverts near County Ditch was measured as approximately 24,700 feet. Using the existing inverts of the Chain of Rocks Road culverts and the channel bottom flowline at the reconnection point as the constraints, the proposed channel slope was computed to be 0.00025 ft/ft. This slope could be maintained through the I-270 and Sand Road crossings as well. The proposed creek profile for Alternative 1 is included in the Appendix. The proposed length of improved creek for Alternative 1 was divided into five reaches for flow routing purposes, as listed in Table 1.

Table 1 Restored Old Cahokia Creek Characteristics

Name	Description of Reach	Approx. Length (ft)
Reach 1	Restored creek from reconnection point south of Poag Rd. to bike trail	15,240
Reach 2	Restored creek from bike trail to Chain of Rocks Road	3,450
Reach 3	Improved channel from Chain of Rocks Road to I-270	2,105
Reach 4	Improved channel from I-270 to the transition of grass to concrete channel	1,620
Reach 5	Improved channel from transition of grass to concrete channel to Sand Road	1,930

In order to size channel improvements for Alternative 1, flows for each reach were computed as described in the Revised Hydrology section.

Revised Hydrology

The existing HEC-1 base model for Cahokia Canal could not be used to compute inflow into the proposed overflow area, since the location of the only hydrologic point for Old Cahokia Creek was at the downstream confluence with County Ditch. Therefore, a preliminary HEC-1 model for the Old Cahokia Creek watershed was created using the rainfall data from the base model and the sub-basin characteristics for the bluff areas provided by the District. All sub-basins were assigned curve numbers of 75.0, as directed by the District, in order to represent future development conditions. The approximate sub-basin boundaries shown in the drainage area map for Cahokia Canal were drawn onto the most recent aerial photomaps. Using the 1-foot contours from the Sand Road survey, the 2-foot contours provided by the District and observations from field visits, these sub-basin boundaries were modified to represent proposed conditions upstream of the bike trail in more detail. The western boundary of the Old Cahokia Creek drainage area was assumed to be the proposed confining levee, located just outside the proposed greenway corridor. According to existing topography, the area west of the levee drains westward to County Ditch north of the Old Cahokia Creek confluence and was therefore removed from the drainage area. Revised sub-basin boundaries are described in Table 2 and shown in the Old Cahokia Creek Restoration Drainage Area Map included in the Appendix.

Table 2 Revised Sub-basin Boundaries for Preliminary HEC-1 Model

Original Sub-basin	Revised Sub-basins	Description of Revised Sub-basin Boundaries
79-83	79-83	(Boundaries for these bluff areas were not modified)
6	6A1A	Bounded by the railroad to the north and New Poag Road to the south
	6A1B	Bounded by New Poag Road to the north and Poag Road to the south
	6A2	Bounded by Poag Road to the north and sub-basin 7A to the south
	Remainder	All area west of the proposed levee; removed from total drainage area
7	7A	Bounded by sub-basin 6A2 to the north and the bike trail to the south
	Remainder	All area west of the proposed levee; removed from total drainage area

The revised boundaries altered some of the sub-basin characteristics such as area and hydraulic length. New values for these characteristics were estimated using the aerial maps and contour information, and new lag times were computed using the SCS lag time equation. A table listing the proposed sub-basin characteristics for Old Cahokia watershed is included in the Appendix.

A preliminary HEC-1 model was created with the new sub-basin information for 6A1A, 6A1B, 6A2 and 7A, along with bluff areas 79 through 83 in order to compute inflow for the pond analysis. The three hydrologic points in this model represented the culverts at New Poag Road, Poag Road and the bike trail. Flow was routed through the culverts at New Poag Road and Poag Road in the model by using the computed rating table for each existing structure. The resulting peak flows and runoff volumes computed by the preliminary HEC-1 model for the design flood pulse at the hydrologic points are shown in Table 3.

Table 3 Preliminary HEC-1 Model Results

Location of Hydrologic Point	Approximate Peak Flow (cfs)	Runoff Volume (ac-ft)
New Poag Road	840	189
Poag Road	400	215
Bike Trail (pond outlet)	2,780	1,166

The peak flow at Poag Road is lower than the peak flow upstream at New Poag Road due to the attenuation created by the Poag Road culvert. The inlet of this existing culvert is located approximately 5 feet above the creek flowline on the upstream side of the road, creating a small overflow area. The rating table developed for the culvert incorporated this into the revised HEC-1 model. The inflow was computed to be approximately 2,780 cfs, and the total volume entering the overflow area was computed to be 1,166 acre-ft.

Using the surveyed 1-foot contours, an elevation-area relationship was defined for the natural ground from the creek banks up to elevation 432 NGVD. The additional volume within the creek banks was computed down to the channel bottom flowline elevation at the bike trail, and included in the available volume computation. Because the proposed confining levee was to be located at the edge of the proposed greenway corridor, the storage area would be larger in a scenario using the 100-meter greenway width than with the 75-meter or 50-meter greenway widths. The surface area at elevation 431' was approximately 383 acres including a 100-meter greenway, 356 acres including a 75-meter greenway and 329 acres including a 50-meter greenway. The difference in storage area for the site including a 50-meter and the site including the 100-meter greenway was approximately 54 acres or 0.08 square miles. In order to compute a conservative estimate of peak flows and volumes, the storage area boundary was set at the edge of the 100-meter greenway for all computations.

Storage volume calculations were performed to determine the available storage area for each size of habitat area, including 50-meter, 75-meter and 100-meter greenways. The storage volume at the target ponding elevation of 431 NGVD was approximately 931 acre-ft with the 50-meter greenway, 1,024 acre-ft with the 75-meter greenway and 1,516 acre-ft with the 100-meter greenway. The total runoff volume entering the proposed area was computed as 1,166 acre-ft, so a target outflow was estimated that would utilize the available storage volume. This was performed using the Haestad Methods' PondPack storage calculator, assuming the volume of 1024 acre-ft as an intermediate target value. This calculation resulted in an initial estimate of peak outflow of 135 cfs. These volume calculations are included in the Appendix.

Inflow/Outflow Analysis

An inflow/outflow analysis was performed on the proposed overflow area, with inflow modeled by the design flow hydrograph at the bike trail from the preliminary HEC-1 model and outflow controlled by proposed outlet structures under the bike trail. The size of the outlet structures was determined by trial and error while attempting to minimize outflow into the downstream creek and maintain a maximum water surface elevation of 431' in the overflow area. The result of the preliminary inflow/outflow analysis indicated that 2-2'x 2' RCB culverts would form a suitable outlet configuration, releasing a peak flow of approximately 130 cfs into the creek downstream of the bike trail. The required length of the outlet culverts was estimated from the aerial map as 70 feet. The boundary of the ponding area up to the proposed levee was measured as 442.3 acres. Pond volume calculations, inflow/outflow calculations and hydrographs, a graph of pond water surface elevation versus time and a layout plan for Alternative 1 are included in the Appendix.

The preliminary HEC-1 model was extended downstream to the confluence with County Ditch. The rating table for the outlet at the bike trail was developed using the E-Q-V (elevation-outflow-storage) relationship computed by PondPack, and included in the HEC-1 model as the routing mechanism for computing the pond outflows. Sub-basins 84 and 10, which contribute runoff to Old Cahokia Creek downstream of the bikeway-required modifications to their boundaries as listed in Table 4 on the following page. During field investigation, it was determined that the outflow of sub-basin 84 was directed toward two different outlets under University Drive. Approximately 75% of the bluff area drain to a 42-inch RCP to the north of Chain of Rocks Road and the remainder drain to another 42-inch RCP to the south of Chain of Rocks Road. Using the 1-foot contours from the Sand Road survey, the 2-foot contours provided by the District and observations from field visits, the corresponding sub-basin characteristics were modified to represent proposed conditions more accurately.

Table 4 Revised Sub-basin Boundaries for Preliminary HEC-1 Model

Original Sub-basin	Revised Sub-basins	Description of Revised Sub-basin Boundaries
84	84A	Bounded by University Drive to the south, inflow north of Chain of Rocks Road
	84B	Bounded by University Drive to the north, inflow south of Chain of Rocks Road
10	10A	Bounded by the bike trail to the north and Chain of Rocks Road to the south
	10B1	Bounded by Chain of Rocks Road to the north, I-270 to the south and a proposed drainage divide to the west
	10B2	Bounded by Chain of Rocks Road to the north, I-270 to the south and a proposed drainage divide to the east
	10C	Bounded by I-270 to the north and an existing drainage divide to the south
85	85	Removed from the total area

The outflow from sub-basin 85 was removed from the Old Cahokia Creek drainage area because it is apparently conveyed through an independent drainage ditch along the southern boundary of sub-basin 10 to an outfall into County Ditch. Sub-basin 10B2 was proposed to be removed from the watershed by regrading the existing roadside ditch along Chain of Rocks Road to flow west to County Ditch rather than east into Old Cahokia Creek. This was proposed in order to reduce the peak flow in Old Cahokia Creek and thereby reduce the required size of channel improvements downstream of Chain of Rocks Road. The regrading of approximately 3,445 feet of roadside ditch and inclusion of three 24-inch CMP culverts and a flap-gated 24-inch CMP outlet into County Ditch would be required.

The revised boundaries of the sub-basins remaining in the watershed altered some of the sub-basin characteristics such as area and hydraulic length. New values for the sub-basin characteristics were estimated using the aerial maps and contour information, and new lag times were computed using the SCS lag time equation. A table listing the proposed sub-basin characteristics for all of Old Cahokia watershed is included in the Appendix, along with a revised drainage area map showing the revised sub-basin boundaries. The Revised HEC-1 Model was run and peak flows and runoff volumes for the design flood pulse were computed. These results are listed in Table 5.

Table 5 Revised HEC-1 Model Results

Location of Hydrologic Point	Approximate Peak Flow (cfs)	Runoff Volume (ac-ft)
Chain of Rocks Road	500	1,307
I-270	570	1,347
Sand Road	750	1,418

The total volume of 1,418 acre-ft computed at the downstream end of Old Cahokia Creek represents runoff from the revised drainage area of 5.66 square miles. Input and output for the Revised HEC-1 Model are included in the Appendix.

Channel Improvements

The minimum design flow depth for Reach 1 was set at 5 feet, which was the existing depth of the creek at the reconnection point. This design flow depth was maintained through the culverts at Sand Road. Although the design target depth through Reach 1 was 5 feet, the actual creek depth varied according to the depth of excavation required to achieve the proposed flowline elevation. The average existing ground elevation through Reach 1 was approximately 428 NGVD, while the flowline decreased from elevation 422.6 NGVD at the northern end to 418.8 NGVD at the bike trail. The bottom width of 40 feet was maintained in Reaches 1 and 2, which represented the restored creek segments. The bottom width through Reaches 3 and 4, which are not part of the historical path of Old Cahokia Creek, were sized for the 100-year storm event flows calculated at I-270 and Sand Road, respectively. The resulting bottom width of the channel in Reach 3 was 50 feet. The bottom width in Reach 4 varied from 75 feet as a grass-lined channel to 25 feet as a concrete-lined channel. The downstream end near Sand Road did not have the available width to accommodate a grass-lined channel with the required capacity. Channel improvement calculations used Manning's equation for normal depth flow and were made using Haestad Methods' FlowMaster computer program and the output is shown in the Appendix.

Excavation and Fill Estimates
The approximate excavation volume for Alternative 1 was computed by channel reach. The total excavation for Reach 1 was computed as the sum of volumes computed for sections defined by similar ground elevations. Some sections of this reach included the cross-section of the existing creek while other sections did not. The resulting estimate of excavation volume for Reach 1 was of 296,000 CY. The proposed creek through Reach 2 did not follow the existing creek alignment; the length multiplied by the typical proposed cross-section was used to compute an excavation volume for this reach of 65,400 CY. The proposed creek alignment through Reaches 3, 4 and 5 followed the existing creek alignment; the typical existing cross-sectional areas were subtracted from the proposed cross-sectional areas for each reach and the resulting volumes were computed as 18,200 CY, 23,000 CY and 3,400 CY respectively. The total excavation for Alternative 1 was 406,000 CY.

The volume of fill for the proposed levee extending from Poag Road to the bike trail was computed as the sum of volumes computed for sections defined by similar ground elevations. Assuming 3H:1V side slopes, a 10-foot crown, and varying levee height of up to 7 feet, the cumulative volume was computed as 71,900 CY. Although the flow depth for the design flood pulse was within the 1-foot freeboard below the bank elevation through Reach 2, an additional 1-foot of berm height was proposed along the western edge in order to provide an extra measure of flood control between the creek and existing development. The length of this berm was approximately 3,140 feet, and assuming 3H:1V side slopes and a 10-foot crown, the volume was computed as approximately 1,500 CY. The total berm and levee fill for Alternative 1, without inclusion of a compaction factor, was 73,400 CY.

Alternative 2:
Alternative 2 proposed the restoration of the Old Cahokia Creek alignment with a pump station at the Cahokia Diversion Channel that would provide a continuous base flow through the restored creek. The limits of creek restoration were extended from Chain of Rocks Road upstream to New Poag Road, while channel improvements continued from New Poag Road upstream to the northern limits of the creek at the railroad embankment in order to convey the proposed base flow to the restored creek. Proposed greenway corridors of 50-meter, 75-meter and 100-meter widths were also extended to the railroad embankment.

The total surface area of the proposed overflow area was increased from that of Alternative 1, due to the additional greenway area between the "reconnection point" described in Alternative 1 and Poag Road. The inclusion of this additional area caused the proposed levee alignment to be moved farther to the west of the creek through this section. The limits of the ponding area to the north and south were consistent with Alternative 1, with the upstream limit at Poag Road and the downstream limit at the bike trail. The top of the proposed levee remained at elevation 432', and the target ponding elevation remained at 431'.

Revised Hydraulics
Alternative 2 proposed the restoration of the Old Cahokia Creek along the alignment delineated for Alternative 1, while channel improvements were proposed from Sand Road to the upstream limits of the creek at the railroad embankment. The additional channel improvements are proposed to convey a base flow to and through the length of the restored creek. The base flow will be provided by the

Cahokia Diversion Channel through a proposed pump station at the upstream end of the proposed improvements. The minimum design flow depth for the restored creek section was set at 5 feet, which was consistent with Alternative 1. This design flow depth was maintained through the culverts at Sand Road.

Using the aerial map and observations from a site visit, an appropriate location for the pump station was chosen by the District. The proposed pump intake was located at the Cahokia Diversion Channel and the proposed discharge pipe was directed southward under the levee and railroad embankment. The approximate length of the discharge pipe was estimated from the aerial map as 560 feet. A small drainage ditch was proposed to carry the base flow from the discharge pipe along the southern edge of the railroad west to the upstream end of the existing creek.

Consistent with the historical bottom width determined in Alternative 1, the restored creek section was to maintain a proposed bottom width of 40 feet. The limits of the restored creek were extended from the reconnection point described in Alternative 1 north to New Poag Road for Alternative 2. The objective of the proposed pilot channel within the restored creek section was to maintain the base flow at a depth of 1 foot at the centerline of the creek, while keeping as much of the creek's bottom width wet as possible. The District directed this objective for the purposes of enhancing habitat characteristics of the restored creek.

The upstream invert of the existing culvert at Poag Road, which is elevated approximately 5 feet above the existing creek flowline, formed an obstruction to the proposed base flow. In order to convey the base flow under Poag Road and minimize roadway overtopping, additional culverts were proposed. Double 24-inch RCP's were sized using an inlet control nomograph, assuming a target capacity of 10 cfs at a headwater depth close to 1 foot. The inverts of these culverts were located at surveyed points on the existing profile just upstream and downstream of Poag Road. For the purpose of sizing channel improvements and computing excavation quantities, the creek was divided into seven reaches for Alternative 2, as shown in Table 6.

Table 6 Restored Old Cahokia Creek Characteristics

Name	Description of Reach	Approx.Length (ft)
Reach 1A	Pilot channel from railroad embankment to confluence with Sub-basin 79 Inflow	1,260
Reach 1B	Pilot channel from confluence with Sub-basin 79 Inflow, to New Poag Road	1,620
Reach 2	Restored creek from New Poag Road to Poag Road, including pilot channel	2,235
Reach 3	Restored creek from Poag Road to bike trail, including pilot channel	17,875
Reach 4	Restored creek from bike trail to Chain of Rocks Road	3,450
Reach 5	Improved channel from Chain of Rocks Road to I-270	2,105
Reach 6	Improved channel from I-270 to the transition of grass to concrete channel	1,620
Reach 7	Improved channel from transition of grass to concrete channel to Sand Road	1,930

The total length of the proposed improvements from the pump discharge pipe at the northern limit to the upstream inverts of the Sand Road culverts near County Ditch was measured as approximately 32,095 feet.

The target base flow was determined by computing the normal depth capacity of a triangular pilot channel constructed within the restored channel through the ponding area, which was identified as Reach 3. In order for the proposed 40-foot bottom width of the restored creek to be wetted by the base flow, the topwidth of the proposed pilot channel was set to 40 feet. A topwidth of 40 feet with a 1-foot depth at the centerline could be achieved by side slopes of 20H:1V for the pilot channel. The improved channel slope for the restored creek through the ponding area was computed as 0.0002 ft/ft, based on the downstream invert of the proposed culverts at Poag Road and the upstream invert at the bike trail proposed for Alternative 1. With these channel dimensions at the slope of 0.0002 ft/ft, the target base flow was computed to be 10 cfs.

The slope of the creek flowline was not constant for each reach upstream of the ponding area, so the dimensions of the pilot channel varied from reach to reach. The criteria of a 1-foot depth at the centerline and capacity of 10 cfs were used to size the pilot channel for the upstream reaches.

Reach 1A consisted of a proposed ditch that would carry the base flow west along the south side of the railroad embankment from the outfall of the proposed pipe and then south to the existing upstream end of Old Cahokia Creek. The flowline at the downstream end of this reach was set by the surveyed flowline of the upstream end of the existing creek at the inflow from Sub-basin 79. A slope of 0.0002 ft/ft was assumed for Reach 1A, as determined by the elevation of the natural ground at the upstream end. A trapezoidal channel configuration was chosen for this ditch in order to minimize the topwidth and surface area required for the new ditch. The ditch was sized to carry the base flow of 10 cfs at a depth of 1 foot, with 3H:1V side slopes, which required a bottom width of 11 feet. No stormwater runoff was assumed to enter the proposed ditch for Reach 1A since it is located along the upstream boundary of the drainage area.

At the upstream end of Reach 1B, however, stormwater runoff from sub-basin 79 enters Old Cahokia Creek. No channel improvements other than the pilot channel were proposed through this reach, since the only increase in flow from existing conditions is the proposed base flow, which will be contained in the proposed pilot channel. The development to the west is protected by an existing levee through this reach, and additional flood control measures did not appear to be necessary. The pilot channel through Reach 1B was sized using the average slope from the existing flowline of the creek at the upstream end and the upstream invert of the existing New Poag Road culvert, which was computed as 0.0036 ft/ft. Since the existing creek had a bottom width of up to 40 feet, a triangular configuration was chosen for the pilot channel in order to maximize the topwidth, thereby maximizing the wetted bottom width of the creek. The slope and proposed depth of 1 foot were used to compute the required side slopes of 6H:1V.

The pilot channel through Reach 2 was sized using the slope between the downstream invert of the existing New Poag Road culvert and the upstream invert of the proposed Poag Road culverts, which was computed as 0.00068 ft/ft. The creek restoration was extended north to New Poag Road for Alternative 2, so the restored channel bottom width of 40 feet was proposed through Reach 2. Therefore, a triangular pilot channel configuration was chosen for this reach as well.

At the proposed slope, the required side slopes for a triangular pilot channel were computed to be 14H:1V, assuming a 1-foot depth at the centerline. The pilot channel through Reach 2 was achieved through fill in the existing channel rather than excavation in order to maintain a consistent flowline from the inverts of Poag and New Poag Roads.

No pilot channel was proposed downstream of the bike trail. Pilot channel calculations and the restored creek profile for Alternative 2 are included in the Appendix.

Revised Hydrology

The revised hydrologic conditions defined for Alternative 1 were assumed to be the base hydrologic conditions for the analysis of Alternative 2, since the modification of drainage sub-basin boundaries and characteristics were consistent for both alternatives. Routing through Poag Road and New Poag Road had to be revised, however, due to the proposed new culverts at Poag Road and the change in the storage upstream of each road resulting from channel improvements.

A preliminary HEC-1 model for Alternative 2 was created with the new sub-basin information for areas 6A1A, 6A1B, 6A2 and 7A, along with bluff areas 79 through 83 in order to compute inflow for the pond analysis. The three main hydrologic points of interest in this model represented the culverts at New Poag Road, Poag Road and the bike trail. Flow was routed through the culverts at New Poag Road and Poag Road in the model by using the computed rating table for each structure. The resulting peak flows and runoff volumes computed by the preliminary HEC-1 model for the design flood pulse at the hydrologic points are shown in Table 7.

Table 7 Preliminary HEC-1 Model Results

Location of Hydrologic Point	Approximate Peak Flow (cfs)	Runoff Volume (ac-ft)
New Poag Road	840	189
Poag Road	400	215
Bike Trail (pond outlet)	2,710	1,177

The peak flow at Poag Road is lower than the peak flow upstream at New Poag Road due to the attenuation created by the Poag Road culvert. The design inflow into the proposed overflow ponding area was computed to be approximately 2,710 cfs, and the total volume entering the overflow area was computed to be 1,177 ac-ft.

Using the surveyed 1-foot contours, an elevation-area relationship was defined for the natural ground from the top of creek banks up to elevation 432 NGVD. The additional volume within the creek banks was computed down to the flowline elevation at the bike trail, and included in the available volume computation. Because the proposed confining levee was to be located at the edge of the proposed greenway corridor, the storage area would be larger in a scenario using the 100-meter greenway width than with the 75-meter or 50-meter greenway widths. The surface area at elevation 431 NGVD was approximately 410 acres including a 100-meter greenway, 376 acres including a 75-meter greenway and 342 acres including a 50-meter greenway. The difference in storage areas for the site including a 50-meter greenway and the site including the 100-meter greenway was approximately 68 acres or 0.1 square miles. In order to compute a conservative estimate of peak flows and volumes, the storage area boundary was set at the edge of the 100-meter greenway for all computations.

Storage volume calculations were performed to determine the available storage for each size of overflow area, including 50-meter, 75-meter and 100-meter greenways. The storage volume at the target ponding elevation of 431 NGVD was approximately 1,006 acre-ft with the 50-meter greenway, 1,122 ac-ft with the 75-meter greenway, and 1,237 ac-ft with the 100-meter greenway. These volume calculations are included in the Appendix.

Inflow/Outflow Analysis

An inflow/outflow analysis was performed on the proposed overflow area, with inflow modeled by the design flood at the bike trail from the preliminary HEC-1 model and outflow controlled by proposed outlet structures under the bike trail. The size of the outlet structures was determined by trial and error while attempting to minimize outflow into the downstream creek and maintain a maximum water surface elevation of 431 NGVD in the overflow area. The result of the preliminary inflow/outflow analysis indicated that 2-2'x 2' RCB culverts would form a suitable outlet configuration, releasing a peak flow of approximately 130 cfs into the creek downstream of the bike trail. The required length of the outlet culverts was estimated from the aerial map as 70 feet. The boundary of the ponding area up to the proposed levee was measured for Alternative 2 as 458.2 acres, which was 15.9 acres more than for Alternative 1. Pond volume calculations, inflow/outflow calculations and hydrographs, a graph of pond water surface elevation versus time and proposed layout plan are included in the Appendix.

The preliminary HEC-1 model for Alternative 2 was extended downstream to the confluence with County Ditch. The rating table for the bike trail culverts was developed using the E-Q-V (elevation-outflow-storage) relationship computed by PondPack, and included in the HEC-1 model as the routing mechanism for the pond outlet. The modifications to sub-basins and their characteristics computed for Alternative 1 were utilized to extend the Revised HEC-1 Model for Alternative 2 downstream to Sand Road. The model was run and peak flows and runoff volumes for the design flood pulse were computed. These results are listed in Table 8.

Table 8 Revised HEC-1 Model Results

Location of Hydrologic Point	Approximate Peak Flow (cfs)	Runoff Volume (ac-ft)
Chain of Rocks Road	500	1,318
I-270	570	1,359
Sand Road	750	1,429

The total volume of 1,429 ac-ft computed at the downstream end of Old Cahokia Creek represents the revised drainage area of 5.66 square miles. Input and output for the Revised HEC-1 Model are included in the Appendix. Since the approximate peak flows downstream of the bike trail did not increase from those computed for Alternative 1, the channel improvements proposed for Reaches 4 through 7 of Alternative 2 were identical to those proposed for Reaches 2 through 5 of Alternative 1.

Excavation and Fill Estimates
The approximate excavation volume for Alternative 2 was computed by channel reach. The pilot channel in Reach 1A did not replace or improve an existing channel, so the excavation was calculated as the product of the proposed cross-sectional area and the length, or approximately 940 CY. The volume of excavation required for the pilot channel in Reach 1B was computed as the product of the proposed cross-sectional area of the pilot channel and the length of the reach, which resulted in an estimate of approximately 200 CY. The existing creek in Reach 2 was deeper than the proposed creek in some areas, so this reach required a net fill rather than excavation value. The volume of fill was estimated as the difference between the cross-sectional area of the bottom 1 foot of a typical existing channel section and the proposed pilot channel, multiplied by the length of the reach. This yielded an estimate of 2,820 CY. The existing ground elevation adjacent to the proposed creek alignment in Reach 3 varied greatly, with some sections the same as the existing creek cross-section. The total excavation for Reach 3 was computed as the sum of volumes computed for sections defined by similar ground elevations, resulting in a value of 224,630 CY.

The volume of excavation for Reaches 4, 5, 6 and 7 were identical to those computed for Reaches 2 through 5 for Alternative 1, because the channel improvements proposed downstream of the bike trial remained constant for both alternatives. The excavation volumes computed for these reaches were, 65,400 CY, 18,200 CY, 23,000 CY and 3,400 CY respectively. The total channel excavation for Alternative 2 was 335,770 CY and total channel fill was 2,820 CY.

The proposed berm and levee fill volume for Alternative 2 was also estimated. No berm was proposed along Reach 1A, since it did not impact local drainage. An existing levee up to elevation 436' is located just west of the creek through Reach 1B; this levee will be relocated in order to incorporate the extended greenway corridor from the restored creek north to the railroad. The existing crown elevation of 436 NGVD was maintained by the proposed levee in order to insure that the project would have no detrimental effect on flood protection of development west of the levee. The average existing ground elevation was approximately 432 NGVD, so the required fill was computed assuming a 4-foot height, 3H:1V side slopes and a 10-foot crown, resulting in a volume of 3,330 CY. The existing levee between Poag Road and New Poag Road will also be relocated to incorporate the extended greenway corridor, and its existing crown elevation of 435.5 NGVD was maintained in order to insure that the project would have no detrimental effect on flood protection of development west of the levee. The average existing ground elevation was approximately 432 NGVD, so the required fill was computed assuming a 3.5-foot height, 3H:1V side slopes and a 10-foot crown, resulting in a volume of 5,190 CY. The proposed levee forming the western boundary of the area and the proposed berm along the creek between the bike trail and Chain of Rocks Road were unchanged from Alternative 1 to Alternative 2. The volume of fill for the proposed levee was computed as approximately 71,900 CY, while the volume of fill for the proposed berm was approximately 1,500 CY. The total berm and levee fill for Alternative 2, without inclusion of a compaction factor, was 81,920 CY.

Cost Features
A summary of major engineering cost features for Alternative 1 and Alternative 2 is included in Tables 9. It should be noted that this is not intended to be an all-inclusive list, but only includes major features requested by the District. The District has computed additional cost features that would be combined with those listed in Table 9.

Also, since no detailed hydrologic or hydraulic models were created for this analysis, it is possible that other major cost features might be required when a design analysis is performed.

Table 9 Engineering Cost Features

Alternative 1	
Features:	**Quantity**
Real Estate for pond, includes creek through	442.3 acres
Grass Trapezoidal Channel	40' BW, 5' deep, L=15236'
Grass Trapezoidal Channel	40' BW, 6' deep, L=3448'
Grass Trapezoidal Channel	50' BW, 6' deep, L=2105'
Grass Trapezoidal Channel	75' BW, 6' deep, L=1621'
Concrete Trapezoidal Channel	25' BW, 6' deep, L=1930'
Channel Excavation Volume	406,000 CY
West Side Berm - north	13805 ft x 4' high
West Side Berm - south	3140 ft x 1' high
Berm Volume	73,400 CY
Concrete Culverts at Bike Trail	2-2'x2' RCB, L=70'
CMP Culvert at Sand Road	1-72"x44" CMP Arch, L=120'
CMP Culvert along Chain of Rocks	1-24" CMP, L=36'
CMP Culvert along Chain of Rocks	1-24" CMP, L=36'
CMP Culvert along Chain of Rocks	1-24" CMP, L=40'
Ditch Regrading along Chain of Rocks	L=3445'

Alternative 2	
Features:	**Quantity**
Real Estate for pond, includes creek through	458.2 acres
Grass Trapezoidal Channel	11' BW, 1' deep, L=1260'
Grass Triangular Channel	1' deep, 6H:1V SS, L=1622'
Grass Trapezoidal Channel	40' BW, 4' deep, L=2234'
Grass Triangular Channel	1' deep, 14H:1V SS, L=2234'
Grass Trapezoidal Channel	40' BW, 4' deep, L=17873'
Grass Triangular Channel	1' deep, 20H:1V SS, L=17873'
Grass Trapezoidal Channel	40' BW, 6' deep, L=3448'
Grass Trapezoidal Channel	50' BW, 6' deep, L=2105'
Grass Trapezoidal Channel	75' BW, 6' deep, L=1621'
Concrete Trapezoidal Channel	25' BW, 6' deep, L=1930'
Channel Excavation Volume	335,770 CY
Channel Fill Volume	2820 CY

Table 9 Continued

Alternative 2 - Continued	
Features:	**Quantity**
West Side Berm	14650 ft x 4' high
West Side Berm	1950 ft x 3.5' high
West Side Berm	3140 ft x 1' high
Berm Volume	81,920 CY
Concrete Culverts at Old Poag Road	2-24" RCP, L=90'
Concrete Culverts at Bike Trail	2-2'x2' RCB, L=70'
CMP Culvert at Sand Road	1-72"x44" CMP Arch, L=120'
CMP Culvert along Chain of Rocks	1-24" CMP, L=36'
CMP Culvert along Chain of Rocks	1-24" CMP, L=36'
CMP Culvert along Chain of Rocks	1-24" CMP, L=40', flap-gated
Ditch Regrading along Chain of Rocks	L=3445'
Pump Station	10 cfs discharge
Discharge Pipe	L=560'

NOTE: Quantities for greenway areas and plantings not included.

APPENDIX

SUPPORTING CALCULATIONS FOR OLD CAHOKIA CREEK RESTORATION

Base Information and Calculations
- Surveyed Profile of Existing Alignment of Old Cahokia Creek
- Rating Tables for Existing Culverts
- HEC-1 Base Model for Cahokia Canal Watershed Output
- Base Cahokia Canal Sub-Basin Drainage Area Map

Alternative 1: Calculations
- Profile of Old Cahokia Creek Restoration
- Revised Sub-basin Characteristics
- Revised Drainage Area Map
- Storage Volume Calculations
  - Including 50-meter Greenway
  - Including 75-meter Greenway
  - Including 100-meter Greenway
- Peak Outflow Estimate
- E-Q-V Table
- Pond Analysis Summary
- Graph of Elevation Vs. Time for Pond
- Inflow and Outflow Hydrographs for Pond
- Capacity Calculations for Proposed Culverts
- HEC-1 Revised Model Output
- Channel Improvement Calculations
- Alternative 1 Layout

Alternative 2: Calculations
- Profile of Old Cahokia Creek Restoration
- Storage Volume Calculations
  - Including 50-meter Greenway
  - Including 75-meter Greenway
  - Including 100-meter Greenway
- E-Q-V Table
- Pond Analysis Summary
- Graph of Elevation Vs. Time for Pond
- Inflow and Outflow Hydrographs for Pond
- Capacity Calculations for Proposed Culverts
- HEC-1 Revised Model Output
- Channel Improvement Calculations
- Alternative 2 Layout

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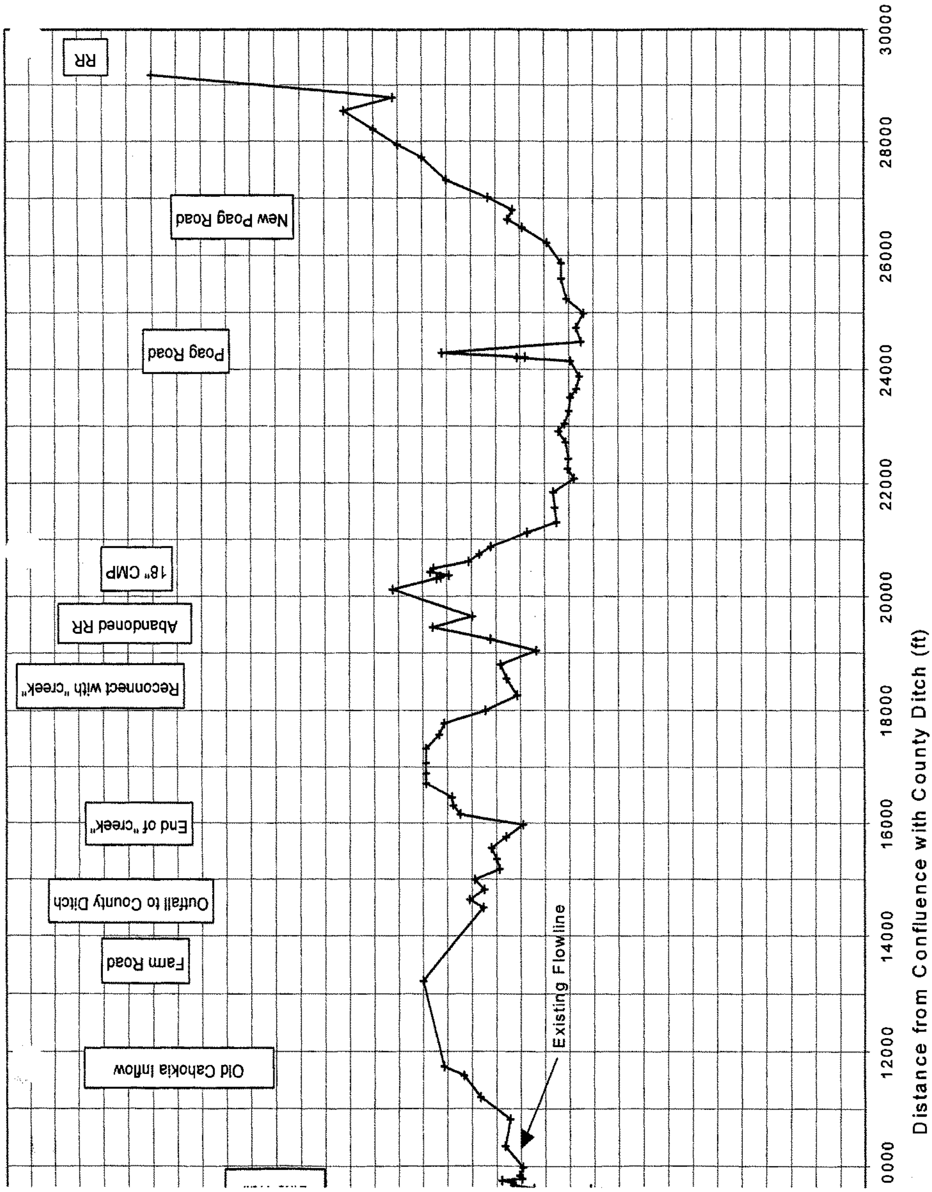
BASE INFORMATION AND CALCULATIONS


RR
New Poag Road
Poag Road
18" CMP
Abandoned RR
Reconnect with "creek"
End of "creek"
Outfall to County Ditch
Farm Road
Old Cahokia Inflow
Existing Flowline
0000
12000
14000
16000
18000
20000
22000
24000
26000
28000
30000
Distance from Confluence with County Ditch (ft)

Rating Tables for Existing Culverts

Chain of Rocks Road: 2-8'x 6' RCB's

Elevation (ft)	HW Depth (ft)	Outflow (cfs)
417.7	0.0	0
418	0.3	7
420	2.3	176
422	4.3	416
423.7	6.0	688
424.7	7.0	800

I-270: 2-9'x 6' RCB's

Elevation (ft)	HW Depth (ft)	Outflow (cfs)
417.4	0.0	0
418	0.3	26
420	2.3	216
422	4.3	540
423.4	6.0	756
424.4	7.0	900

Note: Values estimated from Inlet Control Nomographs

Poag Road: 1-36" RCP

Elevation (ft)	Outflow (cfs)	Area (cfs)
421.5	0	0
422.0	0	0.7
424.0	0	2.2
426.0	0	2.8
427.2	0	3.1
428.0	3	3.6
430.0	29	4.1
432.0	60	5.6
433.0	530	25.8

New Poag Road: 1-72" RCP

Elevation (ft)	Outflow (cfs)	Area (ac)
424.5	0	0
426.0	18	0.14
428.0	80	0.83
430.0	185	1.3
432.0	270	2.4
433.0	325	37.9
434.0	375	62.0

Note: Elevation-Outflow relationships developed in CulvertMaster; Elevation-Area relationships estimated from contours and surveyed channel sections.

Sand Road: 4-72"x 44" Elliptical Pipe Arches

Invert at 416.2'

Target HW = 5'

HW/D = 1.36

Q = 150 cfs/pipe

Existing $Q_{capacity}$ = 600 cfs

Note: Values estimated from Inlet Control Nomographs

HEC-1 Base Model Output

```
1****************************************                  ****************************************
*                                       *                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                  *   U.S. ARMY CORPS OF ENGINEERS       *
*             JUN   1998                *                  *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                 *                  *        609 SECOND STREET             *
*                                       *                  *     DAVIS, CALIFORNIA 95616          *
* RUN DATE   09MAY01  TIME  07:54:46    *                  *        (916) 756-1104                *
*                                       *                  *                                      *
****************************************                  ****************************************


              X       X  XXXXXXX    XXXXX           X
              X       X  X         X     X         XX
              X       X  X         X                X
              XXXXXXX    XXXX      X         XXXXX  X
              X       X  X         X                X
              X       X  X         X     X          X
              X       X  XXXXXXX    XXXXX          XXX


     THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

     THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
     THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
     NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
     DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL    LOSS RATE:GREEN AND AMPT INFILTRATION
     KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                        HEC-1 INPUT                                              PAGE  1

        LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          1         ID        METRO EAST WATERSHED PLANNING TEAM STUDY - AUGUST,1996
          2         ID        CAHOKIA CANAL HEC-1 MODEL FOR FUTURE CONDITIONS
          3         ID        ASSUMES FULL DEVELOPMENT OF HILLSIDE WATERSHEDS
          4         ID        MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
          5         ID        BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
          6         ID        MADISON COUNTY, IL  (Design FLOOD)
          7         ID        INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC.)
          8         IT      30                  300
          9         IO       5

         10         KK       1
         11         KM        COMPUTE RUNOFF FOR SUBAREA 1 (UPPER COUNTY DITCH)
         12         BA    1.99
         13         BF       0    -.03   1.074
         14         PH       1    91.1    0.99    2.22    3.86    4.84    5.25    6.16    7.14    8.21
         15         LS       0   87.40
         16         UD    1.43

         17         KK       2
         18         KM        ROUTE TO AREA 2
         19         RS       1    STOR      -1
         20         SV       0      20      50     560    1400    1710    2969
         21         SQ       0      50     100     200     300     400     500

         22         KK       3
         23         KM        COMPUTE RUNOFF FOR SUBAREA 3
         24         BA     .22
         25         LS       0   87.90
         26         UD     .88

         27         KK       2
         28         KM        COMPUTE RUNOFF FOR SUBAREA 2
         29         BA    1.39
         30         LS       0   83.70
         31         UD    1.74

         32         KK       2
         33         KM        COMBINE 3 HYDROGRAPHS AT 2
         34         HC       3

         35         KK       5
         36         KM        ROUTE TO AREA 5
         37         RS       1    STOR      -1
         38         SV       0       4       8      15     300     666    1190    1670
         39         SQ       0      50     100     200     300     400     500     600

         40         KK       4
         41         KM        COMPUTE RUNOFF FOR SUBAREA 4
         42         BA    1.34
         43         LS       0   90.40
```

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            44          UD     1.16
 1                                                 HEC-1 INPUT                                                PAGE  2

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            45          KK        5
            46          KM         COMPUTE RUNOFF FOR SUBAREA 5
            47          BA      .79
            48          LS        0   78.70
            49          UD     1.24

            50          KK        5
            51          KM         COMBINE 3 HYDORGRAPHS AT 5
            52          HC        3

            53          KK        8
            54          KM         ROUTE TO SUBAREA 8
            55          RS        1    STOR      -1
            56          SV        0      11      70    2100    3200    3800
            57          SQ        0      50     100     200     300     400

            58          KK        8
            59          KM         COMPUTE RUNOFF FOR SUBAREA 8
            60          BA     1.55
            61          LS        0   90.60
            62          UD     1.37

            63          KK        8
            64          KM         COMBINE 2 HYDROGRAPHS AT 8
            65          HC        2

            66          KK       10
            67          KM         ROUTE TO SUBAREA 10 AT I-270
            68          RS        1    STOR      -1
            69          SV        0      18     120    3000    4000    6200    8600
            70          SQ        0      50     100     115     150     200     250

            71          KK       10
            72          KM         COMPUTE RUNOFF FOR SUBAREAS 79,80,81,82,83,84,85,6,7,AND 10
            73          BA     7.28
            74          LS        0   75.00
            75          UD     5.76

            76          KK       10
            77          KM         COMBINE 2 HYDROGRAPHS AT 10
            78          HC        2

            79          KK       11
            80          KM         COMPUTE RUNOFF FOR SUBAREAS 86 AND 11
            81          BA      .97
            82          LS        0   75.00
            83          UD     1.74

            84          KK       11
            85          KM         COMBINE 2 HYDROGRAPHS AT SUBAREA 11
            86          HC        2
 1                                                 HEC-1 INPUT                                                PAGE  3

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            87          KK       12
            88          KM         COMPUTE RUNOFF FOR SUBAREAS 87 AND 12
            89          BA     1.50
            90          LS        0   81.00
            91          UD     1.48

            92          KK        9
            93          KM         COMPUTE RUNOFF FOR SUBAREA 9
            94          BA     1.50
            95          LS        0   90.00
            96          UD     1.11

            97          KK       13
            98          KM         COMBINE 3 HYDROGRAPHS AT 13
            99          HC        3

           100          KK       13
           101          KM         ROUTE TO SUBAREA 13 AT ILL. HIGHWAY 162
           102          RS        1    STOR      -1
           103          SV        0      16      25    1000    1600    2550    3350    3950    4678    5405
           104          SQ        0      50     100     200     300     400     500     600     700     800

           105          KK       13
           106          KM         COMPUTE RUNOFF FOR SUBAREAS 88 AND 13 (JUDY'S BRANCH)
           107          BA     9.01
           108          LS        0   75.00
           109          UD     1.54

           110          KK       13
           111          KM         DIVERSION OF SPILL OUT OF JUDY'S BRANCH
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 112          DT   NORTH
 113          DI      0    1500    1501    5476   10000
 114          DQ      0       0       1    3976    8500

 115          KK     13
 116          KM        COMBINE CAHOKIA CANAL AND JUDY'S BRANCH
 117          HC      2

 118          KK     89
 119          KM        COMPUTE RUNOFF FOR SUBAREAS 89 AND 15 (BURDICK BRANCH)
 120          BA   3.11
 121          LS      0   75.00
 122          UD   1.13

 123          KK     15
 124          KM        DIVERSION OF SPILL OUT OF BURDICK BRANCH
 125          DT   NORTH
 126          DI      0     500     501    2158   10000
 127          DQ      0       0       1    1658    9500
1                                          HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 128          KK     15
 129          KM        COMBINE CAHOKIA CANAL AND BURDICK BRANCH AT SUBAREA 15
 130          HC      2

 131          KK     18
 132          KM        DIVERSION OF SPILL OUT OF CAHOKIA CANAL TO MCDONOUGH LAKE
 133          DT   NORTH
 134          DI      0    2000    2001    2304   15000
 135          DQ      0       0       1     304   13000

 136          KK     21
 137          KM        ROUTE TO SUBAREA 21 AT HORSESHOE LAKE ROAD
 138          RS      4    STOR      -1
 139          SV      0      97     170     196     287
 140          SQ      0     500    1000    1500    2000

 141          KK     21
 142          KM        COMPUTE RUNOFF FOR SUBAREAS 99 AND 21 (SCHOOLHOUSE BRANCH)
 143          BA   7.38
 144          LS      0   75.00
 145          UD   1.49

 146          KK     21
 147          KM        DIVERSION OF SPILL OUT OF SCHOOLHOUSE BRANCH TO THE SOUTH
 148          DT   SOUTH
 149          DI      0    2500    2501    4503   20000
 150          DQ      0       0       1    2003   17500

 151          KK     15
 152          KM        COMBINE 2 HYDROGRAPHS AT SUBAREA 15 (SCHOOLHOUSE BR. AND CAHOKIA CANAL)
 153          HC      2

 154          KK     22
 155          KM   DIVERSION OF SPILL OUT OF CAHOKIA CANAL TO THE SOUTH
 156          DT   SOUTH
 157          DI      0    3000    3001    4468   20000
 158          DQ      0       0       1    1468   17000

 159          KK     22
 160          KM        ROUTE FROM SCHOOLHOUSE BRANCH TO JUNCTION WITH CAHOKIA CANAL
 161          RS      2    STOR      -1
 162          SV      0      55      97     138     176     212     245
 163          SQ      0     500    1000    1500    2000    2500    3000

 164          KK     98
 165          KM        COMPUTE RUNOFF FOR SUBAREA 98 (CANTEEN CREEK)
 166          BA  22.90
 167          LS      0   75.00
 168          UD   3.50
1                                          HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 169          KK     25
 170          KM        DIVERSION OF SPILL FROM CANTEEN CREEK
 171          DT    CAN
 172          DI      0    2100    2101   11752   20000
 173          DQ      0       0       1    9652   17900

 174          KK     25
 175          KM        ROUTE CANTEEN CREEK TO JUNCTION WITH CAHOKIA CANAL
 176          RS      2    STOR      -1
 177          SV      0      74     122     163     200     235     255     284     446     479
 178          SQ      0     500    1000    1500    2000    2500    2500    2500    2500    2500

 179          KK     22
 180          KM        COMBINE 2 HYDROGRAPHS (CANTEEN CREEK AND CAHOKIA CANAL)
```

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181          HC       2

182          KK      29
183          KM        DIVERSION OF SPILL FROM CAHOKIA CANAL BETWEEN GATES AND CANTEEN CREEK
184          DT     HOK
185          DI       0    3500    3501    5100   20000
186          DQ       0       0       1    1600   18400

187          KK      29
188          KM        ROUTE TO CONTROL GATES
189          RS       1    STOR      -1
190          SV       0      17      29      42      58      72      86      98     109     118
191          SQ       0     500    1000    1500    2000    2500    3000    3500    4000    4500

192          KK      30
193          KM        COMPUTE RUNOFF FROM HORSESHOE LAKE WATER SURFACE AREA
194          BA    3.05
195          LS       0  100.00
196          UD     .50

197          KK      29
198          KM        COMPUTE RUNOFF FOR SUBAREAS 28,29,40,41,42,43,44,45,46,47.49, AND 55
199          BA    9.94
200          LS       0   82.00
201          UD    1.92

202          KK      48
203          KM        COMPUTE RUNOFF FOR SUBAREA 48 (NAMEOKI DITCH)
204          BA    3.02
205          LS       0   80.40
206          UD    2.07

207          KK      29
208          KM        COMBINE 4 HYDROGRAPHS
209          HC       4
                                 HEC-1 INPUT                                               PAGE  6

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


210          KK      58
211          KM        COMPUTE RUNOFF FROM SUBAREAS 61,60,52,59,57, AND 58 (MITCHELL DITCH)
212          BA    4.50
213          LS       0   87.70
214          UD    4.61

215          KK      17
216          KM        ROUTE TO ELM SLOUGH
217          RS       1    STOR      -1
218          SV       0       2    5000
219          SQ       0      90      90

220          KK      17
221          KM        COMBINE 2 HYDROGRAPHS AT SUBAREA 17
222          HC       2

223          KK      56
224          KM        COMPUTE RUNOFF FOR SUBAREAS 53,54 AND 56 (LONG LAKE)
225          BA    2.92
226          LS       0   88.20
227          UD    2.90

228          KK      17
229          KM        ROUTE TO ELM SLOUGH
230          RS       1    STOR      -1
231          SV       0      20    3000
232          SQ       0      65      65

233          KK      17
234          KM        COMBINE 2 HYDROGRAPHS AT SUBAREA 17
235          HC       2

236          KK      17
237          KM        COMPUTE RUNOFF FOR SUBAREA 17(ELM SLOUGH)
238          BA    3.72
239          LS       0   79.80
240          UD     .95

241          KK      30
242          KM        COMBINE 2 HYDROGRAPHS AT HORSESHOE LAKE
243          HC       2

244          KK      30
245          KM        ROUTE PAST CONTROL GATES--HORSESHOE LAKE STORAGE
246          RS       1    STOR      -1
247          SV       0       4       8      17    2514    4739   10300   13480   21000   27000
248          SQ       0     100     200     400     600     800    1000    1300    1300    1300

249          KK      36
250          KM        ROUTE TO JUNCTION WITH LANSDOWNE DITCH
251          RS       7    STOR      -1
252          SV       0      44      70     112     149     188     231     335     442     554
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        253          SQ      0     100     200     400     600     800    1000    1500    2000    2500
1                                                  HEC-1 INPUT                                                  PAGE  7

      LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        254          KK      35
        255          KM        COMPUTE RUNOFF FOR LANSDOWNE DITCH
        256          BA    1.99
        257          LS       0   78.70
        258          UD    1.06

        259          KK      36
        260          KM        ROUTE TO JUNCTION WITH CAHOKIA CANAL
        261          RS       2    STOR      -1
        262          SV       0      36      42      49      58      63      69      80
        263          SQ       0     243     382     473     598     689     777     963

        264          KK      36
        265          KM        COMBINE LANSDOWNE DITCH AND CAHOKIA CANAL
        266          HC       2

        267          KK      39
        268          KM        ROUTE TO NORTH PUMP STATION
        269          RS       4    STOR      -1
        270          SV       0      24      35      51      63      75      85     111     137     163
        271          SQ       0     100     200     400     600     800    1000    1500    2000    2500

        272          KK      39
        273          KM        COMPUTE RUNOFF FOR SUBAREA 39
        274          BA     .71
        275          LS       0   82.90
        276          UD    1.60

        277          KK      39
        278          KM        COMBINE 2 HYDROGRAPHS AT NORTH PUMP STATION
        279          HC       2

        280          KK      39
        281          KM        ROUTE FROM NORTH PUMP STATION TO MISSISSIPPI RIVER
        282          RS       1    STOR      -1
        283          SV       0      10      25      50   10000
        284          SQ       0     325     650    1300    1300
        285          ZZ
1*****************************************                                          ***************************************
*                                         *                                          *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *                                          *     U.S. ARMY CORPS OF ENGINEERS    *
*              JUN  1998                  *                                          *     HYDROLOGIC ENGINEERING CENTER   *
*            VERSION 4.1                  *                                          *          609 SECOND STREET          *
*                                         *                                          *       DAVIS, CALIFORNIA 95616       *
* RUN DATE   09MAY01  TIME  07:54:46      *                                          *           (916) 756-1104            *
*                                         *                                          *                                     *
*****************************************                                           ***************************************



                            METRO EAST WATERSHED PLANNING TEAM STUDY - AUGUST,1996
                            CAHOKIA CANAL HEC-1 MODEL FOR FUTURE CONDITIONS
                            ASSUMES FULL DEVELOPMENT OF HILLSIDE WATERSHEDS
                            MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
                            BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
                            MADISON COUNTY, IL  (Design FLOOD)
                            INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC.)

   9 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                       NMIN         30  MINUTES IN COMPUTATION INTERVAL
                      IDATE     1    0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     7    0  ENDING DATE
                     NDTIME       0530  ENDING TIME
                      ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL     .50 HOURS
                     TOTAL TIME BASE  149.50 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT
```

WARNING --- ROUTED OUTFLOW (1259.) IS GREATER THAN MAXIMUM OUTFLOW (963.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1725.) IS GREATER THAN MAXIMUM OUTFLOW (963.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1698.) IS GREATER THAN MAXIMUM OUTFLOW (963.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1345.) IS GREATER THAN MAXIMUM OUTFLOW (963.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (976.) IS GREATER THAN MAXIMUM OUTFLOW (963.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1372.) IS GREATER THAN MAXIMUM OUTFLOW (963.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1651.) IS GREATER THAN MAXIMUM OUTFLOW (963.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1544.) IS GREATER THAN MAXIMUM OUTFLOW (963.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1229.) IS GREATER THAN MAXIMUM OUTFLOW (963.) IN STORAGE-OUTFLOW TABLE

1

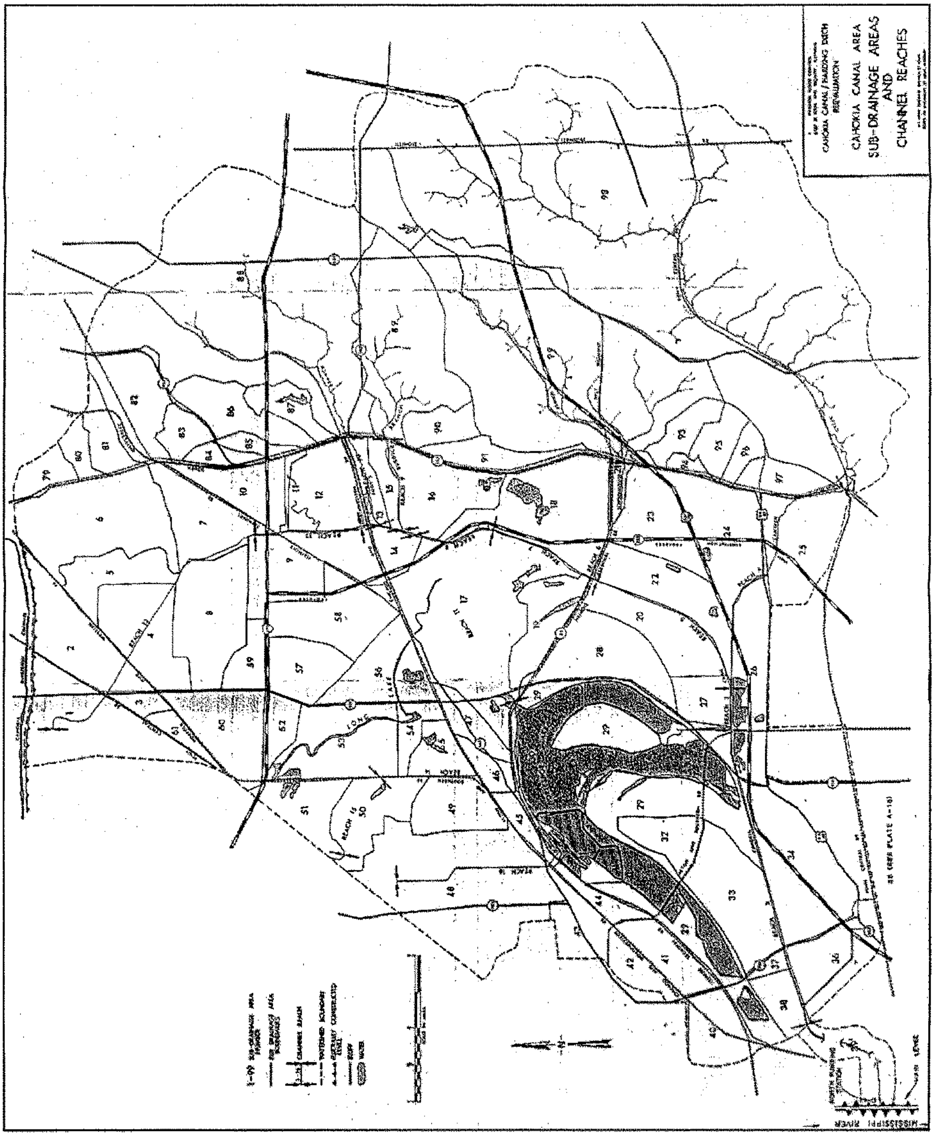
RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	1	1885.	13.50	991.	336.	120.	1.99		
+	ROUTED TO	2	182.	20.00	182.	171.	119.	1.99		
+	HYDROGRAPH AT	3	270.	13.00	113.	38.	14.	.22		
+	HYDROGRAPH AT	2	1120.	14.00	642.	218.	77.	1.39		
+	3 COMBINED AT	2	1423.	14.00	900.	414.	210.	3.60		
+	ROUTED TO	5	313.	21.00	312.	299.	210.	3.60		
+	HYDROGRAPH AT	4	1487.	13.50	704.	240.	86.	1.34		
+	HYDROGRAPH AT	5	702.	13.50	339.	113.	40.	.79		
+	3 COMBINED AT	5	2421.	13.50	1299.	629.	336.	5.73		
+	ROUTED TO	8	159.	64.00	159.	158.	152.	5.73		
+	HYDROGRAPH AT	8	1582.	13.50	810.	277.	99.	1.55		
+	2 COMBINED AT	8	1693.	13.50	926.	399.	241.	7.28		
+	ROUTED TO	10	105.	149.50	105.	105.	104.	7.28		
+	HYDROGRAPH AT	10	2147.	18.50	1919.	914.	318.	7.28		
+	2 COMBINED AT	10	2249.	18.50	2021.	1015.	420.	14.56		
+	HYDROGRAPH AT	11	650.	14.00	374.	127.	45.	.97		
+	2 COMBINED AT	11	2380.	18.50	2175.	1139.	464.	15.53		
+	HYDROGRAPH AT	12	1234.	14.00	667.	224.	79.	1.50		
+	HYDROGRAPH AT	9	1684.	13.50	785.	267.	96.	1.50		
+	3 COMBINED AT	13	3980.	13.50	3094.	1615.	636.	18.53		
+	ROUTED TO	13	411.	31.50	410.	399.	361.	18.53		
+	HYDROGRAPH AT	13	6473.	14.00	3525.	1182.	416.	9.01		

+	DIVERSION TO	NORTH	4973.	12.50	2053.	513.	171.	9.01
+	HYDROGRAPH AT	13	1500.	12.50	1472.	668.	245.	9.01
+	2 COMBINED AT	13	1746.	17.00	1662.	982.	588.	27.54
+	HYDROGRAPH AT	89	2668.	13.50	1239.	412.	146.	3.11
+	DIVERSION TO	NORTH	2168.	12.00	755.	189.	63.	3.11
+	HYDROGRAPH AT	15	500.	12.00	484.	223.	83.	3.11
+	2 COMBINED AT	15	2228.	16.50	2140.	1201.	670.	30.65
+	DIVERSION TO	NORTH	228.	12.50	156.	39.	13.	30.65
+	HYDROGRAPH AT	18	2000.	12.50	1984.	1162.	657.	30.65
+	ROUTED TO	21	1997.	18.00	1936.	1152.	655.	30.65
+	HYDROGRAPH AT	21	5355.	14.00	2896.	969.	341.	7.38
+	DIVERSION TO	SOUTH	2855.	13.00	855.	214.	71.	7.38
+	HYDROGRAPH AT	21	2500.	13.00	2041.	755.	270.	7.38
+	2 COMBINED AT	15	4433.	15.50	3789.	1888.	920.	38.03
+	DIVERSION TO	SOUTH	1433.	13.00	804.	201.	67.	38.03
+	HYDROGRAPH AT	22	3000.	13.00	2985.	1687.	853.	38.03
+	ROUTED TO	22	3000.	18.00	2950.	1680.	852.	38.03
+	HYDROGRAPH AT	98	9698.	16.00	7546.	2930.	1018.	22.90
+	DIVERSION TO	CAN	7598.	13.00	5446.	1574.	525.	22.90
+	HYDROGRAPH AT	25	2100.	13.00	2100.	1356.	494.	22.90
+	ROUTED TO	25	2100.	19.50	2100.	1351.	494.	22.90
+	2 COMBINED AT	22	5100.	18.00	5022.	3031.	1345.	60.93
+	DIVERSION TO	HOK	1600.	13.50	1522.	502.	167.	60.93
+	HYDROGRAPH AT	29	3500.	13.50	3500.	2529.	1177.	60.93
+	ROUTED TO	29	3500.	16.50	3500.	2526.	1177.	60.93
+	HYDROGRAPH AT	30	4690.	12.50	1755.	627.	235.	3.05
+	HYDROGRAPH AT	29	7218.	14.00	4387.	1506.	530.	9.94
+	HYDROGRAPH AT	48	2048.	14.50	1280.	442.	155.	3.02
+	4 COMBINED AT	29	14103.	14.00	10175.	4976.	2064.	76.94
+	HYDROGRAPH AT	58	2034.	17.00	1726.	742.	259.	4.50
+	ROUTED TO	17	90.	10.50	90.	90.	90.	4.50

+	2 COMBINED AT	17	14193.	14.00	10265.	5066.	2152.	81.44
+	HYDROGRAPH AT	56	1825.	15.00	1328.	492.	173.	2.92
+	ROUTED TO	17	65.	11.00	65.	65.	65.	2.92
+	2 COMBINED AT	17	14258.	14.00	10330.	5130.	2216.	84.36
+	HYDROGRAPH AT	17	3743.	13.00	1651.	549.	196.	3.72
+	2 COMBINED AT	30	17026.	13.50	11953.	5675.	2411.	88.08
+	ROUTED TO	30	984.	43.50	984.	982.	965.	88.08
+	ROUTED TO	36	984.	46.00	984.	982.	965.	88.08
+	HYDROGRAPH AT	35	1886.	13.50	862.	286.	102.	1.99
+	ROUTED TO	36	1651.	14.00	837.	286.	102.	1.99
+	2 COMBINED AT	36	2093.	14.00	1409.	1112.	1024.	90.07
+	ROUTED TO	39	2019.	15.00	1401.	1110.	1024.	90.07
+	HYDROGRAPH AT	39	590.	14.00	325.	110.	39.	.71
+	2 COMBINED AT	39	2492.	14.50	1688.	1202.	1056.	90.78
+	ROUTED TO	39	1300.	14.00	1300.	1199.	1055.	90.78

*** NORMAL END OF HEC-1 ***

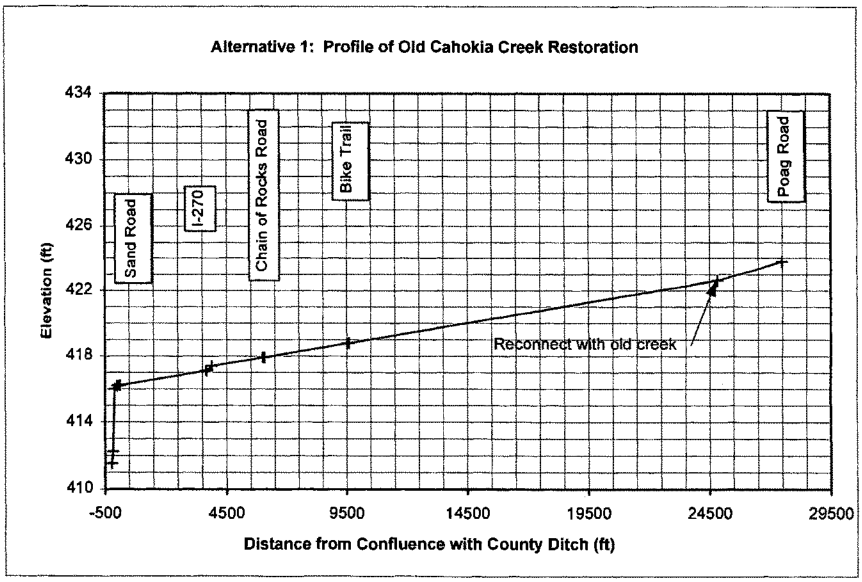

CAHOKIA CANAL AREA
SUB-DRAINAGE AREAS
AND
CHANNEL REACHES
MISSISSIPPI RIVER

ALTERNATIVE 1: CALCULATIONS

Alternative 1. Old Cahokia Creek Restoration Profile

Measured Distance	Realigned Station	Proposed FL Elev.	Description of Location and Structures
0	-221	411.54	near County Ditch
45	-176	412.26	
74	-102	416	
102	0	416.19	Sand Rd. 4-40"x70" elliptical CMP's (DS)
118	118	416.22	Sand Rd. 4-40"x70" elliptical CMP's (US)
3551	3669	417.11	I-270 2-9'x6' RCB's (DS)
226	3895	417.39	I-270 2-9'x6' RCB's (US)
2105	6000	*417.91*	*Chain of Rocks Rd. 2-8'x6' RCB's (DS)*
70	6070	*417.92*	*Chain of Rocks Rd. 2-8'x6' RCB's (US)*
3448	9518	*418.78*	*Bike Trail, 2-2'x2' RCB's (DS)*
70	9588	*418.80*	*Bike Trail, 2-2'x2' RCB's (US)*
15236	24824	*422.61*	At Reconnect with old creek
2667	27491	423.79	Poag Road 1-36" RCP (DS)

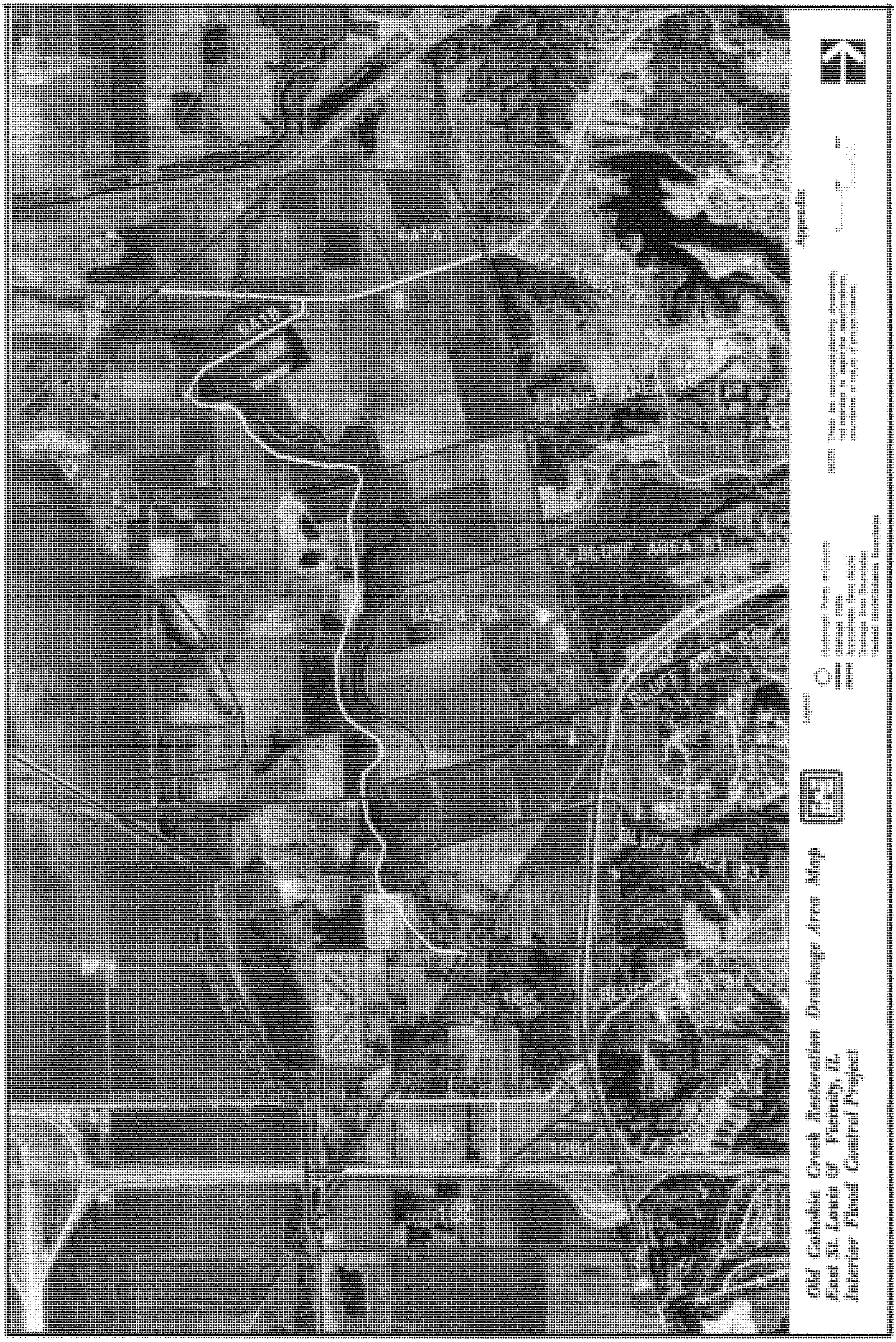
NOTE: Creek flowline distances measured from aerial photograph, confirmed with survey data where possible.



Revised Sub-basin Characteristics for Old Cahokia Creek Watershed

Area Name	Area (ac)	Area (mi^2)	CN Future	HL_{total} (ft)	HL Overland (ft)	HL Channel (ft)	So (%)	Lag Time (hr)
79	**272**	**0.43**	75.0	**3485**	***	***	**9**	0.33
80	**152**	**0.24**	75.0	**4013**	***	***	**9.8**	0.36
81	**298**	**0.47**	75.0	**5491**	***	***	**11.3**	0.43
82	**754**	**1.18**	75.0	**9979**	***	***	**11.8**	0.68
83	**225**	**0.35**	75.0	**4699**	***	***	**13.1**	0.35
84A	121	0.19	75.0	**1690**	***	***	**10.4**	0.17
84B	40	0.06	75.0	1970	***	***	**10.4**	0.20
6A1A	205	0.32	75.0	5212	1620	3592	3.5	0.74
6A1B	66	0.10	75.0	3575	1135	2440	0.18	2.41
6A2&7A	1008	1.58	75.0	23636	5725	17911	**1.8**	3.45
10A	239	0.37	75.0	6600	2240	4360	**1.2**	1.52
10B1	61	0.10	75.0	1290	1290	2120	**1.2**	0.41
10C	178	0.28	75.0	6110	2610	3500	**1.2**	1.43
Total	3619	5.66						

Note: Values in bold were provided by the District (see Sub-basin Table for base HEC-1 Model)


Old Cahokia Creek Restoration Drainage Area Map
East St. Louis & Vicinity, IL
Interior Flood Control Project

Storage Volume Calculations

```
Type.... Vol: Elev-Area                                         Page 1.01
Name.... NEW-50M

File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK.PPW
Title... Calculation of Pond Volume with 50-meter Greenway
```

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
418.80	-----	.0000	.0000	.000	.000
420.00	-----	4.8000	4.8000	1.920	1.920
421.00	-----	9.4000	20.9171	6.972	8.892
422.00	-----	14.6000	35.7150	11.905	20.797
423.00	-----	18.4000	49.3902	16.463	37.261
424.00	-----	19.4000	56.6934	18.898	56.159
425.00	-----	20.5000	59.8424	19.947	76.106
426.00	-----	31.9000	77.9725	25.991	102.097
427.00	-----	39.7000	107.1869	35.729	137.826
428.00	-----	119.8000	228.4642	76.155	213.981
429.00	-----	210.1000	488.5505	162.850	376.831
430.00	-----	286.3000	741.6584	247.220	624.050
431.00	-----	328.8999	922.0616	307.354	931.404
432.00	-----	362.8999	1037.2820	345.761	1277.165

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

```
where: EL1, EL2      = Lower and upper elevations of the increment
       Area1,Area2   = Areas computed for EL1, EL2, respectively
       Volume        = Incremental volume between EL1 and EL2
```

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 12:59:29   Date: 02-28-2001

Storage Volume Calculations

Type.... Vol: Elev-Area   Page 1.01
Name.... NEW-75M

File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK.PPW
Title... Calculation of Pond Volume with 75-meter Greenway

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
418.80	-----	.0000	.0000	.000	.000
420.00	-----	4.8000	4.8000	1.920	1.920
421.00	-----	9.4000	20.9171	6.972	8.892
422.00	-----	14.6000	35.7150	11.905	20.797
423.00	-----	18.4000	49.3902	16.463	37.261
424.00	-----	19.4000	56.6934	18.898	56.159
425.00	-----	20.5000	59.8424	19.947	76.106
426.00	-----	31.9000	77.9725	25.991	102.097
427.00	-----	39.7000	107.1869	35.729	137.826
428.00	-----	146.8000	262.8411	87.614	225.440
429.00	-----	237.0000	570.3251	190.108	415.548
430.00	-----	313.2000	822.6489	274.216	689.764
431.00	-----	355.8000	1002.8210	334.274	1024.038
432.00	-----	389.8999	1118.1600	372.720	1396.758

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 13:00:04   Date: 02-28-2001

Storage Volume Calculations

Type.... Vol: Elev-Area Page 1.01
Name.... NEW-100M

File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK.PPW
Title... Calculation of Pond Volume with 100-meter Greenway

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
418.80	-----	.0000	.0000	.000	.000
420.00	-----	4.8000	4.8000	1.920	1.920
421.00	-----	9.4000	20.9171	6.972	8.892
422.00	-----	14.6000	35.7150	11.905	20.797
423.00	-----	18.4000	49.3902	16.463	37.261
424.00	-----	19.4000	56.6934	18.898	56.159
425.00	-----	20.5000	59.8424	19.947	76.106
426.00	-----	31.9000	77.9725	25.991	102.097
427.00	-----	39.7000	107.1869	35.729	137.826
428.00	-----	173.7000	296.4415	98.814	236.640
429.00	-----	264.0000	651.8420	217.281	453.920
430.00	-----	340.2000	903.8878	301.296	755.216
431.00	-----	382.8000	1083.8720	361.291	1116.507
432.00	-----	416.8999	1199.1860	399.729	1516.236
433.00	-----	447.2000	1295.8840	431.961	1948.197

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 13:00:33 Date: 02-28-2001

Peak Outflow Estimate

Type.... Vol.Est: Peak Estimate Page 2.01
Name.... OLDCAHOK

File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK.PPW
Title... Alt. 1: Initial Peak Outflow Estimate for Detention Pond

DETENTION STORAGE ESTIMATE
Estimated from Max Allowable Outflow
(Outflow Hydrograph Approximation)

Peak Inflow = 2781.00 cfs
Max Outflow = 135.00 cfs

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	943.094	10.2826	25.9762
Linear	1023.981	7.0000	25.9762
Curvilinear	1117.347	6.5000	25.9762
Upper Boundary	1130.644	6.5000	25.9762
Total Inflow	1165.207	6.5000	55.0000

Stretch Factor = .000 % (Curvilinear Estimate Only)

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:06:17 Date: 03-02-2001

E-Q-V Table

Type.... Pond E-V-Q Table Page 10.01
Name.... OLDCAHOK
File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK.PPW

LEVEL POOL ROUTING DATA

HYG Dir = K:\STLCOE\ESTL-IFC\PONDPACK\
Inflow HYG file = NONE STORED - OLDCAHOK IN 100
Outflow HYG file = NONE STORED - OLDCAHOK OUT 100

Pond Node Data = OLDCAHOK
Pond Volume Data = new-100m
Pond Outlet Data = BIKEOUTLET

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 418.80 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .5000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
418.80	.00	.000	.0000	.00	.00	.00
419.00	.61	.009	.1333	.00	.61	1.04
419.20	2.01	.071	.5333	.00	2.01	5.45
419.40	3.91	.240	1.2000	.00	3.91	15.53
419.60	6.23	.569	2.1332	.00	6.23	33.77
419.80	8.90	1.111	3.3333	.00	8.90	62.68
420.00	11.88	1.920	4.8000	.00	11.88	104.81
420.20	15.13	2.959	5.5974	.00	15.13	158.33
420.40	18.65	4.163	6.4562	.00	18.65	220.14
420.60	22.37	5.545	7.3761	.00	22.37	290.75
420.80	26.35	7.118	8.3574	.00	26.35	370.84
421.00	30.54	8.892	9.4000	.00	30.54	460.93
421.20	34.89	10.866	10.3487	.00	34.89	560.82
421.40	38.86	13.035	11.3431	.00	38.86	669.75
421.60	42.00	15.407	12.3831	.00	42.00	787.68
421.80	45.07	17.991	13.4687	.00	45.07	915.84
422.00	48.03	20.797	14.6000	.00	48.03	1054.63
422.20	51.01	23.789	15.3248	.00	51.01	1202.41
422.40	53.83	26.928	16.0673	.00	53.83	1357.17
422.60	56.61	30.217	16.8272	.00	56.61	1519.13
422.80	59.42	33.660	17.6048	.00	59.42	1688.59
423.00	62.17	37.261	18.4000	.00	62.17	1865.59
423.20	64.85	40.960	18.5979	.00	64.85	2047.33

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 14:37:47 Date: 03-01-2001

E-Q-V Table

```
Type.... Pond E-V-Q Table                                    Page 10.02
Name.... OLDCAHOK
File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK.PPW

                    LEVEL POOL ROUTING DATA

 HYG Dir            = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - OLDCAHOK      IN  100
 Outflow HYG file = NONE STORED - OLDCAHOK      OUT 100

 Pond Node   Data = OLDCAHOK
 Pond Volume Data = new-100m
 Pond Outlet Data = BIKEOUTLET

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =   418.80 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
423.40	67.49	44.700	18.7968	.00	67.49	2230.97
423.60	70.02	48.479	18.9968	.00	70.02	2416.40
423.80	72.47	52.299	19.1979	.00	72.47	2603.72
424.00	74.82	56.159	19.4000	.00	74.82	2792.89
424.20	77.11	60.060	19.6176	.00	77.11	2984.01
424.40	79.32	64.006	19.8364	.00	79.32	3177.19
424.60	81.50	67.994	20.0563	.00	81.50	3372.43
424.80	83.60	72.028	20.2776	.00	83.60	3569.76
425.00	85.66	76.106	20.5000	.00	85.66	3769.20
425.20	87.66	80.412	22.5790	.00	87.66	3979.60
425.40	89.63	85.144	24.7587	.00	89.63	4210.61
425.60	91.32	90.322	27.0385	.00	91.32	4462.90
425.80	92.99	95.966	29.4190	.00	92.99	4737.76
426.00	94.65	102.097	31.9000	.00	94.65	5036.14
426.20	96.28	108.625	33.3917	.00	96.28	5353.72
426.40	97.89	115.456	34.9177	.00	97.89	5685.95
426.60	99.50	122.594	36.4775	.00	99.50	6033.04
426.80	101.06	130.049	38.0717	.00	101.06	6395.42
427.00	102.60	137.826	39.7000	.00	102.60	6773.37
427.20	104.12	147.625	58.9274	.00	104.12	7249.15
427.40	105.63	161.649	81.9432	.00	105.63	7929.46
427.60	107.12	180.653	108.7404	.00	107.12	8850.73
427.80	108.61	205.398	139.3273	.00	108.61	10049.88

```
S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)        Compute Time: 14:37:47    Date: 03-01-2001
```

E-Q-V Table

Type.... Pond E-V-Q Table Page 10.03
Name.... OLDCAHOK
File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK.PPW

LEVEL POOL ROUTING DATA

HYG Dir = K:\STLCOE\ESTL-IFC\PONDPACK\
Inflow HYG file = NONE STORED - OLDCAHOK IN 100
Outflow HYG file = NONE STORED - OLDCAHOK OUT 100

Pond Node Data = OLDCAHOK
Pond Volume Data = new-100m
Pond Outlet Data = BIKEOUTLET

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 418.80 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .5000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
428.00	110.04	236.640	173.7000	.00	110.04	11563.40
428.20	111.48	273.019	190.2519	.00	111.48	13325.60
428.40	112.90	312.790	207.5596	.00	112.90	15251.94
428.60	114.32	356.091	225.6179	.00	114.32	17349.14
428.80	115.71	403.087	244.4323	.00	115.71	19625.10
429.00	117.08	453.920	264.0000	.00	117.08	22086.82
429.20	118.45	508.156	278.4668	.00	118.45	24713.18
429.40	119.78	565.332	293.3217	.00	119.78	27481.83
429.60	121.12	625.508	308.5603	.00	121.12	30395.70
429.80	122.45	688.780	324.1871	.00	122.45	33459.40
430.00	123.76	755.216	340.2000	.00	123.76	36676.23
430.20	125.04	824.080	348.5182	.00	125.04	40010.52
430.40	126.34	894.629	356.9383	.00	126.34	43426.36
430.60	127.62	966.860	365.4575	.00	127.62	46923.63
430.80	128.87	1040.816	374.0785	.00	128.87	50504.38
431.00	130.11	1116.507	382.8000	.00	130.11	54169.05
431.20	131.36	1193.729	389.5030	.00	131.36	57907.85
431.40	132.59	1272.310	396.2652	.00	132.59	61712.39
431.60	133.80	1352.237	403.0846	.00	133.80	65582.05
431.80	135.02	1433.545	409.9631	.00	135.02	69518.61
432.00	136.21	1516.236	416.8999	.00	136.21	73522.02

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 14:37:47 Date: 03-01-2001

Pond Analysis Summary

```
Type.... Pond Routing Summary                                  Page 10.06
Name.... OLDCAHOK       OUT  Tag: 100                          Event: 100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK.PPW
Storm... 100    Tag: 100

                    LEVEL POOL ROUTING SUMMARY

 HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - OLDCAHOK      IN  100
 Outflow HYG file = NONE STORED - OLDCAHOK      OUT 100

 Pond Node   Data = OLDCAHOK
 Pond Volume Data = new-100m
 Pond Outlet Data = BIKEOUTLET

 No Infiltration

 INITIAL CONDITIONS
 ---------------------------------
 Starting WS Elev    =    418.80 ft
 Starting Volume     =      .000 ac-ft
 Starting Outflow    =       .00 cfs
 Starting Infiltr.   =       .00 cfs
 Starting Total Qout=        .00 cfs
 Time Increment      =     .5000 hrs

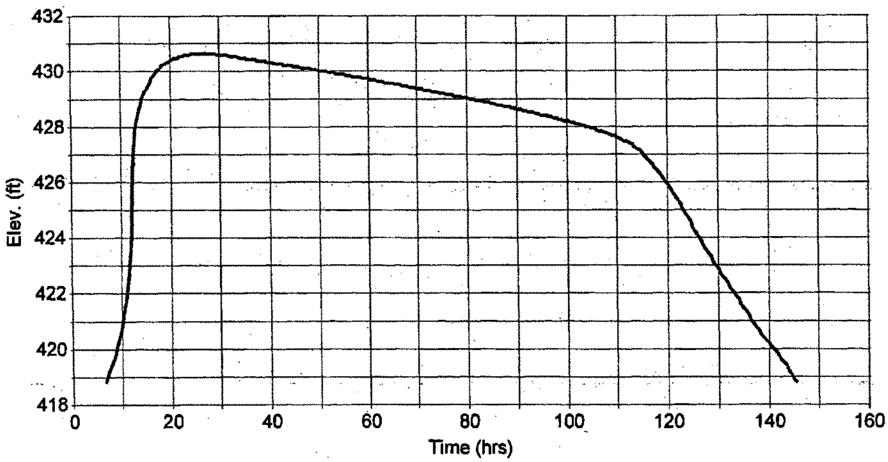
 INFLOW/OUTFLOW HYDROGRAPH SUMMARY
 ====================================================
 Peak Inflow       =   2781.00 cfs    at   13.0000 hrs
 Peak Outflow      =    127.83 cfs    at   26.0000 hrs
 ----------------------------------------------------
 Peak Elevation    =    430.63 ft
 Peak Storage =        979.544 ac-ft
 ====================================================

 MASS BALANCE (ac-ft)
 -------------------------
+ Initial Vol   =          .000
+ HYG Vol IN    =      1165.207
- Infiltration =           .000
- HYG Vol OUT   =      1165.207
- Retained Vol =           .000
                      ----------
  Unrouted Vol =           .000 ac-ft  (.000% of Outflow Volume)

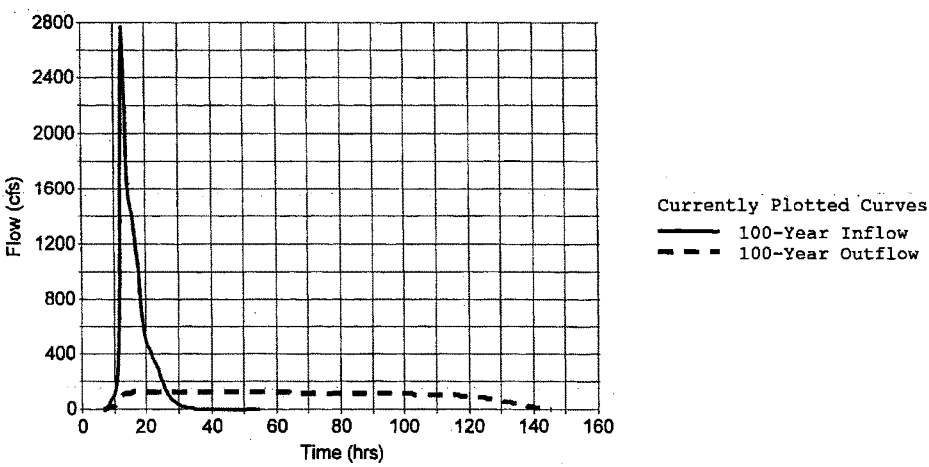



S/N: 021801A06A86    Parsons
PondPack Ver: 7.0 (312)       Compute Time: 14:37:47     Date: 03-01-2001
```

Alt. 1: Elevation Vs. Time in Proposed Detention Area



Alt. 1: Inflow and Ouflow Hydrographs for Proposed Detention Area



Alt. 1 Capacity Calculations for Proposed Culverts

Bike Trail: Proposed 2-24" RCP's

Elevation (ft)	Outflow (cfs)	Volume (ac-ft)
418.8	0	0
420.0	12	1.9
421.0	31	8.9
422.0	48	20.8
423.0	62	37.3
424.0	75	56.1
425.0	86	76.1
426.0	95	102
427.0	103	137.8
428.0	110	236.6
429.0	117	453.9
430.0	124	755.2
431.0	130	1116.5
432.0	136	1516.2

Note: Elevation-Outflow-Volume relationship developed in PondPack for detention area outlets

Sand Road: 4-72"x 44" Elliptical Pipe Arches

Invert at 416.2'
Target HW = 5'
HW/D = 1.36
Q = 150 cfs/pipe
Existing $Q_{capacity}$ = 600 cfs

Add one pipe arch of same size:

Proposed $Q_{capacity}$ = 750 cfs

Note: Values estimated from Inlet Control Nomographs

HEC-1 Revised Model Output

```
1****************************************                    ****************************************
*                                       *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998               *                    *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                 *                    *        609 SECOND STREET             *
*                                       *                    *     DAVIS, CALIFORNIA 95616          *
*  RUN DATE   09MAY01  TIME  08:41:57   *                    *         (916) 756-1104               *
*                                       *                    *                                      *
****************************************                    ****************************************


                          X     X  XXXXXXX   XXXXX          X
                          X     X  X        X     X        XX
                          X     X  X        X               X
                          XXXXXXX  XXXX     X        XXXXX  X
                          X     X  X        X               X
                          X     X  X        X     X         X
                          X     X  XXXXXXX   XXXXX         XXX


THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                          HEC-1 INPUT                                          PAGE  1

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

       1           ID        FILENAME: REVISED_OC1.TXT
       2           ID        REVISED FOR OLD CAHOKIA CREEK RESTORATION, ALT.1
       3           ID        EAST ST. LOUIS & VICINITY, IL, INTERIOR FLOOD CONTROL PROJECT
       4           ID        FUTURE DEVELOPMENT ASSUMED
       5           ID        MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
       6           ID        BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
       7           ID        MADISON COUNTY, IL  (Design FLOOD)
       8           IT      30                     300
       9           IO       5

      10           KK      79
      11           KM        COMPUTE BLUFF AREA 79
      12           BA    0.43
      13           PH       1    91.1    0.99    2.22    3.86    4.84    5.25    6.16    7.14    8.21
      14           LS       0    75.0
      15           UD    0.33

      16           KK    6A1A
      17           KM        COMPUTE AREA 6A1A
      18           BA    0.32
      19           LS       0    75.0
      20           UD    0.74

      21           KK       1
      22           KM        COMBINE 2 HYDROGRAPHS
      23           HC       2

      24           KK   NPOAG
      25           KM        ROUTE THROUGH NEW POAG ROAD CULVERT
      26           RS       1    ELEV   424.5
      27           SA     0.0    0.14    0.83     1.3     2.4    37.9    62.0
      28           SE   424.5   426.0   428.0   430.0   432.0   433.0   434.0
      29           SQ       0      18      80     185     270     325     375

      30           KK    6A1B
      31           KM        COMPUTE AREA 6A1B
      32           BA     0.1
      33           LS       0    75.0
      34           UD    2.41

      35           KK       2
      36           KM        COMBINE 2 HYDROGRAPHS
      37           HC       2

      38           KK    POAG
      39           KM        ROUTE THROUGH POAG ROAD CULVERT
      40           RS       1    ELEV   421.5
      41           SA     0.0     0.7     2.2     2.8     3.1     3.6     4.1     5.6    25.8
      42           SE   421.5   422.0   424.0   426.0   427.2   428.0   430.0   432.0   433.0
      43           SQ       0       0       0       0       0       3      29      60     530
```

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1                                        HEC-1 INPUT                                                  PAGE  2

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        44           KK     80
        45           KM        COMPUTE AREA 80
        46           BA    0.24
        47           LS      0    75.0
        48           UD    0.36

        49           KK      3
        50           KM        COMBINE 2 HYDROGRAPHS
        51           HC      2

        52           KK     81
        53           KM        COMPUTE AREA 81
        54           BA    0.46
        55           LS      0    75.0
        56           UD    0.43

        57           KK     82
        58           KM        COMPUTE AREA 82
        59           BA    1.18
        60           LS      0    75.0
        61           UD    0.68

        62           KK      3
        63           KM        COMBINE 3 HYDROGRAPHS
        64           HC      3

        65           KK     83
        66           KM        COMPUTE AREA 83
        67           BA    0.35
        68           LS      0    75.0
        69           UD    0.35

        70           KK    6A2
        71           KM        COMPUTE AREA 6A2 AND 7A
        72           BA    1.58
        73           LS      0    75.0
        74           UD    3.45

        75           KK      3
        76           KM        COMBINE 3 HYDROGRAPHS
        77           HC      3

        78           KK    BIKE
        79           KM        ROUTE THROUGH BIKE TRAIL CULVERTS
        80           RS      1    ELEV   418.8
        81           SV      0     1.9     8.9    20.8    37.3    56.1    76.1   102.0   137.8   236.6
        82           SV  453.9   755.2  1116.5  1516.2
        83           SQ      0      12      31      48      62      75      86      95     103     110
        84           SQ    117     124     130     136
        85           SE  418.8   420.0   421.0   422.0   423.0   424.0   425.0   426.0   427.0   428.0
        86           SE  429.0   430.0   431.0   432.0
1                                        HEC-1 INPUT                                                  PAGE  3

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        87           KK    10A
        88           KM        COMPUTE RUNOFF FROM 10A
        89           BA    0.37
        90           LS      0    75.0
        91           UD    1.52

        92           KK    84A
        93           KM        COMPUTE RUNOFF FROM 84A
        94           BA    0.19
        95           LS      0    75.0
        96           UD    0.17

        97           KK      4
        98           KM        COMBINE 3 HYDROGRAPHS
        99           HC      3

       100           KK    CORR
       101           KM        ROUTE FLOW THROUGH CHAIN OF ROCKS CULVERTS
       102           RS      1    ELEV   417.7
       103           SA      0     1.3     5.0     6.2     7.2     7.3
       104           SE  417.7   418.0     420     422   423.7   424.7
       105           SQ      0       7     176     416     688     800

       106           KK    84B
       107           KM        COMPUTE RUNOFF FROM 84B
       108           BA    0.06
       109           LS      0    75.0
       110           UD    0.20

       111           KK   10B1
       112           KM        COMPUTE RUNOFF TO I-270
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        113          BA     0.10
        114          LS       0     75.0
        115          UD     0.41

        116          KK       5
        117          KM          COMBINE 3 HYDROGRAPHS
        118          HC       3

        119          KK     I270
        120          KM          ROUTE THROUGH I-270 CULVERTS
        121          RS       1    ELEV    417.4
        122          SA       0      2.4      3.2      3.7      4.1      4.4
        123          SE   417.4    418.0      420      422    423.4    424.4
        124          SQ       0       26      216      540      756      900

        125          KK     10C
        126          KM          COMPUTE RUNOFF TO SAND ROAD
        127          BA     0.28
        128          LS       0     75.0
        129          UD     1.43
1                                            HEC-1 INPUT                                                PAGE  4

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        130          KK       6
        131          KM          COMBINE 2 HYDROGRAPHS
        132          HC       2
        133          ZZ
1****************************************                                ****************************************
 *                                      *                                *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                *   U.S. ARMY CORPS OF ENGINEERS      *
 *           JUN   1998                 *                                *   HYDROLOGIC ENGINEERING CENTER     *
 *        VERSION 4.1                   *                                *        609 SECOND STREET            *
 *                                      *                                *     DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   09MAY01  TIME  08:41:57  *                                *         (916) 756-1104              *
 *                                      *                                *                                      *
****************************************                                 ****************************************



                          FILENAME: REVISED_OC1.TXT
                          REVISED FOR OLD CAHOKIA CREEK RESTORATION, ALT.1
                          EAST ST. LOUIS & VICINITY, IL, INTERIOR FLOOD CONTROL PROJECT
                          FUTURE DEVELOPMENT ASSUMED
                          MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
                          BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
                          MADISON COUNTY, IL  (Design FLOOD)

   9 IO         OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT         HYDROGRAPH TIME DATA
                       NMIN         30  MINUTES IN COMPUTATION INTERVAL
                      IDATE     1    0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     7    0  ENDING DATE
                     NDTIME       0530  ENDING TIME
                      ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL      .50 HOURS
                      TOTAL TIME BASE  149.50 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT
1
                                                    RUNOFF SUMMARY
                                               FLOW IN CUBIC FEET PER SECOND
                                            TIME IN HOURS,  AREA IN SQUARE MILES

                                        PEAK    TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD       BASIN     MAXIMUM     TIME OF
         OPERATION        STATION       FLOW     PEAK                                              AREA      STAGE     MAX STAGE
+                                                            6-HOUR      24-HOUR      72-HOUR

         HYDROGRAPH AT
+                              79       608.   12.50         175.          55.          18.          .43

         HYDROGRAPH AT
+                            6A1A       339.   13.00         129.          41.          14.          .32

         2 COMBINED AT
```

+		1	838.	12.50	303.	95.	32.	.75		
	ROUTED TO									
+		NPOAG	353.	14.00	300.	95.	32.	.75		
+									433.56	14.00
	HYDROGRAPH AT									
+		6A1B	54.	15.00	37.	13.	4.	.10		
	2 COMBINED AT									
+		2	403.	14.50	334.	108.	36.	.85		
	ROUTED TO									
+		POAG	399.	15.00	304.	101.	34.	.85		
+									432.72	15.00
	HYDROGRAPH AT									
+		80	323.	12.50	97.	31.	10.	.24		
	2 COMBINED AT									
+		3	470.	13.50	387.	131.	44.	1.09		
	HYDROGRAPH AT									
+		81	549.	12.50	187.	59.	20.	.46		
	HYDROGRAPH AT									
+		82	1294.	13.00	476.	150.	50.	1.18		
	3 COMBINED AT									
+		3	2256.	13.00	1037.	340.	114.	2.73		
	HYDROGRAPH AT									
+		83	479.	12.50	142.	45.	15.	.35		
	HYDROGRAPH AT									
+		6A2	676.	16.00	524.	201.	67.	1.58		
	3 COMBINED AT									
+		3	2781.	13.00	1616.	585.	196.	4.66		
	ROUTED TO									
+		BIKE	128.	26.00	128.	127.	123.	4.66		
+									430.62	26.00
	HYDROGRAPH AT									
+		10A	267.	14.00	145.	47.	16.	.37		
	HYDROGRAPH AT									
+		84A	300.	12.50	77.	24.	8.	.19		
	3 COMBINED AT									
+		4	500.	12.50	331.	191.	145.	5.22		
	ROUTED TO									
+		CORR	441.	14.00	327.	190.	145.	5.22		
+									422.16	14.00
	HYDROGRAPH AT									
+		84B	95.	12.50	24.	8.	3.	.06		
	HYDROGRAPH AT									
+		10B1	123.	12.50	41.	13.	4.	.10		
	3 COMBINED AT									
+		5	570.	13.00	387.	209.	151.	5.38		
	ROUTED TO									
+		I270	546.	13.50	384.	209.	151.	5.38		
+									422.04	13.50
	HYDROGRAPH AT									
+		10C	206.	13.50	110.	36.	12.	.28		
	2 COMBINED AT									
+		6	752.	13.50	494.	244.	163.	5.66		

*** NORMAL END OF HEC-1 ***

Channel Improvement Calculations

Capacity Calculation for Reach 1
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\oldcahok\chain of.fm2
Worksheet	Reach 1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.035	
Channel Slope	0.000250	ft/ft
Depth	5.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	40.00	ft

Results		
Discharge	452.64	cfs
Flow Area	275.00	ft²
Wetted Perimeter	71.62	ft
Top Width	70.00	ft
Critical Depth	1.52	ft
Critical Slope	0.016242	ft/ft
Velocity	1.65	ft/s
Velocity Head	0.04	ft
Specific Energy	5.04	ft
Froude Number	0.15	
Flow is subcritical.		

Channel Improvement Calculations

Capacity Calculation for Reach 2
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\oldcahok\chain of.fm2
Worksheet	Reach 2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.000250	ft/ft
Depth	5.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	40.00	ft

Results		
Discharge	528.08	cfs
Flow Area	275.00	ft²
Wetted Perimeter	71.62	ft
Top Width	70.00	ft
Critical Depth	1.68	ft
Critical Slope	0.011593	ft/ft
Velocity	1.92	ft/s
Velocity Head	0.06	ft
Specific Energy	5.06	ft
Froude Number	0.17	
Flow is subcritical.		

Channel Improvement Calculations

Capacity Calculation for Reach 3
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\oldcahok\chain of.fm2
Worksheet	Reach 3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.000250	ft/ft
Depth	5.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	50.00	ft

Results		
Discharge	639.40	cfs
Flow Area	325.00	ft²
Wetted Perimeter	81.62	ft
Top Width	80.00	ft
Critical Depth	1.66	ft
Critical Slope	0.011535	ft/ft
Velocity	1.97	ft/s
Velocity Head	0.06	ft
Specific Energy	5.06	ft
Froude Number	0.17	
Flow is subcritical.		

Channel Improvement Calculations

Capacity Calculation for Reach 4
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\oldcahok\chain of.fm2
Worksheet	Reach 4
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.035	
Channel Slope	0.000250	ft/ft
Depth	5.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	75.00	ft

Results		
Discharge	788.89	cfs
Flow Area	450.00	ft²
Wetted Perimeter	106.62	ft
Top Width	105.00	ft
Critical Depth	1.48	ft
Critical Slope	0.016075	ft/ft
Velocity	1.75	ft/s
Velocity Head	0.05	ft
Specific Energy	5.05	ft
Froude Number	0.15	
Flow is subcritical.		

Channel Improvement Calculations

Capacity Calculation for Reach 5
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\oldcahok\chain of.fm2
Worksheet	Reach 5
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.000250	ft/ft
Depth	5.00	ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	25.00	ft

Results		
Discharge	755.92	cfs
Flow Area	175.00	ft²
Wetted Perimeter	47.36	ft
Top Width	45.00	ft
Critical Depth	2.82	ft
Critical Slope	0.001935	ft/ft
Velocity	4.32	ft/s
Velocity Head	0.29	ft
Specific Energy	5.29	ft
Froude Number	0.39	
Flow is subcritical.		


Alternative 1. Old Cahokia Creek Restoration
East St. Louis & Vicinity, IL
Interior Flood Control Project

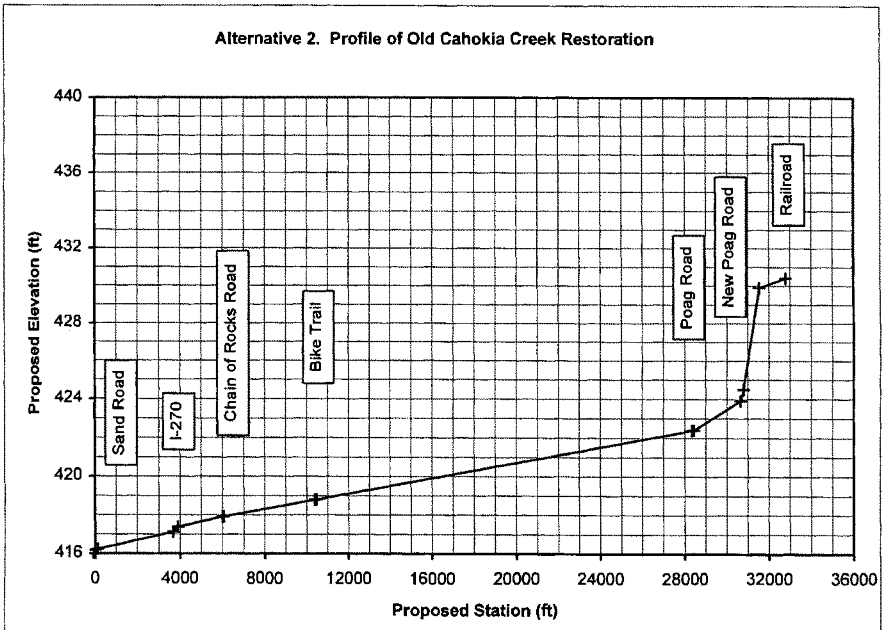
1787

ALTERNATIVE 2: CALCULATIONS

Alternative 2. Old Cahokia Creek Restoration Profile

Measured Distance	Realigned Station	Proposed FL Elev.	Description of Location and Structures
0	-221	411.54	near County Ditch
45	-176	412.26	
74	-102	416	
102	0	416.19	Sand Rd. 5-40"x70" elliptical CMP's (DS)
118	118	416.22	Sand Rd. 5-40"x70" elliptical CMP's (US)
3551	3669	417.11	I-270 2-9'x6' RCB's (DS)
226	3895	417.39	I-270 2-9'x6' RCB's (US)
2105	6000	417.91	Chain of Rocks Rd. 2-8'x6' RCB's (DS)
70	6070	417.92	Chain of Rocks Rd. 2-8'x6' RCB's (US)
4312	10382	418.78	Bike Trail, 2-2'x2' RCB's (DS)
80	10462	418.80	Bike Trail, 2-2'x2' RCB's (US)
17873	28335	422.37	Poag Road 2-24" and 1-36" RCP (DS)
90	28425	422.39	Poag Road 2-24" and 1-36" RCP (US)
2234	30659	423.9	New Poag Road (72" RCP) DS
140	30799	424.5	New Poag Road (72" RCP) US
1622	31538	429.9	FL at inflow from Trib 79
1260	32798	430.4	At RR crossing, FL 1' below existing ground

NOTE: Creek flowline distances measured from aerial photograph, confirmed with survey data where possible.



Storage Volume Calculations

Type.... Vol: Elev-Area   Page 1.01
Name.... 50M

File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK2.PPW
Title... Calculation of Pond Volume w/50-meter Greenway

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
418.80	-----	.0000	.0000	.000	.000
420.00	-----	.9000	.9000	.360	.360
421.00	-----	6.0000	9.2238	3.075	3.435
422.00	-----	11.8000	26.2143	8.738	12.173
423.00	-----	18.2000	44.6547	14.885	27.058
424.00	-----	22.3000	60.6460	20.215	47.273
425.00	-----	24.8000	70.6168	23.539	70.812
426.00	-----	37.6000	92.9365	30.979	101.791
427.00	-----	46.8000	126.3485	42.116	143.907
428.00	-----	141.7000	269.9344	89.978	233.885
429.00	-----	233.1001	556.5424	185.514	419.399
430.00	-----	299.6001	796.9667	265.656	685.055
431.00	-----	342.3000	962.1393	320.713	1005.768

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 13:16:36 Date: 03-02-2001

Storage Volume Calculations

Type.... Vol: Elev-Area Page 1.01
Name.... 75M

File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK2.PPW
Title... Calculation of Pond Volume w/75-meter Greenway

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
418.80	-----	.0000	.0000	.000	.000
420.00	-----	.9000	.9000	.360	.360
421.00	-----	6.0000	9.2238	3.075	3.435
422.00	-----	11.8000	26.2143	8.738	12.173
423.00	-----	18.2000	44.6547	14.885	27.058
424.00	-----	22.3000	60.6460	20.215	47.273
425.00	-----	24.8000	70.6168	23.539	70.812
426.00	-----	37.6000	92.9365	30.979	101.791
427.00	-----	46.8000	126.3485	42.116	143.907
428.00	-----	175.4000	312.8020	104.267	248.174
429.00	-----	266.8000	658.5256	219.509	467.683
430.00	-----	333.3000	898.3021	299.434	767.117
431.00	-----	376.0000	1063.3070	354.436	1121.552

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 13:17:07 Date: 03-02-2001

Storage Volume Calculations

Type.... Vol: Elev-Area   Page 1.01
Name.... 100M

File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK2.PPW
Title... Calculation of Pond Volume w/100-meter Greenway

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
418.80	-----	.0000	.0000	.000	.000
420.00	-----	.9000	.9000	.360	.360
421.00	-----	6.0000	9.2238	3.075	3.435
422.00	-----	11.8000	26.2143	8.738	12.173
423.00	-----	18.2000	44.6547	14.885	27.058
424.00	-----	22.3000	60.6460	20.215	47.273
425.00	-----	24.8000	70.6168	23.539	70.812
426.00	-----	37.6000	92.9365	30.979	101.791
427.00	-----	46.8000	126.3485	42.116	143.907
428.00	-----	209.1000	354.8236	118.275	262.181
429.00	-----	300.3999	760.1263	253.376	515.557
430.00	-----	367.0000	999.4341	333.145	848.702
431.00	-----	409.7000	1164.4630	388.154	1236.856

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312)   Compute Time: 13:16:02   Date: 03-02-2001

E-Q-V Table

```
Type.... Pond E-V-Q Table                                          Page 10.03
Name.... PONDING AREA
File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK2.PPW

                    LEVEL POOL ROUTING DATA

 HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file  = NONE STORED - PONDING AREA IN  100
 Outflow HYG file  = NONE STORED - PONDING AREA OUT 100

 Pond Node   Data  = PONDING AREA
 Pond Volume Data  = 100M
 Pond Outlet Data  = OUTLET

 No Infiltration

 INITIAL CONDITIONS
 ---------------------------------
 Starting WS Elev    =   418.80 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
418.80	.00	.000	.0000	.00	.00	.00
419.00	.61	.002	.0250	.00	.61	.69
419.20	2.01	.013	.1000	.00	2.01	2.65
419.40	3.91	.045	.2250	.00	3.91	6.09
419.60	6.23	.107	.4000	.00	6.23	11.40
419.80	8.90	.208	.6250	.00	8.90	18.99
420.00	11.88	.360	.9000	.00	11.88	29.31
420.20	15.13	.603	1.5595	.00	15.13	44.31
420.40	18.65	.996	2.3994	.00	18.65	66.85
420.60	22.37	1.575	3.4193	.00	22.37	98.58
420.80	26.35	2.376	4.6195	.00	26.35	141.33
421.00	30.54	3.435	6.0000	.00	30.54	196.77
421.20	34.89	4.734	7.0045	.00	34.89	264.00
421.40	38.86	6.242	8.0868	.00	38.86	340.96
421.60	42.00	7.973	9.2467	.00	42.00	427.92
421.80	45.07	9.945	10.4845	.00	45.07	526.43
422.00	48.03	12.173	11.8000	.00	48.03	637.19
422.20	51.01	14.648	12.9694	.00	51.01	759.99
422.40	53.83	17.364	14.1942	.00	53.83	894.26
422.60	56.61	20.330	15.4741	.00	56.61	1040.57
422.80	59.42	23.557	16.8094	.00	59.42	1199.60
423.00	62.17	27.058	18.2000	.00	62.17	1371.76
423.20	64.85	30.776	18.9866	.00	64.85	1554.39

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 13:27:06   Date: 03-02-2001

E-Q-V Table

Type.... Pond E-V-Q Table
Name.... PONDING AREA
File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = K:\STLCOE\ESTL-IFC\PONDPACK\
Inflow HYG file = NONE STORED - PONDING AREA IN 100
Outflow HYG file = NONE STORED - PONDING AREA OUT 100

Pond Node Data = PONDING AREA
Pond Volume Data = 100M
Pond Outlet Data = OUTLET

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 418.80 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .5000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
423.40	67.49	34.653	19.7900	.00	67.49	1744.71
423.60	70.02	38.693	20.6100	.00	70.02	1942.74
423.80	72.47	42.898	21.4467	.00	72.47	2148.75
424.00	74.82	47.273	22.3000	.00	74.82	2362.83
424.20	77.11	51.781	22.7893	.00	77.11	2583.32
424.40	79.32	56.389	23.2841	.00	79.32	2808.54
424.60	81.50	61.095	23.7840	.00	81.50	3038.51
424.80	83.60	65.903	24.2893	.00	83.60	3273.29
425.00	85.66	70.812	24.8000	.00	85.66	3512.96
425.20	87.66	76.004	27.1475	.00	87.66	3766.28
425.40	89.63	81.678	29.6015	.00	89.63	4042.83
425.60	91.32	87.852	32.1612	.00	91.32	4343.35
425.80	92.99	94.549	34.8275	.00	92.99	4669.17
426.00	94.65	101.791	37.6000	.00	94.65	5021.32
426.20	96.28	109.485	39.3594	.00	96.28	5395.37
426.40	97.89	117.537	41.1592	.00	97.89	5786.68
426.60	99.50	125.951	42.9991	.00	99.50	6195.54
426.80	101.06	134.739	44.8794	.00	101.06	6622.43
427.00	102.60	143.907	46.8000	.00	102.60	7067.70
427.20	104.12	155.505	69.9692	.00	104.12	7630.58
427.40	105.63	172.205	97.7864	.00	105.63	8440.33
427.60	107.12	194.928	130.2431	.00	107.12	9541.64
427.80	108.61	224.612	167.3492	.00	108.61	10979.81

E-Q-V Table

```
Type.... Pond E-V-Q Table                                    Page 10.05
Name.... PONDING AREA
File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK2.PPW

                LEVEL POOL ROUTING DATA

HYG Dir          = K:\STLCOE\ESTL-IFC\PONDPACK\
Inflow  HYG file = NONE STORED - PONDING AREA IN  100
Outflow HYG file = NONE STORED - PONDING AREA OUT 100

Pond Node   Data = PONDING AREA
Pond Volume Data = 100M
Pond Outlet Data = OUTLET

No Infiltration

INITIAL CONDITIONS
---------------------------------
Starting WS Elev    =   418.80 ft
Starting Volume     =     .000 ac-ft
Starting Outflow    =      .00 cfs
Starting Infiltr.   =      .00 cfs
Starting Total Qout=       .00 cfs
Time Increment      =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
428.00	110.04	262.181	209.1000	.00	110.04	12799.62
428.20	111.48	305.680	226.0389	.00	111.48	14906.40
428.40	112.90	352.640	243.6401	.00	112.90	17180.68
428.60	114.32	403.178	261.8984	.00	114.32	19628.15
428.80	115.71	457.442	280.8192	.00	115.71	22255.92
429.00	117.08	515.557	300.3999	.00	117.08	25070.03
429.20	118.45	576.905	313.1857	.00	118.45	28040.67
429.40	119.78	640.847	326.2400	.00	119.78	31136.79
429.60	121.12	707.417	339.5588	.00	121.12	34360.09
429.80	122.45	776.687	353.1461	.00	122.45	37714.10
430.00	123.76	848.702	367.0000	.00	123.76	41200.92
430.20	125.04	922.928	375.3513	.00	125.04	44794.77
430.40	126.34	998.846	383.7978	.00	126.34	48470.50
430.60	127.62	1076.451	392.3370	.00	127.62	52227.85
430.80	128.87	1155.785	400.9715	.00	128.87	56068.88
431.00	130.11	1236.856	409.7000	.00	130.11	59993.93

```
S/N: 021801A06A86    Parsons
PondPack Ver: 7.0 (312)       Compute Time: 13:27:06    Date: 03-02-2001
```

Pond Analysis Summary

```
Type.... Pond Routing Summary                                    Page 10.08
Name.... PONDING AREA OUT    Tag: 100                          Event: 100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\OLDCAHOK2.PPW
Storm... 100   Tag: 100

                    LEVEL POOL ROUTING SUMMARY

 HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - PONDING AREA IN  100
 Outflow HYG file = NONE STORED - PONDING AREA OUT 100

 Pond Node   Data = PONDING AREA
 Pond Volume Data = 100M
 Pond Outlet Data = OUTLET

 No Infiltration

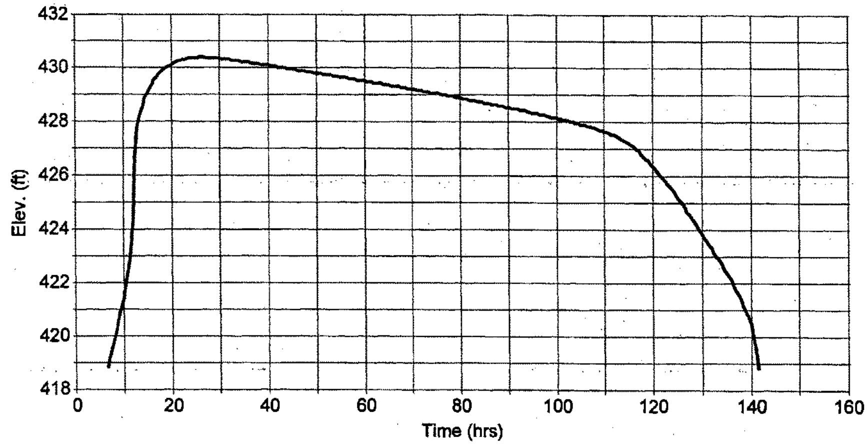
 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =    418.80 ft
 Starting Volume     =      .000 ac-ft
 Starting Outflow    =       .00 cfs
 Starting Infiltr.   =       .00 cfs
 Starting Total Qout=        .00 cfs
 Time Increment      =     .5000 hrs


 INFLOW/OUTFLOW HYDROGRAPH SUMMARY
 =====================================================
 Peak Inflow      =   2710.00 cfs     at    13.0000 hrs
 Peak Outflow     =    126.30 cfs     at    26.0000 hrs
 -----------------------------------------------------
 Peak Elevation   =    430.40 ft
 Peak Storage =       996.926 ac-ft
 =====================================================

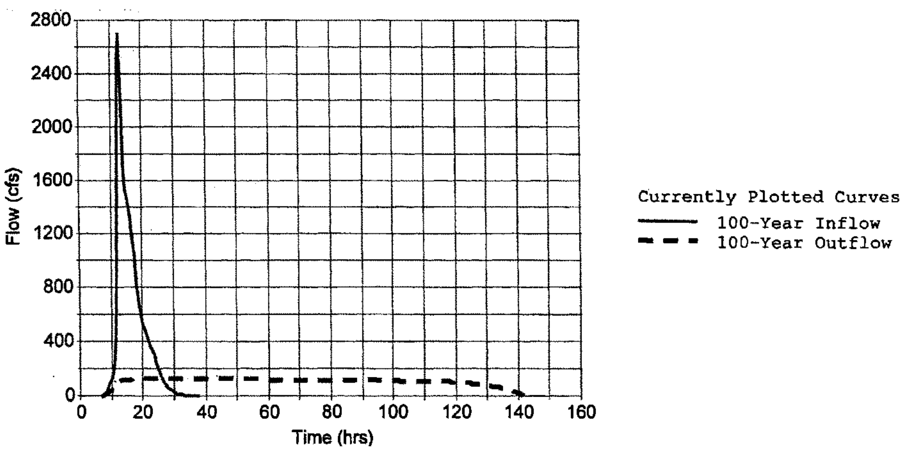

 MASS BALANCE (ac-ft)
 -------------------------
+ Initial Vol  =       .000
+ HYG Vol IN   =   1176.901
- Infiltration =       .000
- HYG Vol OUT  =   1176.901
- Retained Vol =       .000
                 ----------
 Unrouted Vol =        .000 ac-ft  (.000% of Outflow Volume)
```

```
S/N: 021801A06A86    Parsons
PondPack Ver: 7.0 (312)        Compute Time: 13:27:06    Date: 03-02-2001
```

Alternative 2. Elevation Vs. Time in Proposed Detention Area



Alt. 2: Inflow and Outflow Hydrographs for Proposed Detention Area



ALT. 2 CAPACITY CALCULATIONS FOR PROPOSED CULVERTS

Poag Road: 1-36" RCP & Proposed 2-24" RCP's

Elevation (ft)	Outflow (cfs)	Area (ac)
422.4	0	0
423.4	6	1.4
424.4	22	1.7
425.4	35	2.4
427.4	55	3.1
429.4	87	3.7
430.0	101	4.1
432.0	143	5.6
433.0	600	25.8

Note: Elevation-Outflow relationship developed in CulvertMaster
Elevation-Area relationship estimated from contours and surveyed channel sections.

Bike Trail: Proposed 2-24" RCP's

Elevation (ft)	Outflow (cfs)	Volume (ac-ft)
418.8	0	0
420.0	12	0.4
421.0	30	3.4
422.0	48	12.2
423.0	62	27
424.0	75	47.3
425.0	86	70.8
426.0	95	101.8
427.0	103	143.9
428.0	110	262.2
429.0	117	515.6
430.0	124	848.7
431.0	130	1236.9

Note: Elevation-Outflow-Volume relationship developed in PondPack for detention area outlets

Sand Road: 4-72"x 44" Elliptical Pipe Arches

Invert at 416.2'
Target HW = 5'
HW/D = 1.36
Q = 150 cfs/pipe
Existing $Q_{capacity}$ = 600 cfs

Add one pipe arch of same size:
Proposed $Q_{capacity}$ = 750 cfs

Note: Values estimated from Inlet Control Nomographs

HEC-1 Revised Model Output

```
****************************************                    **************************************
*                                      *                    *                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS     *
*              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER    *
*           VERSION 4.1                *                    *         609 SECOND STREET          *
*                                      *                    *      DAVIS, CALIFORNIA 95616       *
* RUN DATE   09MAY01  TIME  09:18:55   *                    *         (916) 756-1104             *
*                                      *                    *                                    *
****************************************                    **************************************


          X     X  XXXXXXX   XXXXX          X
          X     X  X        X     X        XX
          X     X  X        X               X
          XXXXXXX  XXXX     X       XXXXX   X
          X     X  X        X               X
          X     X  X        X     X         X
          X     X  XXXXXXX   XXXXX         XXX


THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                    HEC-1 INPUT                                          PAGE  1

     LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

       1        ID        FILENAME: REVISED_OC2.TXT
       2        ID        REVISED FOR OLD CAHOKIA CREEK RESTORATION, ALT. 2
       3        ID        EAST ST. LOUIS & VICINITY, IL, INTERIOR FLOOD CONTROL STUDY
       4        ID        ASSUMES FULL DEVELOPMENT
       5        ID        MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
       6        ID        BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
       7        ID        MADISON COUNTY, IL  (Design FLOOD)
       8        IT      30                     300
       9        IO       5

      10        KK      79
      11        KM        COMPUTE BLUFF AREA 79
      12        BA    0.43
      13        PH       1    91.1    0.99    2.22    3.86    4.84    5.25    6.16    7.14    8.21
      14        LS       0    75.0
      15        UD    0.33

      16        KK    6A1A
      17        KM        COMPUTE AREA 6A1A
      18        BA    0.32
      19        LS       0    75.0
      20        UD    0.74

      21        KK       1
      22        KM        COMBINE 2 HYDROGRAPHS
      23        HC       2

      24        KK   NPOAG
      25        KM        ROUTE THROUGH NEW POAG ROAD CULVERT
      26        RS       1    ELEV   424.5
      27        SA       0    0.14    0.83     1.3     2.4    37.9    62.0
      28        SE   424.5   426.0   428.0   430.0   432.0   433.0   434.0
      29        SQ       0      18      80     185     270     325     375

      30        KK    6A1B
      31        KM        COMPUTE AREA 6A1B
      32        BA     0.1
      33        LS       0    75.0
      34        UD    2.41

      35        KK       2
      36        KM        COMBINE 2 HYDROGRAPHS
      37        HC       2

      38        KK    POAG
      39        KM        ROUTE THROUGH POAG ROAD CULVERTS
      40        RS       1    ELEV   422.4
      41        SA     0.0     1.4     1.7     2.4     3.1     3.7     4.1     5.6    25.8
      42        SE   422.4   423.4   424.4   425.4   427.4   429.4   430.0   432.0   433.0
      43        SQ       0       6      22      35      55      87     101     143     600
```

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1                                          HEC-1 INPUT                                              PAGE  2

LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 44        KK     80
 45        KM       COMPUTE AREA 80
 46        BA    0.24
 47        LS      0     75.0
 48        UD    0.36

 49        KK      3
 50        KM       COMBINE 2 HYDROGRAPHS
 51        HC      2

 52        KK     81
 53        KM       COMPUTE AREA 81
 54        BA    0.46
 55        LS      0     75.0
 56        UD    0.43

 57        KK     82
 58        KM       COMPUTE AREA 82
 59        BA    1.18
 60        LS      0     75.0
 61        UD    0.68

 62        KK      3
 63        KM       COMBINE 3 HYDROGRAPHS
 64        HC      3

 65        KK     83
 66        KM       COMPUTE AREA 83
 67        BA    0.35
 68        LS      0     75.0
 69        UD    0.35

 70        KK    6A2
 71        KM       COMPUTE AREA 6A2 AND 7A
 72        BA    1.58
 73        LS      0     75.0
 74        UD    3.45

 75        KK      3
 76        KM       COMBINE 3 HYDROGRAPHS
 77        HC      3

 78        KK   BIKE
 79        KM       ROUTE THROUGH BIKE TRAIL CULVERTS
 80        RS      1    ELEV   418.8
 81        SV      0     0.4     3.4    12.2    27.0    47.3    70.8   101.8   143.9   262.2
 82        SV  515.6   848.7  1236.9
 83        SQ      0      12      30      48      62      75      86      95     103     110
 84        SQ    117     124     130
 85        SE  418.8     420     421     422     423     424     425     426     427     428
 86        SE    429     430     431
1                                          HEC-1 INPUT                                              PAGE  3

LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 87        KK    10A
 88        KM       COMPUTE RUNOFF FROM 10A
 89        BA    0.37
 90        LS      0     75.0
 91        UD    1.52

 92        KK    84A
 93        KM       COMPUTE RUNOFF FROM 84A
 94        BA    0.19
 95        LS      0     75.0
 96        UD    0.17

 97        KK      4
 98        KM       COMBINE 3 HYDROGRAPHS
 99        HC      3

100        KK   CORR
101        KM       ROUTE FLOW THROUGH CHAIN OF ROCKS CULVERTS
102        RS      1    ELEV   417.7
103        SA      0     1.3     5.0     6.2     7.2     7.3
104        SE  417.7   418.0     420     422   423.7   424.7
105        SQ      0       7     176     416     688     800

106        KK    84B
107        KM       COMPUTE RUNOFF FROM 84B
108        BA    0.06
109        LS      0     75.0
110        UD    0.20

111        KK   10B1
112        KM       COMPUTE RUNOFF TO I-270
```

```
          113           BA    0.10
          114           LS       0     75.0
          115           UD    0.41

          116           KK       5
          117           KM        COMBINE 3 HYDROGRAPHS
          118           HC       3

          119           KK    I270
          120           KM        ROUTE THROUGH I-270 CULVERTS
          121           RS       1    ELEV   417.4
          122           SA       0      2.4      3.2      3.7      4.1      4.4
          123           SE   417.4   418.0      420      422    423.4    424.4
          124           SQ       0       26      216      540      756      900

          125           KK     10C
          126           KM        COMPUTE RUNOFF TO SAND ROAD
          127           BA    0.28
          128           LS       0     75.0
          129           UD    1.43
1                                           HEC-1 INPUT                                              PAGE  4

         LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          130           KK       6
          131           KM        COMBINE 2 HYDROGRAPHS
          132           HC       2
          133           ZZ
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 *                                      *                                        *                                      *
 *  FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                        *    U.S. ARMY CORPS OF ENGINEERS      *
 *            JUN  1998                 *                                        *    HYDROLOGIC ENGINEERING CENTER     *
 *          VERSION 4.1                 *                                        *        609 SECOND STREET             *
 *                                      *                                        *     DAVIS, CALIFORNIA 95616          *
 * RUN DATE  09MAY01  TIME  09:18:55    *                                        *         (916) 756-1104               *
 *                                      *                                        *                                      *
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                              FILENAME: REVISED_OC2.TXT
                              REVISED FOR OLD CAHOKIA CREEK RESTORATION, ALT. 2
                              EAST ST. LOUIS & VICINITY, IL, INTERIOR FLOOD CONTROL STUDY
                              ASSUMES FULL DEVELOPMENT
                              MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
                              BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
                              MADISON COUNTY, IL  (Design FLOOD)

    9 IO         OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT         HYDROGRAPH TIME DATA
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                       ITIME       0000  STARTING TIME
                          NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      7   0  ENDING DATE
                      NDTIME       0530  ENDING TIME
                       ICENT         19  CENTURY MARK

                   COMPUTATION INTERVAL     .50 HOURS
                        TOTAL TIME BASE  149.50 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT
1
                                                  RUNOFF SUMMARY
                                             FLOW IN CUBIC FEET PER SECOND
                                          TIME IN HOURS,  AREA IN SQUARE MILES

                                         PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN    MAXIMUM    TIME OF
            OPERATION       STATION      FLOW    PEAK                                            AREA      STAGE    MAX STAGE
+                                                           6-HOUR     24-HOUR     72-HOUR

            HYDROGRAPH AT
+                                79       608.   12.50       175.        55.        18.        .43

            HYDROGRAPH AT
+                              6A1A       339.   13.00       129.        41.        14.        .32

            2 COMBINED AT
```

+		1	838.	12.50	303.	95.	32.	.75		
+	ROUTED TO	NPOAG	353.	14.00	300.	95.	32.	.75		
+									433.56	14.00
+	HYDROGRAPH AT	6A1B	54.	15.00	37.	13.	4.	.10		
+	2 COMBINED AT	2	403.	14.50	334.	108.	36.	.85		
+	ROUTED TO	POAG	399.	15.00	300.	108.	36.	.85		
+									432.56	15.00
+	HYDROGRAPH AT	80	323.	12.50	97.	31.	10.	.24		
+	2 COMBINED AT	3	453.	14.00	385.	139.	46.	1.09		
+	HYDROGRAPH AT	81	549.	12.50	187.	59.	20.	.46		
+	HYDROGRAPH AT	82	1294.	13.00	476.	150.	50.	1.18		
+	3 COMBINED AT	3	2185.	13.00	1038.	348.	116.	2.73		
+	HYDROGRAPH AT	83	479.	12.50	142.	45.	15.	.35		
+	HYDROGRAPH AT	6A2	676.	16.00	524.	201.	67.	1.58		
+	3 COMBINED AT	3	2710.	13.00	1614.	592.	198.	4.66		
+	ROUTED TO	BIKE	126.	26.00	126.	125.	121.	4.66		
+									430.38	26.50
+	HYDROGRAPH AT	10A	267.	14.00	145.	47.	16.	.37		
+	HYDROGRAPH AT	84A	300.	12.50	77.	24.	8.	.19		
+	3 COMBINED AT	4	501.	12.50	329.	190.	144.	5.22		
+	ROUTED TO	CORR	440.	14.00	326.	189.	144.	5.22		
+									422.15	14.00
+	HYDROGRAPH AT	84B	95.	12.50	24.	8.	3.	.06		
+	HYDROGRAPH AT	10B1	123.	12.50	41.	13.	4.	.10		
+	3 COMBINED AT	5	571.	13.00	387.	208.	150.	5.38		
+	ROUTED TO	I270	547.	13.50	384.	208.	150.	5.38		
+									422.04	13.50
+	HYDROGRAPH AT	10C	206.	13.50	110.	36.	12.	.28		
+	2 COMBINED AT	6	753.	13.50	494.	243.	161.	5.66		

*** NORMAL END OF HEC-1 ***

Channel Improvement Calculations

Reach 1A Pilot Channel
Cross Section for Trapezoidal Channel

Project Description	
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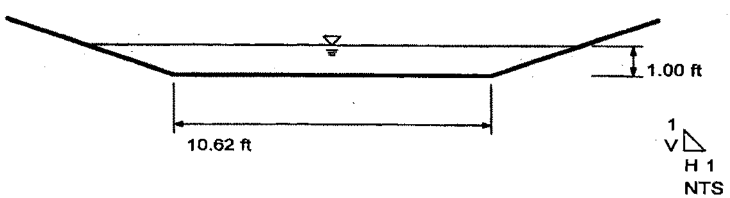
Worksheet	Reach 1A
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Section Data		
Mannings Coefficient	0.035	
Channel Slope	0.000400	ft/ft
Depth	1.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	10.62	ft
Discharge	10.00	cfs

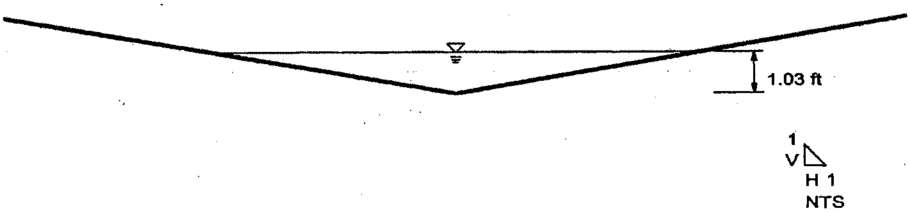


Channel Improvement Calculations

Reach 1B Pilot Channel
Cross Section for Triangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\oldcahok\oldcahok.fm2
Worksheet	Reach 1B Pilot Channel
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.035	
Channel Slope	0.003300	ft/ft
Depth	1.03	ft
Left Side Slope	6.000000	H : V
Right Side Slope	6.000000	H : V
Discharge	10.00	cfs



Channel Improvement Calculations

Reach 2 Pilot Channel
Cross Section for Triangular Channel

Project Description	
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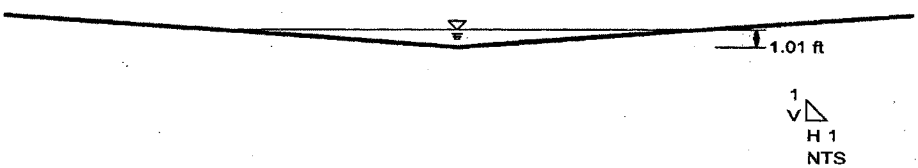
Worksheet	Reach 2 Pilot Channel
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.035	
Channel Slope	0.000680	ft/ft
Depth	1.01	ft
Left Side Slope	14.000000	H : V
Right Side Slope	14.000000	H : V
Discharge	10.00	cfs



Channel Improvement Calculations

Reach 3 Pilot Channel
Cross Section for Triangular Channel

Project Description	
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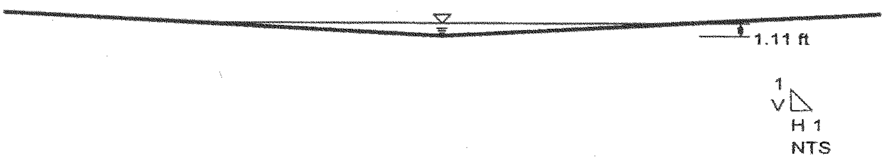
Worksheet	Reach 3 Pilot Channel
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.035	
Channel Slope	0.000200	ft/ft
Depth	1.11	ft
Left Side Slope	20.000000	H : V
Right Side Slope	20.000000	H : V
Discharge	10.00	cfs



03/02/01
12:51:42 PM
Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 (203) 755-1666
FlowMaster v5.13
Page 1 of 1


Alternative 2. Old Cahokia Creek Restoration
East St. Louis & Vicinity, IL
Interior Flood Control Project

C.4.2 Judy's/Burdick Branch

Summary of Engineering Calculations

Judy's/Burdick Site

East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project

Prepared for:
St. Louis District Army Corps of Engineers

Prepared by:
PARSONS
St. Louis, Missouri

May 2001

Judy's/Burdick Site

Description
The Judy's/Burdick site is one of the potential project sites of the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project for the St. Louis District Army Corps of Engineers (District). It is located between Highway 162 and I-255, at the confluence of Judy's Branch and Burdick Branch with Cahokia Canal. The canal is called County Ditch upstream of Highway 162. The engineering objectives for this site are to restore a flood pulse to increase the bio-diversity of the site, and provide sediment removal to improve water quality for Cahokia Canal.

Hydrology
A preliminary hydrologic analysis was performed using the District's HEC-1 base model for the Cahokia Canal watershed. This model included the drainage area for County Ditch upstream of Highway 162, and Judy's and Burdick Branches at their confluence with Cahokia Canal, a total of 30.65 square miles. Under existing conditions, Judy's and Burdick Branches do not have capacity to convey the design flood pulse, and overtopping flows during larger storms are modeled by diversions out of the channels in the base model. The diverted stormwater is assumed to flow overland southeast toward McDonough Lake. The bankfull capacity of Judy's Branch was determined as 1,500 cfs, while the capacity of Burdick Branch was determined as 500 cfs. In order to evaluate the total flows from these streams, the base model was revised to remove the diversions and compute a combined hydrograph at the confluence with Cahokia Canal that includes the total flow from Judy's Branch, Burdick Branch and County Ditch. The revised model was truncated downstream of the Judy's/Burdick site. Values computed with these models are considered preliminary in nature, and will require verification with more detailed modeling during the design process. Peak flows and runoff volumes computed for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year and 500-year storms at the Judy's/Burdick site are listed in Table 1 below. The HEC-1 base model input and output, and the revised HEC-1 model input and output are included in the Appendix.

Table 1 Peak Flows and Runoff Volumes at the Judy's/Burdick Site

Storm Frequency	Peak Flow (cfs)	Runoff Volume (ac-ft)
2-year	1,606	1,944
5-year	3,031	3,022
10-year	4,036	3,655
25-year	5,559	4,640
50-year	7,167	5,668
100-year	8,977	6,808
500-year	14,147	10,100

The assumption that all flow from Judy's and Burdick Branches would reach the habitat area was based on the inclusion of a proposed berm along the southern bank of Burdick Branch, which would prevent overland flow away from the site. This containment berm was assumed to extend from the bluffs to the edge of the habitat area. The height and length of the berm were dependent on the habitat area configuration, as described in the site analysis section of this report.

Hydraulics
It was assumed that no downstream channel improvements would be proposed as part of the Judy's/Burdick site project. Therefore, the outflow from the Judy's/Burdick site had to be less than the existing capacity of Cahokia Canal at the downstream end of the site. This capacity was determined by using the typical improved channel cross-section shown in construction plans for the *Rehabilitation of Cahokia Canal and County Ditch*, dated 1986. The dimensions of the typical channel section included an 18-foot bottom width, a depth of 14 feet, 2:1 horizontal to vertical (2H:1V) side slopes, and a channel slope of 0.00045 ft/ft (.045%). Using Manning's Equation for normal depth at full flow in channel, the channel capacity was computed as approximately 2,700 cfs. Calculation were made using Haestad Methods' FlowMaster computer program and the output is included in the Appendix.

Site Analysis
Using the cross-sections shown in the construction plans for Rehabilitation of Cahokia Canal and County Ditch, the channel profile of Cahokia Canal was plotted for the reach traversing the Judy's/Burdick site, from Highway 162 to I-255. Channel flowline and top of right and left levees (looking upstream) were included in order to determine the height and depth constraints for the proposed habitat area. The left bank levee would be removed in order to allow flow into the habitat area, and the right bank levee would form part of the perimeter berm for the habitat area. The minimum elevation of the right bank levee, approximately 425 NGVD, was assumed to be the maximum allowable height of berms around the habitat site. The elevation of the flowline in Cahokia Canal at the downstream end of the site was approximately 409.4 NGVD, so the minimum pond bottom elevation was set at 410 NGVD in order to facilitate drainage from the pond back to the channel. The existing profile for Cahokia Canal through the Judy's/Burdick site is included in the Appendix.

The most recent topographic information available for the site was in the form of aerial photomaps with 2-foot contours at 1"=200' scale, produced for the District in 1973. These predate the I-255 extension, which forms the southern boundary of the Judy's/Burdick site. The age of the data should be noted when considering the results of this analysis. Aerial photographs dated 1998 were also available for the site, but without topographic information. These maps were used in conjunction with the contour maps to identify recent land use within the site.

Three alternative habitat configurations were evaluated for Judy's/Burdick site. The proposed objective for Alternative 1 was to minimize the required surface area by excavating to the lowest allowable pond bottom elevation. This alternative would require the largest volume of excavation and the least volume of fill. The objective for Alternative 2 was to propose an intermediate depth of excavation that would produce more balanced volumes of cut and fill than those required by Alternatives 1 and 3. The objective for Alternative 3 was to minimize excavation and ponding depth within the habitat site by using a greater surface area This alternative would require the least excavation and the most fill.

In order to create a buffer area outside the Judy's/Burdick habitat area, a 100-meter (328-foot) greenway was proposed along the perimeter of the area and along the north bank of Burdick Branch. The area adjacent to the eastern bank of Cahokia Canal, north of Burdick Branch is currently wooded so a new greenway was not needed for that area in the site layout. The District estimated the proposed acreage for greenways for each alternative.

One of the goals for the Judy's/Burdick site was to prevent sediment deposition within the habitat site. This could be achieved by allowing the flow from Judy's Branch and Burdick Branch to pass through a sediment basin in advance of the habitat area at the Judy's/Burdick site. Sediment basins were evaluated for each of the three habitat alternatives. Additional dry sediment detention basins have been sized for locations in the tributary streams by others, and construction of these basins would eliminate the need for a proposed sediment basin on the floodplain designed to provide protection to the Judy's/Burdick site.. Therefore, Alternatives 1, 2 and 3 were each subdivided into an "A" and "B" alternative; Alternatives 1A, 2A and 3A assumed that tributary stream sediment basins would be constructed, while Alternatives 1B, 2B and 3B assumed that a sediment basin would be required on the floodplain in advance of the Judy's/Burdick habitat site.

Alternative 1:
The layout for Alternative 1 was drawn using the right bank levee of Cahokia Canal to form the eastern boundary for the site. Using the most recent aerial maps to avoid ponding water near existing roadways and structures, the remaining sides of the area were delineated. Based on the contour map, it was determined that the average ground elevation in the site was approximately 419 NGVD. Alternative 1 assumed excavation of the site to the lowest allowable elevation based on existing flow line of the Cahokia Canal of 410 NGVD and proposed perimeter berms to the maximum elevation of 425 NGVD. This created a proposed site approximately 15 feet deep, with a 9-foot depth of excavation and 6-foot high berms. The target water surface elevation was 424 NGVD, allowing a minimum of 1 foot of freeboard to be maintained below the top of berm. The approximate area available west of Cahokia Canal was measured as 131.6 acres. With the assumption of 3H:1V side slopes for excavation and berms, the available storage within this area was computed to be approximately 1,758 acre-ft at elevation 424 NGVD using the PondPack volume calculator.

An inflow/outflow analysis was performed on this pond configuration, with inflow modeled by the design flood event for Judy's/Burdick site from the revised HEC-1 model and outflow controlled by proposed outlet structures. The size of the outlet structures was determined by trial and error, with the maximum water surface elevation in the pond and the maximum capacity of the downstream channel as the constraints. The upstream invert elevation of the outlet structures was set at 409.4 NGVD, which was the approximate elevation of the existing flowline of Cahokia Canal at that location. The result of the preliminary inflow/outflow analysis indicated that 2-12'x 8' RCB culverts would form a suitable outlet configuration, releasing a peak flow of 2,690 cfs, which was just less than the 2,700 cfs capacity of the downstream channel. Calculations for Alternative 1, including pond volume calculations, inflow/outflow calculations and hydrographs, as well as a graph of pond water surface elevation versus time, are included in the Appendix.

The perimeter of Alternative 1 was measured as 11,080 feet, of which approximately 4,580 feet was existing Cahokia Canal levee, leaving 6,500 feet of required new berm. The footprint area of this new perimeter berm was estimated by assuming a 10-foot crown at the top of the berm, 3H:1V side slopes and an average of height of 6 feet. The total width of the berm multiplied by the length of berm resulted in a product of 6.9 acres. The proposed berm along the south bank of Burdick Branch was approximately 7,365 feet long, extending from the bluffs to Cahokia Canal. This berm was assumed to be 6 feet high to stay consistent with the Cahokia Canal levee; using the same assumptions for crown and side slopes as the perimeter berm, the footprint area of the containment berm was computed to be 7.8 acres.

Sediment basin sizing corresponding to each of the three alternatives was based on the same basic information and calculation procedures. According to data from the USDA-NRCS, as provided by the District, the sediment load estimated at the bluffs for Judy's Branch was 27,000 tons/year and for Burdick Branch was 12,500 tons/year. The sum of these loads was equivalent to the assumed sediment load in Cahokia Canal at the Judy's/Burdick site, totaling 39,500 tons/year. The sediment was assigned an average specific weight of 85 pcf, a representative value provided by the District. The volume of average annual runoff for the watershed was estimated to be 10.0 inches, a value provided by the Illinois State Water Survey. A design cleanout period of 3 years was chosen by the District as representative of realistic maintenance schedules from past experience. A target trap efficiency of 70% was chosen as the design effectiveness of the sediment basin. Based on the above information, the required cleanout volume was computed to be 72,273 CY for all three alternatives.

The location of the proposed sediment basin was chosen as the northeast corner of the Judy's/Burdick habitat area, where all three sources of flow would enter it directly. Constraints on the sizing of the basin included maintaining a basin length approximately twice as long as the basin width to optimize settling time through the basin. The dimensions of the sediment pond were dependent on the depth of the surrounding site; for Alternative 1B, the resulting sediment basin dimensions were 1,600 feet by 525 feet, with a sediment pond depth of 12 feet. A freeboard of 3 feet was maintained between the top of habitat berm and the top of sediment berm. The berm footprint area and fill requirements for the sediment pond were computed with the assumptions of a 10-foot crown and 3H:1V side slopes. An estimated berm footprint area of 5.4 acres was computed along with an estimated 36.3 acre-ft volume requirement for fill. Complete sediment basin calculations are included in the Appendix. Before project implementation, more detailed analysis will be performed using the results of the State Pilot Assessment Project on Judy's Branch as a basis for design.

Alternative 2:
The objective for Alternative 2 was to propose an intermediate depth of excavation that would produce more balanced volumes of cut and fill than those required by Alternatives 1 and 3. The desirable ponding depth for this alternative was determined by the District to be approximately 8 feet, which required at least 9 feet of total depth from the pond bottom to the top of berms. This configuration would include an average of 3 feet of excavated depth within the pond and 6 feet high perimeter berms. The initial surface area was estimated as 220 acres by using a conical volume calculation, assuming the same storage volume of 1,758 acre-ft provided by Alternative 1 and the desired depth of 8 feet. From the contour map, it was determined that the average ground elevation in the site east and west of Cahokia Canal was 419 NGVD, so the pond bottom elevation was set at elevation 416 NGVD. The top of the perimeter berms around the pond were set at the maximum elevation of 425 NGVD, allowing a minimum of 1 foot of freeboard to be maintained between the top of berm and the target ponding elevation of 424 NGVD. The boundary of the proposed habitat site for Alternative 2 was drawn by trial and error, computing the available volume offered at a depth of 8 feet by each measured surface area, with the assumption of 3H:1V side slopes for excavation and berms. The resulting surface area was 229.9 acres, and the available storage was computed to be approximately 1,823 acre-ft at elevation 424 NGVD using the PondPack volume calculator.

An inflow/outflow analysis was performed on this pond configuration, with inflow modeled by the design flood pulse hydrograph for Judy's/Burdick site from the revised HEC-1 model and outflow controlled by outlet structures. The size of the outlet structures was determined by trial and error, using the maximum water surface elevation in the pond and the maximum capacity of the downstream channel as the constraints. The resulting outlet configuration consisted of 2-9'x 9' RCB culverts, releasing a peak flow of 2,109 cfs. Calculations for Alternative 2, including pond volume calculations, inflow/outflow calculations and hydrographs, as well as a graph of pond water surface elevation versus time, are included in the Appendix.

The perimeter of Alternative 2 was measured as 14,190 feet, of which approximately 2,100 feet was existing Cahokia levee and 1,500 feet was existing Burdick levee. The footprint area of the remaining 10,590 feet of perimeter berm was estimated with the assumption of a 10-foot crown at the top of the berm, 3H:1V side slopes and an average height of 6 feet. The total width of the berm multiplied by the length of berm resulted in a footprint area of 11.2 acres. The proposed containment berm along the south bank of Burdick Branch was approximately 5,865 feet long, extending from the bluffs to the eastern boundary of the proposed habitat area. This berm was assumed to be 6 feet high to stay consistent with the Cahokia Canal levee; using the same assumptions for crown and sides slopes as the perimeter berm, the footprint area required for the containment berm was computed to be 6.2 acres.

Sediment basin sizing for Alternative 2B was based on the same basic information and calculation procedures as described above for Alternative 1B. The computed sediment basin dimensions were 1,900 feet by 900 feet, with a sediment pond depth of 6 feet. A freeboard of 3 feet was maintained between the top of habitat berm and the top of sediment berm. The berm footprint area and fill requirements for the sediment pond were computed with the assumptions of a 10-foot crown and 3H:1V side slopes. An estimated berm footprint area of 4.0 acres was computed along with an estimated 14.7 acre-ft volume requirement for fill. Complete sediment basin calculations are included in the Appendix.

Alternative 3:
The boundary for Alternative 3 was drawn by trial and error, computing the available volume offered by the measured area assuming no excavation. From the contour map, it was determined that the average ground elevation in the site east and west of Cahokia Canal was 419 NGVD, which set the pond bottom elevation for Alternative 3. The only excavation to be proposed would be in a small area where the existing ground is higher than 419 NGVD. Containment berms around the pond were set at the maximum elevation of 425 NGVD, yielding a ponding depth of 5 feet with a minimum 1-foot freeboard to be maintained below the top of berm. Using the assumption of 3H:1V side slopes for excavation and berms, the available storage within the trial surface area of 355.8 acres was computed in PondPack as approximately 1,787 acre-ft at elevation 424 NGVD.

An inflow/outflow analysis was performed on this pond configuration, with inflow modeled by the design flood pulse hydrograph for Judy's/Burdick site from the revised HEC-1 model and outflow controlled by culvert structures. The size of the outlet structures was determined by trial and error, using the maximum water surface elevation in the pond and the maximum capacity of the downstream channel as constraints. The resulting outlet configuration consisted of 2-9'x 9' RCB culverts, releasing a peak flow of 2,124 cfs. Calculations for Alternative 3, including pond volume calculations, inflow/outflow calculations and hydrographs, as well as a graph of pond water surface elevation versus time, are included in the Appendix.

The perimeter of Alternative 3 was measured as 17,700 feet, of which approximately 2,100 feet was existing Cahokia levee and 2,600 feet was existing Burdick levee. The footprint area of the remaining 13,000 feet of perimeter berm was estimated with the assumption of a 10-foot crown at the top of the berm, 3H:1V side slopes and an average of 6 feet in height. The total width of the berm multiplied by the length of berm resulted in a product of 13.7 acres. The proposed containment berm along the south bank of Burdick Branch was approximately 4,765 feet long, extending from the bluffs to eastern boundary of the proposed habitat site. This berm was assumed to be 6 feet high to stay consistent with the Cahokia Canal levee; using the same assumptions as the perimeter berm, the area required for the containment berm was computed to be 5.0 acres.

Sediment basin sizing for Alternative 3B was based on the same basic information and calculation procedures as described above for Alternatives 1B and 2B. The computed sediment basin dimensions were 2,600 feet by 1,000 feet, with a sediment pond depth of 4 feet. A freeboard of 3 feet was maintained between the top of habitat berm and the top of sediment berm, which required an additional 1-foot of excavation beyond the bottom of the proposed habitat site. The berm footprint area and fill requirements for the sediment pond were computed with the assumptions of a 10-foot crown and 3H:1V side slopes. An estimated berm footprint area of 3.6 acres was computed along with an estimated 9.4 ac-ft volume requirement for fill. Complete sediment basin calculations are included in the Appendix.

Depth-Duration Relationship of Pond Alternatives

The duration of ponding at various depths in the Judy's/Burdick habitat area was determined from the water surface elevation versus time graphs for each of the three alternatives, which are included in the Appendix. A comparison of the depth-duration relationships of Alternatives 1, 2 and 3 are shown in Table 2.

Table 2 Depth-Duration Relationships Comparison

Depth of Ponding (ft)	**Approximate Duration of Ponding (hrs)**		
	Alternative 1	**Alternative 2**	**Alternative 3**
13-14	3	N/A	N/A
≥12	5	N/A	N/A
≥10	8	N/A	N/A
≥8	12	N/A	N/A
≥6	17	8	N/A
≥4	27	15	5
≥2	98	22	15

The approximate excavation volume for each alternative was computed using elevation 419' as the average ground elevation. The volume calculator in PondPack was used to estimate the amount of excavation from elevation 419' down to the proposed pond bottoms; excavation calculations for each alternative are included in the Appendix. The average depth of excavation for Alternative 1 was 9 feet, for Alternative 2 was 3 feet, and for Alternative 3 was less than 1 foot. Required excavation volumes for each alternative are listed in the cost features section of this report.

Cost Features

A summary of major engineering cost features is included in Table 3. It should be noted that this is not intended to be an all-inclusive list, but only includes major features requested by the District. The District has computed additional cost features that would be combined with those listed in Table 3. Also, since no detailed hydrologic or hydraulic models were created for this analysis, it is possible that other major cost features might be required when a design analysis is performed.

Table 3 Engineering Cost Features for Judy's/Burdick Site

Alternatives Assuming Tributary Stream Sediment Detention	
Alternative 1A	
Features	**Quantity**
Real Estate for Pond	131.6 acres
Excavation	1,797,253 CY
Perimeter Berm	6,500 ft x 6' high
Containment Berm	7,365 ft x 6' high
Concrete Culverts	2-12'x8' RCB, L=111'

Alternatives with Sediment Detention Basin in Site	
Alternative 1B	
Additional Features	**Quantity**
Detention Berm	2,866 ft x 12' high
Silt Cleanout / 3 years	72,273 CY

Alternatives Assuming Tributary Stream Sediment Detention	
Alternative 2A	
Features	**Quantity**
Real Estate for Pond	229.9 acres
Excavation	1,077,707 CY
Perimeter Berm	10,590 ft x 6' high
Containment Berm	5,865 ft x 6' high
Concrete Culverts	2-9'x9' RCB, L=114'

Alternatives with Sediment Detention Basin in Site	
Alternative 2B	
Additional Features	**Quantity**
Detention Berm	3,808 ft x 6' high
Silt Cleanout / 3 years	72,273 CY

Table 3 Continued

Alternatives Assuming Tributary Stream Sediment Detention	
Alternative 3A	
Features	**Quantity**
Real Estate for Pond	355.8 acres
Excavation	256,520 CY
Perimeter Berm	13,000 ft x 6' high
Containment Berm	4,765 ft x 6' high
Concrete Culverts	2-9'x9' RCB, L=114'

Alternatives with Sediment Detention Basin in Site	
Alternative 3B	
Additional Features	**Quantity**
Detention Berm	4,672 ft x 4' high
Detention Basin Excavation	96,296 CY
Silt Cleanout / 3 years	72,273 CY

NOTE: Quantities for greenway areas, plantings, and tributary stream sediment detention basins data not included.

APPENDIX

SUPPORTING CALCULATIONS FOR JUDY'S/BURDICK SITE

HEC-1 Base Model Output

```
1****************************************                              ***************************************
*                                       *                              *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                              *   U.S. ARMY CORPS OF ENGINEERS      *
*              JUN   1998               *                              *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                 *                              *        609 SECOND STREET            *
*                                       *                              *      DAVIS, CALIFORNIA 95616        *
* RUN DATE   08MAY01  TIME  15:40:15    *                              *         (916) 756-1104              *
*                                       *                              *                                     *
****************************************                               ***************************************


                    X     X  XXXXXXX   XXXXX          X
                    X     X  X        X     X        XX
                    X     X  X        X               X
                    XXXXXXX  XXXX     X        XXXXX  X
                    X     X  X        X               X
                    X     X  X        X     X         X
                    X     X  XXXXXXX   XXXXX         XXX


THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
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1                                           HEC-1 INPUT                                          PAGE  1

      LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1        ID       METRO EAST WATERSHED PLANNING TEAM STUDY - AUGUST,1996
        2        ID       CAHOKIA CANAL HEC-1 MODEL FOR FUTURE CONDITIONS
        3        ID       ASSUMES FULL DEVELOPMENT OF HILLSIDE WATERSHEDS
        4        ID       MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
        5        ID       BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
        6        ID       MADISON COUNTY, IL  (Design FLOOD)
        7        ID       INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC.)
        8        IT     30                   300
        9        IO      5

       10        KK      1
       11        KM       COMPUTE RUNOFF FOR SUBAREA 1 (UPPER COUNTY DITCH)
       12        BA   1.99
       13        BF      0    -.03   1.074
       14        PH      1    91.1    0.99    2.22    3.86    4.84    5.25    6.16    7.14    8.21
       15        LS      0   87.40
       16        UD   1.43

       17        KK      2
       18        KM       ROUTE TO AREA 2
       19        RS      1    STOR      -1
       20        SV      0      20      50     560    1400    1710    2969
       21        SQ      0      50     100     200     300     400     500

       22        KK      3
       23        KM       COMPUTE RUNOFF FOR SUBAREA 3
       24        BA    .22
       25        LS      0   87.90
       26        UD    .88

       27        KK      2
       28        KM       COMPUTE RUNOFF FOR SUBAREA 2
       29        BA   1.39
       30        LS      0   83.70
       31        UD   1.74

       32        KK      2
       33        KM       COMBINE 3 HYDROGRAPHS AT 2
       34        HC      3

       35        KK      5
       36        KM       ROUTE TO AREA 5
       37        RS      1    STOR      -1
       38        SV      0       4       8      15     300     666    1190    1670
       39        SQ      0      50     100     200     300     400     500     600

       40        KK      4
       41        KM       COMPUTE RUNOFF FOR SUBAREA 4
       42        BA   1.34
       43        LS      0   90.40
```

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         44          UD     1.16
1                                               HEC-1 INPUT                                          PAGE  2

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         45          KK        5
         46          KM         COMPUTE RUNOFF FOR SUBAREA 5
         47          BA       .79
         48          LS        0    78.70
         49          UD     1.24

         50          KK        5
         51          KM         COMBINE 3 HYDORGRAPHS AT 5
         52          HC        3

         53          KK        8
         54          KM         ROUTE TO SUBAREA 8
         55          RS        1     STOR       -1
         56          SV        0        11        70      2100      3200      3800
         57          SQ        0        50       100       200       300       400

         58          KK        8
         59          KM         COMPUTE RUNOFF FOR SUBAREA 8
         60          BA     1.55
         61          LS        0    90.60
         62          UD     1.37

         63          KK        8
         64          KM         COMBINE 2 HYDROGRAPHS AT 8
         65          HC        2

         66          KK       10
         67          KM         ROUTE TO SUBAREA 10 AT I-270
         68          RS        1     STOR       -1
         69          SV        0        18       120      3000      4000      6200      8600
         70          SQ        0        50       100       115       150       200       250

         71          KK       10
         72          KM         COMPUTE RUNOFF FOR SUBAREAS 79,80,81,82,83,84,85,6,7,AND 10
         73          BA     7.28
         74          LS        0    75.00
         75          UD     5.76

         76          KK       10
         77          KM         COMBINE 2 HYDROGRAPHS AT 10
         78          HC        2

         79          KK       11
         80          KM         COMPUTE RUNOFF FOR SUBAREAS 86 AND 11
         81          BA       .97
         82          LS        0    75.00
         83          UD     1.74

         84          KK       11
         85          KM         COMBINE 2 HYDROGRAPHS AT SUBAREA 11
         86          HC        2
1                                               HEC-1 INPUT                                          PAGE  3

       LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         87          KK       12
         88          KM         COMPUTE RUNOFF FOR SUBAREAS 87 AND 12
         89          BA     1.50
         90          LS        0    81.00
         91          UD     1.48

         92          KK        9
         93          KM         COMPUTE RUNOFF FOR SUBAREA 9
         94          BA     1.50
         95          LS        0    90.00
         96          UD     1.11

         97          KK       13
         98          KM         COMBINE 3 HYDROGRAPHS AT 13
         99          HC        3

        100          KK       13
        101          KM         ROUTE TO SUBAREA 13 AT ILL. HIGHWAY 162
        102          RS        1     STOR       -1
        103          SV        0        16        25      1000      1600      2550      3350      3950      4678      5405
        104          SQ        0        50       100       200       300       400       500       600       700       800

        105          KK       13
        106          KM         COMPUTE RUNOFF FOR SUBAREAS 88 AND 13 (JUDY'S BRANCH)
        107          BA     9.01
        108          LS        0    75.00
        109          UD     1.54

        110          KK       13
        111          KM         DIVERSION OF SPILL OUT OF JUDY'S BRANCH
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```
     112          DT   NORTH
     113          DI       0     1500    1501     5476    10000
     114          DQ       0        0       1     3976     8500

     115          KK      13
     116          KM         COMBINE CAHOKIA CANAL AND JUDY'S BRANCH
     117          HC       2

     118          KK      89
     119          KM         COMPUTE RUNOFF FOR SUBAREAS 89 AND 15 (BURDICK BRANCH)
     120          BA    3.11
     121          LS       0   75.00
     122          UD    1.13

     123          KK      15
     124          KM         DIVERSION OF SPILL OUT OF BURDICK BRANCH
     125          DT   NORTH
     126          DI       0      500     501     2158    10000
     127          DQ       0        0       1     1658     9500
1                                              HEC-1 INPUT                                      PAGE  4

    LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


     128          KK      15
     129          KM         COMBINE CAHOKIA CANAL AND BURDICK BRANCH AT SUBAREA 15
     130          HC       2

     131          KK      18
     132          KM         DIVERSION OF SPILL OUT OF CAHOKIA CANAL TO MCDONOUGH LAKE
     133          DT   NORTH
     134          DI       0     2000    2001     2304    15000
     135          DQ       0        0       1      304    13000

     136          KK      21
     137          KM         ROUTE TO SUBAREA 21 AT HORSESHOE LAKE ROAD
     138          RS       4     STOR      -1
     139          SV       0       97     170      196      287
     140          SQ       0      500    1000     1500     2000

     141          KK      21
     142          KM         COMPUTE RUNOFF FOR SUBAREAS 99 AND 21 (SCHOOLHOUSE BRANCH)
     143          BA    7.38
     144          LS       0   75.00
     145          UD    1.49

     146          KK      21
     147          KM         DIVERSION OF SPILL OUT OF SCHOOLHOUSE BRANCH TO THE SOUTH
     148          DT   SOUTH
     149          DI       0     2500    2501     4503    20000
     150          DQ       0        0       1     2003    17500

     151          KK      15
     152          KM         COMBINE 2 HYDROGRAPHS AT SUBAREA 15 (SCHOOLHOUSE BR. AND CAHOKIA CANAL)
     153          HC       2

     154          KK      22
     155          KM   DIVERSION OF SPILL OUT OF CAHOKIA CANAL TO THE SOUTH
     156          DT   SOUTH
     157          DI       0     3000    3001     4468    20000
     158          DQ       0        0       1     1468    17000

     159          KK      22
     160          KM         ROUTE FROM SCHOOLHOUSE BRANCH TO JUNCTION WITH CAHOKIA CANAL
     161          RS       2     STOR      -1
     162          SV       0       55      97      138      176      212      245
     163          SQ       0      500    1000     1500     2000     2500     3000

     164          KK      98
     165          KM         COMPUTE RUNOFF FOR SUBAREA 98 (CANTEEN CREEK)
     166          BA   22.90
     167          LS       0   75.00
     168          UD    3.50
1                                              HEC-1 INPUT                                      PAGE  5

    LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


     169          KK      25
     170          KM         DIVERSION OF SPILL FROM CANTEEN CREEK
     171          DT      CAN
     172          DI       0     2100    2101    11752    20000
     173          DQ       0        0       1     9652    17900

     174          KK      25
     175          KM         ROUTE CANTEEN CREEK TO JUNCTION WITH CAHOKIA CANAL
     176          RS       2     STOR      -1
     177          SV       0       74     122      163      200      235      255      284      446      479
     178          SQ       0      500    1000     1500     2000     2500     2500     2500     2500     2500

     179          KK      22
     180          KM         COMBINE 2 HYDROGRAPHS (CANTEEN CREEK AND CAHOKIA CANAL)
```

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181          HC      2

182          KK      29
183          KM        DIVERSION OF SPILL FROM CAHOKIA CANAL BETWEEN GATES AND CANTEEN CREEK
184          DT     HOK
185          DI      0     3500    3501    5100   20000
186          DQ      0        0       1    1600   18400

187          KK      29
188          KM        ROUTE TO CONTROL GATES
189          RS      1     STOR      -1
190          SV      0       17      29      42      58      72      86      98     109     118
191          SQ      0      500    1000    1500    2000    2500    3000    3500    4000    4500

192          KK      30
193          KM        COMPUTE RUNOFF FROM HORSESHOE LAKE WATER SURFACE AREA
194          BA    3.05
195          LS      0  100.00
196          UD     .50

197          KK      29
198          KM        COMPUTE RUNOFF FOR SUBAREAS 28,29,40,41,42,43,44,45,46,47.49, AND 55
199          BA    9.94
200          LS      0   82.00
201          UD    1.92

202          KK      48
203          KM        COMPUTE RUNOFF FOR SUBAREA 48 (NAMEOKI DITCH)
204          BA    3.02
205          LS      0   80.40
206          UD    2.07

207          KK      29
208          KM        COMBINE 4 HYDROGRAPHS
209          HC      4
1                                   HEC-1 INPUT                                            PAGE  6

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


210          KK      58
211          KM        COMPUTE RUNOFF FROM SUBAREAS 61,60,52,59,57, AND 58 (MITCHELL DITCH)
212          BA    4.50
213          LS      0   87.70
214          UD    4.61

215          KK      17
216          KM        ROUTE TO ELM SLOUGH
217          RS      1     STOR      -1
218          SV      0        2    5000
219          SQ      0       90      90

220          KK      17
221          KM        COMBINE 2 HYDROGRAPHS AT SUBAREA 17
222          HC      2

223          KK      56
224          KM        COMPUTE RUNOFF FOR SUBAREAS 53,54 AND 56 (LONG LAKE)
225          BA    2.92
226          LS      0   88.20
227          UD    2.90

228          KK      17
229          KM        ROUTE TO ELM SLOUGH
230          RS      1     STOR      -1
231          SV      0       20    3000
232          SQ      0       65      65

233          KK      17
234          KM        COMBINE 2 HYDROGRAPHS AT SUBAREA 17
235          HC      2

236          KK      17
237          KM        COMPUTE RUNOFF FOR SUBAREA 17(ELM SLOUGH)
238          BA    3.72
239          LS      0   79.80
240          UD     .95

241          KK      30
242          KM        COMBINE 2 HYDROGRAPHS AT HORSESHOE LAKE
243          HC      2

244          KK      30
245          KM        ROUTE PAST CONTROL GATES--HORSESHOE LAKE STORAGE
246          RS      1     STOR      -1
247          SV      0        4       8      17    2514    4739   10300   13480   21000   27000
248          SQ      0      100     200     400     600     800    1000    1300    1300    1300

249          KK      36
250          KM        ROUTE TO JUNCTION WITH LANSDOWNE DITCH
251          RS      7     STOR      -1
252          SV      0       44      70     112     149     188     231     335     442     554
```

```
   253          SQ      0    100    200    400    600    800   1000   1500   2000   2500
1                                          HEC-1 INPUT                                         PAGE  7

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


   254          KK     35
   255          KM        COMPUTE RUNOFF FOR LANSDOWNE DITCH
   256          BA   1.99
   257          LS      0   78.70
   258          UD   1.06

   259          KK     36
   260          KM        ROUTE TO JUNCTION WITH CAHOKIA CANAL
   261          RS      2   STOR     -1
   262          SV      0     36     42     49     58     63     69     80
   263          SQ      0    243    382    473    598    689    777    963

   264          KK     36
   265          KM        COMBINE LANSDOWNE DITCH AND CAHOKIA CANAL
   266          HC      2

   267          KK     39
   268          KM        ROUTE TO NORTH PUMP STATION
   269          RS      4   STOR     -1
   270          SV      0     24     35     51     63     75     85    111    137    163
   271          SQ      0    100    200    400    600    800   1000   1500   2000   2500

   272          KK     39
   273          KM        COMPUTE RUNOFF FOR SUBAREA 39
   274          BA    .71
   275          LS      0   82.90
   276          UD   1.60

   277          KK     39
   278          KM        COMBINE 2 HYDROGRAPHS AT NORTH PUMP STATION
   279          HC      2

   280          KK     39
   281          KM        ROUTE FROM NORTH PUMP STATION TO MISSISSIPPI RIVER
   282          RS      1   STOR     -1
   283          SV      0     10     25     50  10000
   284          SQ      0    325    650   1300   1300
   285          ZZ
1***************************************                       ***************************************
*                                       *                       *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                       *     U.S. ARMY CORPS OF ENGINEERS      *
*              JUN   1998               *                       *     HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                 *                       *           609 SECOND STREET           *
*                                       *                       *        DAVIS, CALIFORNIA 95616        *
*  RUN DATE   08MAY01  TIME  15:40:15   *                       *             (916) 756-1104            *
*                                       *                       *                                       *
*****************************************                       *****************************************



                              METRO EAST WATERSHED PLANNING TEAM STUDY - AUGUST,1996
                              CAHOKIA CANAL HEC-1 MODEL FOR FUTURE CONDITIONS
                              ASSUMES FULL DEVELOPMENT OF HILLSIDE WATERSHEDS
                              MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
                              BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
                              MADISON COUNTY, IL  (Design FLOOD)
                              INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC.)

 9 IO         OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT         HYDROGRAPH TIME DATA
                     NMIN         30  MINUTES IN COMPUTATION INTERVAL
                    IDATE     1    0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     7    0  ENDING DATE
                   NDTIME       0530  ENDING TIME
                    ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL      .50 HOURS
                     TOTAL TIME BASE  149.50 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT
```

```
WARNING --- ROUTED OUTFLOW (   1259.) IS GREATER THAN MAXIMUM OUTFLOW (    963.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1725.) IS GREATER THAN MAXIMUM OUTFLOW (    963.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1698.) IS GREATER THAN MAXIMUM OUTFLOW (    963.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1345.) IS GREATER THAN MAXIMUM OUTFLOW (    963.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (    976.) IS GREATER THAN MAXIMUM OUTFLOW (    963.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1372.) IS GREATER THAN MAXIMUM OUTFLOW (    963.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1651.) IS GREATER THAN MAXIMUM OUTFLOW (    963.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1544.) IS GREATER THAN MAXIMUM OUTFLOW (    963.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1229.) IS GREATER THAN MAXIMUM OUTFLOW (    963.) IN STORAGE-OUTFLOW TABLE
1
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

+	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	1	1885.	13.50	991.	336.	120.	1.99		
+	ROUTED TO	2	182.	20.00	182.	171.	119.	1.99		
+	HYDROGRAPH AT	3	270.	13.00	113.	38.	14.	.22		
+	HYDROGRAPH AT	2	1120.	14.00	642.	218.	77.	1.39		
+	3 COMBINED AT	2	1423.	14.00	900.	414.	210.	3.60		
+	ROUTED TO	5	313.	21.00	312.	299.	210.	3.60		
+	HYDROGRAPH AT	4	1487.	13.50	704.	240.	86.	1.34		
+	HYDROGRAPH AT	5	702.	13.50	339.	113.	40.	.79		
+	3 COMBINED AT	5	2421.	13.50	1299.	629.	336.	5.73		
+	ROUTED TO	8	159.	64.00	159.	158.	152.	5.73		
+	HYDROGRAPH AT	8	1582.	13.50	810.	277.	99.	1.55		
+	2 COMBINED AT	8	1693.	13.50	926.	399.	241.	7.28		
+	ROUTED TO	10	105.	149.50	105.	105.	104.	7.28		
+	HYDROGRAPH AT	10	2147.	18.50	1919.	914.	318.	7.28		
+	2 COMBINED AT	10	2249.	18.50	2021.	1015.	420.	14.56		
+	HYDROGRAPH AT	11	650.	14.00	374.	127.	45.	.97		
+	2 COMBINED AT	11	2380.	18.50	2175.	1139.	464.	15.53		
+	HYDROGRAPH AT	12	1234.	14.00	667.	224.	79.	1.50		
+	HYDROGRAPH AT	9	1684.	13.50	785.	267.	96.	1.50		
+	3 COMBINED AT	13	3980.	13.50	3094.	1615.	636.	18.53		
+	ROUTED TO	13	411.	31.50	410.	399.	361.	18.53		
+	HYDROGRAPH AT	13	6473.	14.00	3525.	1182.	416.	9.01		

+	DIVERSION TO	NORTH	4973.	12.50	2053.	513.	171.	9.01
+	HYDROGRAPH AT	13	1500.	12.50	1472.	668.	245.	9.01
+	2 COMBINED AT	13	1746.	17.00	1662.	982.	588.	27.54
+	HYDROGRAPH AT	89	2668.	13.50	1239.	412.	146.	3.11
+	DIVERSION TO	NORTH	2168.	12.00	755.	189.	63.	3.11
+	HYDROGRAPH AT	15	500.	12.00	484.	223.	83.	3.11
+	2 COMBINED AT	15	2228.	16.50	2140.	1201.	670.	30.65
+	DIVERSION TO	NORTH	228.	12.50	156.	39.	13.	30.65
+	HYDROGRAPH AT	18	2000.	12.50	1984.	1162.	657.	30.65
+	ROUTED TO	21	1997.	18.00	1936.	1152.	655.	30.65
+	HYDROGRAPH AT	21	5355.	14.00	2896.	969.	341.	7.38
+	DIVERSION TO	SOUTH	2855.	13.00	855.	214.	71.	7.38
+	HYDROGRAPH AT	21	2500.	13.00	2041.	755.	270.	7.38
+	2 COMBINED AT	15	4433.	15.50	3789.	1888.	920.	38.03
+	DIVERSION TO	SOUTH	1433.	13.00	804.	201.	67.	38.03
+	HYDROGRAPH AT	22	3000.	13.00	2985.	1687.	853.	38.03
+	ROUTED TO	22	3000.	18.00	2950.	1680.	852.	38.03
+	HYDROGRAPH AT	98	9698.	16.00	7546.	2930.	1018.	22.90
+	DIVERSION TO	CAN	7598.	13.00	5446.	1574.	525.	22.90
+	HYDROGRAPH AT	25	2100.	13.00	2100.	1356.	494.	22.90
+	ROUTED TO	25	2100.	19.50	2100.	1351.	494.	22.90
+	2 COMBINED AT	22	5100.	18.00	5022.	3031.	1345.	60.93
+	DIVERSION TO	HOK	1600.	13.50	1522.	502.	167.	60.93
+	HYDROGRAPH AT	29	3500.	13.50	3500.	2529.	1177.	60.93
+	ROUTED TO	29	3500.	16.50	3500.	2526.	1177.	60.93
+	HYDROGRAPH AT	30	4690.	12.50	1755.	627.	235.	3.05
+	HYDROGRAPH AT	29	7218.	14.00	4387.	1506.	530.	9.94
+	HYDROGRAPH AT	48	2048.	14.50	1280.	442.	155.	3.02
+	4 COMBINED AT	29	14103.	14.00	10175.	4976.	2064.	76.94
+	HYDROGRAPH AT	58	2034.	17.00	1726.	742.	259.	4.50
+	ROUTED TO	17	90.	10.50	90.	90.	90.	4.50

	2 COMBINED AT							
+		17	14193.	14.00	10265.	5066.	2152.	81.44
	HYDROGRAPH AT							
+		56	1825.	15.00	1328.	492.	173.	2.92
	ROUTED TO							
+		17	65.	11.00	65.	65.	65.	2.92
	2 COMBINED AT							
+		17	14258.	14.00	10330.	5130.	2216.	84.36
	HYDROGRAPH AT							
+		17	3743.	13.00	1651.	549.	196.	3.72
	2 COMBINED AT							
+		30	17026.	13.50	11953.	5675.	2411.	88.08
	ROUTED TO							
+		30	984.	43.50	984.	982.	965.	88.08
	ROUTED TO							
+		36	984.	46.00	984.	982.	965.	88.08
	HYDROGRAPH AT							
+		35	1886.	13.50	862.	286.	102.	1.99
	ROUTED TO							
+		36	1651.	14.00	837.	286.	102.	1.99
	2 COMBINED AT							
+		36	2093.	14.00	1409.	1112.	1024.	90.07
	ROUTED TO							
+		39	2019.	15.00	1401.	1110.	1024.	90.07
	HYDROGRAPH AT							
+		39	590.	14.00	325.	110.	39.	.71
	2 COMBINED AT							
+		39	2492.	14.50	1688.	1202.	1056.	90.78
	ROUTED TO							
+		39	1300.	14.00	1300.	1199.	1055.	90.78

*** NORMAL END OF HEC-1 ***

HEC-1 Revised Model Output

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1***************************************                                                  ***************************************
*                                       *                                                  *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                  *   U.S. ARMY CORPS OF ENGINEERS      *
*             JUN   1998                *                                                  *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                 *                                                  *        609 SECOND STREET            *
*                                       *                                                  *     DAVIS, CALIFORNIA 95616         *
*  RUN DATE   20FEB01  TIME  15:28:15   *                                                  *        (916) 756-1104               *
*                                       *                                                  *                                     *
*****************************************                                                  ***************************************


                    X      X  XXXXXXX   XXXXX          X
                    X      X  X         X     X       XX
                    X      X  X         X              X
                    XXXXXXX   XXXX      X      XXXXX   X
                    X      X  X         X              X
                    X      X  X         X     X        X
                    X      X  XXXXXXX   XXXXX         XXX


        THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

        THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
        THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
        NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
        DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
        KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                           HEC-1 INPUT                                                        PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID        JUDY'S/BURDICK BRANCH SITE ANALYSIS
        2           ID           REVISED BY PARSONS FROM BASE MODEL:
        3           ID        CAHOKIA CANAL HEC-1 MODEL FOR FUTURE CONDITIONS
        4           ID        ASSUMES FULL DEVELOPMENT OF HILLSIDE WATERSHEDS
        5           ID        MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
        6           ID        BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
        7           ID        MADISON COUNTY, IL  (Design FLOOD)
        8           ID        INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC.)
        9           IT      30                         300
       10           IO       5
       11           JR    PREC     .37      .51      .60      .73      .86      1.0      1.39

       12           KK       1
       13           KM        COMPUTE RUNOFF FOR SUBAREA 1 (UPPER COUNTY DITCH)
       14           BA    1.99
       15           BF       0    -.03    1.074
       16           PH       1    91.1     0.99     2.22     3.86     4.84     5.25     6.16     7.14     8.21
       17           LS       0   87.40
       18           UD    1.43

       19           KK       2
       20           KM        ROUTE TO AREA 2
       21           RS       1    STOR       -1
       22           SV       0      20       50      560     1400     1710     2969
       23           SQ       0      50      100      200      300      400      500

       24           KK       3
       25           KM        COMPUTE RUNOFF FOR SUBAREA 3
       26           BA     .22
       27           LS       0   87.90
       28           UD     .88

       29           KK       2
       30           KM        COMPUTE RUNOFF FOR SUBAREA 2
       31           BA    1.39
       32           LS       0   83.70
       33           UD    1.74

       34           KK       2
       35           KM        COMBINE 3 HYDROGRAPHS AT 2
       36           HC       3

       37           KK       5
       38           KM        ROUTE TO AREA 5
       39           RS       1    STOR       -1
       40           SV       0       4        8       15      300      666     1190     1670
       41           SQ       0      50      100      200      300      400      500      600

       42           KK       4
       43           KM        COMPUTE RUNOFF FOR SUBAREA 4
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         44          BA     1.34
         45          LS       0    90.40
         46          UD     1.16
1                                              HEC-1 INPUT                                            PAGE  2

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         47          KK       5
         48          KM         COMPUTE RUNOFF FOR SUBAREA 5
         49          BA      .79
         50          LS       0    78.70
         51          UD     1.24

         52          KK       5
         53          KM         COMBINE 3 HYDORGRAPHS AT 5
         54          HC       3

         55          KK       8
         56          KM         ROUTE TO SUBAREA 8
         57          RS       1    STOR      -1
         58          SV       0      11      70     2100     3200     3800
         59          SQ       0      50     100      200      300      400

         60          KK       8
         61          KM         COMPUTE RUNOFF FOR SUBAREA 8
         62          BA     1.55
         63          LS       0    90.60
         64          UD     1.37

         65          KK       8
         66          KM         COMBINE 2 HYDROGRAPHS AT 8
         67          HC       2

         68          KK      10
         69          KM         ROUTE TO SUBAREA 10 AT I-270
         70          RS       1    STOR      -1
         71          SV       0      18     120     3000     4000     6200     8600
         72          SQ       0      50     100      115      150      200      250

         73          KK      10
         74          KM         COMPUTE RUNOFF FOR SUBAREAS 79,80,81,82,83,84,85,6,7,AND 10
         75          BA     7.28
         76          LS       0    75.00
         77          UD     5.76

         78          KK      10
         79          KM         COMBINE 2 HYDROGRAPHS AT 10
         80          HC       2

         81          KK      11
         82          KM         COMPUTE RUNOFF FOR SUBAREAS 86 AND 11
         83          BA      .97
         84          LS       0    75.00
         85          UD     1.74

         86          KK      11
         87          KM         COMBINE 2 HYDROGRAPHS AT SUBAREA 11
         88          HC       2
1                                              HEC-1 INPUT                                            PAGE  3

        LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         89          KK      12
         90          KM         COMPUTE RUNOFF FOR SUBAREAS 87 AND 12
         91          BA     1.50
         92          LS       0    81.00
         93          UD     1.48

         94          KK       9
         95          KM         COMPUTE RUNOFF FOR SUBAREA 9
         96          BA     1.50
         97          LS       0    90.00
         98          UD     1.11

         99          KK      13
        100          KM         COMBINE 3 HYDROGRAPHS AT 13
        101          HC       3

        102          KK      13
        103          KM         ROUTE TO SUBAREA 13 AT ILL. HIGHWAY 162
        104          RS       1    STOR      -1
        105          SV       0      16      25     1000     1600     2550     3350     3950     4678     5405
        106          SQ       0      50     100      200      300      400      500      600      700      800

        107          KK      13
        108          KM         COMPUTE RUNOFF FOR SUBAREAS 88 AND 13 (JUDY'S BRANCH)
        109          BA     9.01
        110          LS       0    75.00
        111          UD     1.54
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112            KK      13
113            KM        COMBINE CAHOKIA CANAL AND JUDY'S BRANCH
114            HC       2

115            KK      89
116            KM        COMPUTE RUNOFF FOR SUBAREAS 89 AND 15 (BURDICK BRANCH)
117            BA     3.11
118            LS       0    75.00
119            UD     1.13

120            KK      15
121            KM        COMBINE CAHOKIA CANAL AND BURDICK BRANCH AT SUBAREA 15
122            HC       2
123            ZZ
1*****************************************                          ***************************************
*                                         *                         *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *                         *   U.S. ARMY CORPS OF ENGINEERS      *
*              JUN   1998                 *                         *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                   *                         *        609 SECOND STREET            *
*                                         *                         *      DAVIS, CALIFORNIA 95616        *
*  RUN DATE   20FEB01  TIME  15:28:15     *                         *          (916) 756-1104             *
*                                         *                         *                                     *
*****************************************                           ***************************************


                          JUDY'S/BURDICK BRANCH SITE ANALYSIS
                        REVISED BY PARSONS FROM BASE MODEL:
                          CAHOKIA CANAL HEC-1 MODEL FOR FUTURE CONDITIONS
                          ASSUMES FULL DEVELOPMENT OF HILLSIDE WATERSHEDS
                          MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
                          BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
                          MADISON COUNTY, IL  (Design FLOOD)
                          INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC.)

  10 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT           HYDROGRAPH TIME DATA
                       NMIN          30  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      7    0  ENDING DATE
                     NDTIME        0530  ENDING TIME
                      ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL     .50 HOURS
                     TOTAL TIME BASE  149.50 HOURS

        ENGLISH UNITS
            DRAINAGE AREA           SQUARE MILES
            PRECIPITATION DEPTH     INCHES
            LENGTH, ELEVATION       FEET
            FLOW                    CUBIC FEET PER SECOND
            STORAGE VOLUME          ACRE-FEET
            SURFACE AREA            ACRES
            TEMPERATURE             DEGREES FAHRENHEIT

    JP           MULTI-PLAN OPTION
                      NPLAN           1  NUMBER OF PLANS

    JR           MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                    .37       .51       .60       .73       .86      1.00      1.39
1
```

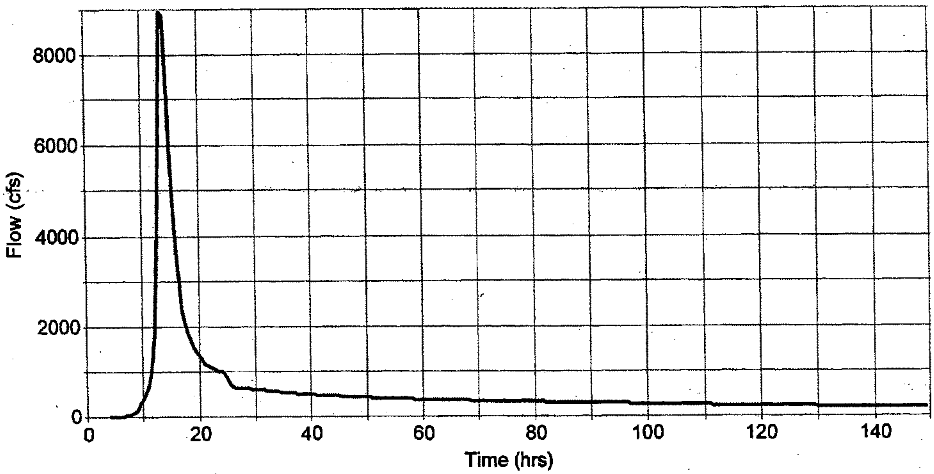
PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

					RATIOS APPLIED TO PRECIPITATION						
OPERATION	STATION	AREA	PLAN		RATIO 1 .37	RATIO 2 .51	RATIO 3 .60	RATIO 4 .73	RATIO 5 .86	RATIO 6 1.00	RATIO 7 1.39
HYDROGRAPH AT											
+	1	1.99	1	FLOW	502.	801.	999.	1287.	1575.	1885.	2743.
				TIME	14.00	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO											
+	2	1.99	1	FLOW	109.	124.	134.	149.	165.	182.	220.
				TIME	17.50	18.50	19.00	19.50	19.50	20.00	21.00
HYDROGRAPH AT											
+	3	.22	1	FLOW	74.	117.	145.	186.	227.	270.	391.
				TIME	13.00	13.00	13.00	13.00	13.00	13.00	13.00

HYDROGRAPH AT											
+	2	1.39	1	FLOW	263.	444.	566.	744.	925.	1120.	1663.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
3 COMBINED AT											
+	2	3.60	1	FLOW	412.	626.	770.	981.	1193.	1423.	2065.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
ROUTED TO											
+	5	3.60	1	FLOW	212.	232.	246.	268.	291.	313.	371.
				TIME	17.00	18.50	19.00	19.50	20.50	21.00	22.50
HYDROGRAPH AT											
+	4	1.34	1	FLOW	446.	678.	827.	1043.	1257.	1487.	2122.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
HYDROGRAPH AT											
+	5	.79	1	FLOW	137.	251.	330.	449.	570.	702.	1074.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
3 COMBINED AT											
+	5	5.73	1	FLOW	783.	1135.	1368.	1708.	2050.	2421.	3453.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO											
+	8	5.73	1	FLOW	111.	121.	128.	138.	148.	159.	189.
				TIME	29.00	37.50	42.50	50.00	57.00	64.00	82.00
HYDROGRAPH AT											
+	8	1.55	1	FLOW	470.	717.	877.	1107.	1336.	1582.	2262.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
2 COMBINED AT											
+	8	7.28	1	FLOW	559.	819.	980.	1212.	1444.	1693.	2381.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO											
+	10	7.28	1	FLOW	100.	101.	102.	103.	104.	105.	108.
				TIME	60.50	88.00	105.00	129.00	148.50	149.50	149.50
HYDROGRAPH AT											
+	10	7.28	1	FLOW	366.	704.	945.	1320.	1712.	2147.	3397.
				TIME	19.00	19.00	18.50	18.50	18.50	18.50	18.50
2 COMBINED AT											
+	10	14.56	1	FLOW	466.	805.	1046.	1421.	1813.	2249.	3500.
				TIME	19.00	19.00	18.50	18.50	18.50	18.50	18.50
HYDROGRAPH AT											
+	11	.97	1	FLOW	107.	211.	285.	400.	519.	650.	1025.
				TIME	14.50	14.00	14.00	14.00	14.00	14.00	14.00
2 COMBINED AT											
+	11	15.53	1	FLOW	494.	854.	1113.	1508.	1922.	2380.	3703.
				TIME	19.00	18.50	18.50	18.50	18.50	18.50	18.00
HYDROGRAPH AT											
+	12	1.50	1	FLOW	270.	471.	607.	808.	1012.	1234.	1862.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	13.50
HYDROGRAPH AT											
+	9	1.50	1	FLOW	501.	764.	934.	1179.	1423.	1684.	2406.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
3 COMBINED AT											
+	13	18.53	1	FLOW	940.	1562.	1988.	2623.	3269.	3980.	6014.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO											
+	13	18.53	1	FLOW	153.	197.	242.	308.	356.	411.	616.
				TIME	33.00	32.50	32.00	31.50	31.50	31.50	31.00
HYDROGRAPH AT											
+	13	9.01	1	FLOW	1089.	2139.	2882.	4012.	5183.	6473.	10138.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
2 COMBINED AT											
+	13	27.54	1	FLOW	1197.	2256.	3005.	4144.	5326.	6628.	10329.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
HYDROGRAPH AT											
+	89	3.11	1	FLOW	448.	883.	1189.	1655.	2137.	2668.	4175.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
2 COMBINED AT											
+	15	30.65	1	FLOW	1606.	3031.	4036.	5559.	7167.	8977.	14147.
				TIME	14.00	14.00	14.00	14.00	13.50	13.50	13.50

*** NORMAL END OF HEC-1 ***

Combined County Ditch, Judy's and Burdick Branches 100-Year Hydrograph



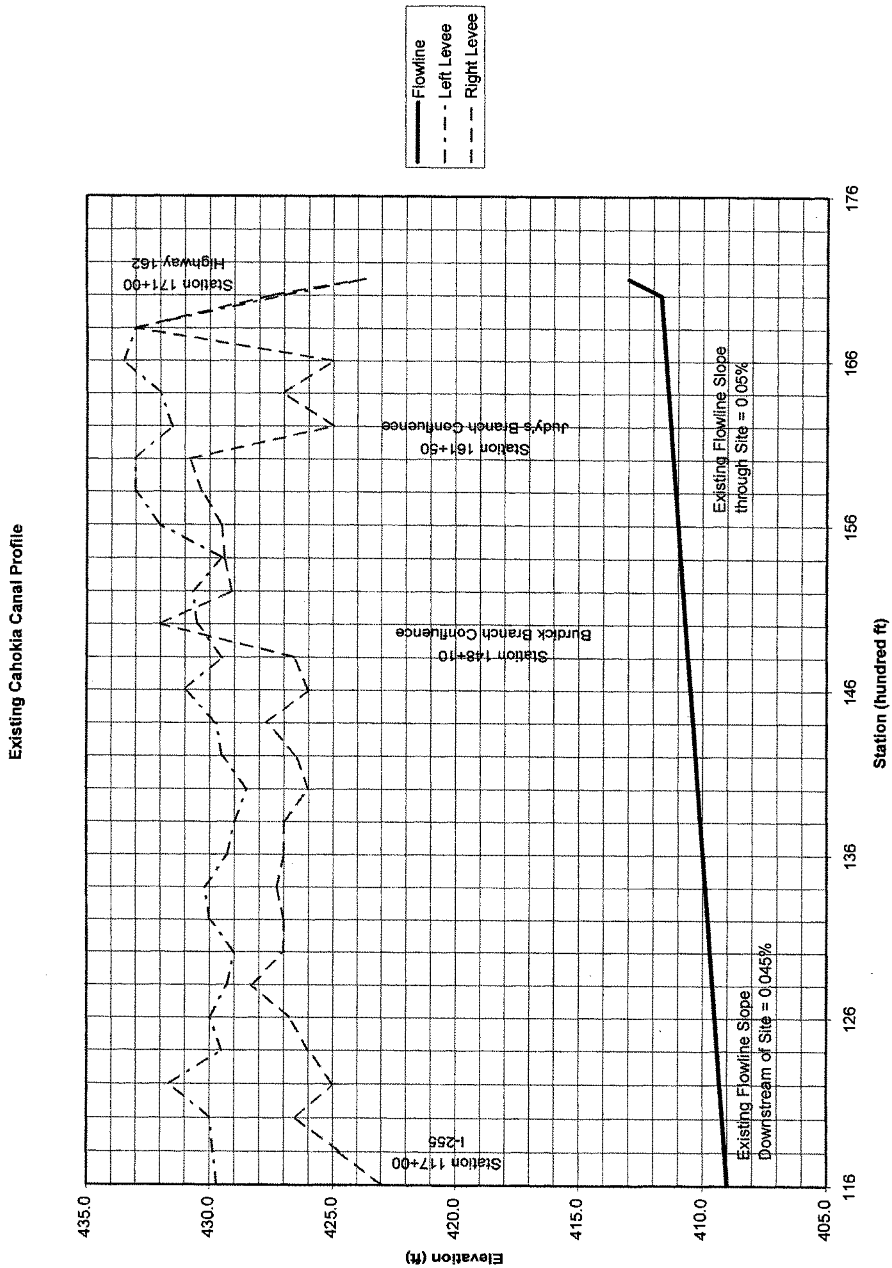
Capacity Calculation for Cahokia Canal at I-255

Capacity of Cahokia Canal at I-255
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\estlifc-.fm2
Worksheet	Cahokia Canal (STA 2+00 - 118+90)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.000450	ft/ft
Depth	14.00	ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	18.00	ft

Results		
Discharge	2,704.15	cfs
Flow Area	644.00	ft²
Wetted Perimeter	80.61	ft
Top Width	74.00	ft
Critical Depth	6.86	ft
Critical Slope	0.008527	ft/ft
Velocity	4.20	ft/s
Velocity Head	0.27	ft
Specific Energy	14.27	ft
Froude Number	0.25	
Flow is subcritical.		


Existing Cahokia Canal Profile
Flowline
Left Levee
Right Levee
Station 171+00
Highway 162
Judy's Branch Confluence
Station 161+50
Burdick Branch Confluence
Station 148+10
Station 117+00
I-255
Existing Flowline Slope
through Site = 0.05%
Existing Flowline Slope
Downstream of Site = 0.045%
Elevation (ft)
435.0
430.0
425.0
420.0
415.0
410.0
405.0
Station (hundred ft)
116
126
136
146
156
166
176

1832

ALTERNATIVE 1: CALCULATIONS

Storage Volume Calculation

```
Type.... Vol: Elev-Area                                    Page 1.01
Name.... TRIAL 3

File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH.PPW
Title... Alternative 1: Max Excavation and Berm Height
```

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
409.40	-----	.0000	.0000	.000	.000
409.99	-----	.5000	.5000	.098	.098
410.00	-----	120.3900	128.6486	.429	.528
412.00	-----	121.8600	363.3728	242.249	242.776
414.00	-----	123.3500	367.8127	245.209	487.985
416.00	-----	124.8400	372.2828	248.189	736.173
418.00	-----	126.3400	376.7677	251.179	987.352
420.00	-----	127.8400	381.2678	254.179	1241.530
422.00	-----	129.3500	385.7828	257.189	1498.719
424.00	-----	130.8700	390.3278	260.219	1758.937
425.00	-----	131.6400	393.7645	131.255	1890.192

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

```
where: EL1, EL2      = Lower and upper elevations of the increment
       Area1,Area2   = Areas computed for EL1, EL2, respectively
       Volume        = Incremental volume between EL1 and EL2
```

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 13:31:22   Date: 02-22-2001

E-Q-V Table

```
Type.... Pond E-V-Q Table                                          Page 10.01
Name.... J/B POND
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH.PPW

                    LEVEL POOL ROUTING DATA

HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
Inflow  HYG file = NONE STORED - J/B POND     IN  ex100
Outflow HYG file = NONE STORED - J/B POND     OUT ex100

Pond Node   Data = J/B POND
Pond Volume Data = trial 3
Pond Outlet Data = OUTLET3

No Infiltration

INITIAL CONDITIONS
----------------------------------
Starting WS Elev     =   409.40 ft
Starting Volume      =     .000 ac-ft
Starting Outflow     =      .00 cfs
Starting Infiltr.    =      .00 cfs
Starting Total Qout=        .00 cfs
Time Increment       =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
409.40	.00	.000	.0000	.00	.00	.00
410.00	33.57	.528	120.3900	.00	33.57	59.10
410.50	82.21	60.814	120.7567	.00	82.21	3025.62
411.00	142.86	121.284	121.1239	.00	142.86	6013.02
411.50	213.05	181.938	121.4917	.00	213.05	9018.86
412.00	291.44	242.776	121.8600	.00	291.44	12041.81
412.50	377.27	303.799	122.2317	.00	377.27	15081.14
413.00	469.59	365.008	122.6039	.00	469.59	18135.97
413.50	567.63	426.403	122.9767	.00	567.63	21205.53
414.00	671.39	487.985	123.3500	.00	671.39	24289.84
414.50	780.49	549.753	123.7217	.00	780.49	27388.51
415.00	894.17	611.706	124.0939	.00	894.17	30500.75
415.50	1012.42	673.846	124.4667	.00	1012.42	33626.59
416.00	1135.25	736.173	124.8400	.00	1135.25	36766.03
416.50	1262.28	798.687	125.2142	.00	1262.28	39918.71
417.00	1393.13	861.387	125.5889	.00	1393.13	43084.28
417.50	1527.41	924.276	125.9642	.00	1527.41	46262.34
418.00	1665.88	987.352	126.3400	.00	1665.88	49453.70
418.50	1807.40	1050.615	126.7142	.00	1807.40	52657.18
419.00	1925.09	1114.066	127.0889	.00	1925.09	55845.88
419.50	1993.57	1177.704	127.4642	.00	1993.57	58994.45
420.00	2062.05	1241.530	127.8400	.00	2062.05	62152.11
420.50	2130.53	1305.544	128.2167	.00	2130.53	65318.88

```
S/N: 021801A06A86    Parsons
PondPack Ver: 7.0 (312)        Compute Time: 13:36:25    Date: 02-22-2001
```

E-Q-V Table

Type.... Pond E-V-Q Table Page 10.02
Name.... J/B POND
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH.PPW

LEVEL POOL ROUTING DATA

HYG Dir = K:\STLCOE\ESTL-IFC\PONDPACK\
Inflow HYG file = NONE STORED - J/B POND IN ex100
Outflow HYG file = NONE STORED - J/B POND OUT ex100

Pond Node Data = J/B POND
Pond Volume Data = trial 3
Pond Outlet Data = OUTLET3

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 409.40 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .5000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
421.00	2214.81	1369.747	128.5939	.00	2214.81	68510.56
421.50	2320.48	1434.138	128.9717	.00	2320.48	71732.78
422.00	2421.57	1498.719	129.3500	.00	2421.57	74959.55
422.50	2518.46	1563.488	129.7292	.00	2518.46	78191.30
423.00	2611.54	1628.448	130.1089	.00	2611.54	81428.42
423.50	2701.76	1693.597	130.4892	.00	2701.76	84671.88
424.00	2788.93	1758.937	130.8700	.00	2788.93	87921.48
424.50	2873.61	1824.468	131.2547	.00	2873.61	91177.88
425.00	2955.63	1890.192	131.6400	.00	2955.63	94440.92

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 13:36:25 Date: 02-22-2001

Pond Analysis Summary

```
Type.... Pond Routing Summary                                   Page 10.06
Name.... J/B POND     OUT   Tag: ex100                       Event: ex100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH.PPW
Storm... ex100    Tag: ex100

                     LEVEL POOL ROUTING SUMMARY

 HYG Dir            = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - J/B POND     IN  ex100
 Outflow HYG file = NONE STORED - J/B POND     OUT ex100

 Pond Node   Data = J/B POND
 Pond Volume Data = trial 3
 Pond Outlet Data = OUTLET3

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =   409.40 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .5000 hrs

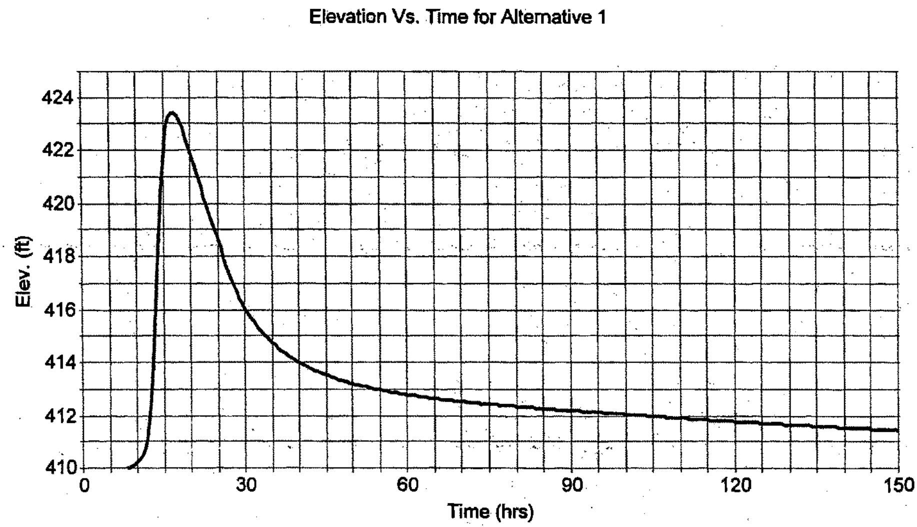

 INFLOW/OUTFLOW HYDROGRAPH SUMMARY
 ====================================================
 Peak Inflow       =   8977.00 cfs    at   13.5000 hrs
 Peak Outflow      =   2688.44 cfs    at   17.0000 hrs
 ----------------------------------------------------
 Peak Elevation    =    423.43 ft
 Peak Storage =       1683.967 ac-ft
 ====================================================

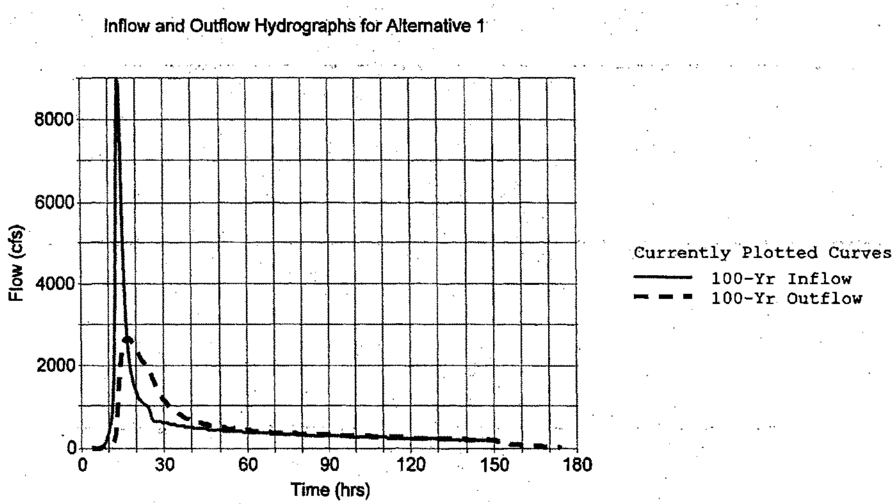

 MASS BALANCE (ac-ft)
 -------------------------
+ Initial Vol   =        .000
+ HYG Vol IN    =    6808.328
- Infiltration =         .000
- HYG Vol OUT   =    6808.323
- Retained Vol =         .000
                   ----------
  Unrouted Vol =        -.004 ac-ft  (.000% of Inflow Volume)

 WARNING: Inflow hydrograph truncated on right side.




S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)       Compute Time: 13:36:25    Date: 02-22-2001
```


Elevation Vs. Time for Alternative 1
Elev. (ft)
424
422
420
418
416
414
412
410
0
30
60
90
120
150
Time (hrs)


Inflow and Outflow Hydrographs for Alternative 1
Flow (cfs)
8000
6000
4000
2000
0
0
30
60
90
120
150
180
Time (hrs)
Currently Plotted Curves
100-Yr Inflow
100-Yr Outflow

Excavation Calculation

Type.... Vol: Elev-Area Page 1.01
Name.... TRIAL 3

File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH.PPW
Title... Alternative 1. Excavation Estimate

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
410.00	-----	120.3900	.0000	.000	.000
412.00	-----	121.8600	363.3728	242.249	242.249
414.00	-----	123.3500	367.8127	245.209	487.457
416.00	-----	124.8400	372.2828	248.189	735.646
418.00	-----	126.3400	376.7677	251.179	986.824
419.00	-----	127.0900	380.1444	126.715	1113.539

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:38:28 Date: 02-22-2001

ALTERNATIVE 2: CALCULATIONS

Storage Volume Calculation

Type.... Vol: Elev-Area   Page 1.01
Name.... NEWPOND

File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH2.PPW
Title... Alternative 2: Max 8' ponding depth

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
409.40	-----	.0500	.0000	.000	.000
410.00	-----	.5000	.7081	.142	.142
411.00	-----	1.3000	2.6062	.869	1.010
414.00	-----	3.2000	6.5396	6.540	7.550
415.90	-----	4.0000	10.7777	6.826	14.376
416.00	-----	221.2000	254.9456	8.499	22.875
418.00	-----	223.1000	666.4480	444.299	467.173
419.00	-----	224.1000	670.7994	223.600	690.773
420.00	-----	225.1000	673.7994	224.600	915.373
422.00	-----	227.0000	678.1480	452.099	1367.471
424.00	-----	228.9000	683.8480	455.899	1823.370
425.00	-----	229.8999	688.1993	229.400	2052.770

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 14:18:10 Date: 02-22-2001

E-Q-V Table

```
Type.... Pond E-V-Q Table                                         Page 10.01
Name.... J/B POND
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH2.PPW

                   LEVEL POOL ROUTING DATA

 HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - J/B POND     IN  ex100
 Outflow HYG file = NONE STORED - J/B POND     OUT ex100

 Pond Node   Data = J/B POND
 Pond Volume Data = newpond
 Pond Outlet Data = OUTLET3

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =   409.40 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
409.40	.00	.000	.0500	.00	.00	.00
409.60	5.05	.019	.1481	.00	5.05	5.97
409.80	13.92	.063	.2980	.00	13.92	16.96
410.00	25.27	.142	.5000	.00	25.27	32.13
410.20	38.72	.254	.6300	.00	38.72	51.03
410.40	53.79	.395	.7750	.00	53.79	72.89
410.60	70.38	.565	.9350	.00	70.38	97.75
410.80	88.31	.770	1.1100	.00	88.31	125.56
411.00	107.38	1.010	1.3000	.00	107.38	156.29
411.20	127.79	1.280	1.4005	.00	127.79	189.76
411.40	149.15	1.571	1.5047	.00	149.15	225.18
411.60	171.66	1.882	1.6127	.00	171.66	262.77
411.80	195.12	2.216	1.7244	.00	195.12	302.38
412.00	219.35	2.572	1.8398	.00	219.35	343.85
412.20	244.71	2.952	1.9590	.00	244.71	387.60
412.40	270.84	3.356	2.0819	.00	270.84	433.29
412.60	297.55	3.785	2.2086	.00	297.55	480.76
412.80	325.20	4.240	2.3390	.00	325.20	530.42
413.00	353.62	4.721	2.4732	.00	353.62	582.13
413.20	382.61	5.229	2.6110	.00	382.61	635.72
413.40	412.56	5.766	2.7527	.00	412.56	691.63
413.60	443.08	6.331	2.8980	.00	443.08	749.49
413.80	474.17	6.925	3.0471	.00	474.17	809.35

```
S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)       Compute Time: 13:13:09     Date: 02-22-2001
```

E-Q-V Table

```
Type.... Pond E-V-Q Table                                    Page 10.02
Name.... J/B POND
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH2.PPW

                   LEVEL POOL ROUTING DATA

 HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - J/B POND      IN  ex100
 Outflow HYG file = NONE STORED - J/B POND      OUT ex100

 Pond Node   Data = J/B POND
 Pond Volume Data = newpond
 Pond Outlet Data = OUTLET3

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev     =   409.40 ft
 Starting Volume      =     .000 ac-ft
 Starting Outflow     =      .00 cfs
 Starting Infiltr.    =      .00 cfs
 Starting Total Qout=        .00 cfs
 Time Increment       =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
414.00	506.02	7.550	3.2000	.00	506.02	871.44
414.20	538.44	8.198	3.2800	.00	538.44	935.22
414.40	571.44	8.862	3.3610	.00	571.44	1000.36
414.60	605.01	9.542	3.4430	.00	605.01	1066.87
414.80	639.34	10.239	3.5260	.00	639.34	1134.92
415.00	674.06	10.953	3.6099	.00	674.06	1204.18
415.20	709.53	11.683	3.6949	.00	709.53	1275.01
415.40	745.39	12.431	3.7808	.00	745.39	1347.05
415.60	782.01	13.196	3.8678	.00	782.01	1420.69
415.80	818.63	13.978	3.9557	.00	818.63	1495.17
416.00	856.40	22.875	221.2000	.00	856.40	1963.53
416.20	894.17	67.129	221.3896	.00	894.17	4143.23
416.40	932.69	111.429	221.5793	.00	932.69	6325.86
416.60	971.60	155.767	221.7691	.00	971.60	8510.71
416.80	1010.90	200.135	221.9590	.00	1010.90	10697.45
417.00	1050.95	244.549	222.1490	.00	1050.95	12887.11
417.20	1091.39	288.994	222.3390	.00	1091.39	15078.67
417.40	1132.20	333.483	222.5291	.00	1132.20	17272.79
417.60	1173.40	378.011	222.7194	.00	1173.40	19469.12
417.80	1214.98	422.570	222.9096	.00	1214.98	21667.35
418.00	1257.32	467.173	223.1000	.00	1257.32	23868.51
418.20	1299.67	511.809	223.2998	.00	1299.67	26071.23
418.40	1342.77	556.492	223.4997	.00	1342.77	28276.97

```
S/N: 021801A06A86    Parsons
PondPack Ver: 7.0 (312)       Compute Time: 13:13:09     Date: 02-22-2001
```

E-Q-V Table

```
Type.... Pond E-V-Q Table                                          Page 10.03
Name.... J/B POND
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH2.PPW

                    LEVEL POOL ROUTING DATA

 HYG Dir            = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - J/B POND      IN  ex100
 Outflow HYG file = NONE STORED - J/B POND      OUT ex100

 Pond Node    Data = J/B POND
 Pond Volume Data = newpond
 Pond Outlet Data = OUTLET3

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =   409.40 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
418.60	1386.26	601.214	223.6998	.00	1386.26	30485.04
418.80	1429.75	645.970	223.8998	.00	1429.75	32694.71
419.00	1474.00	690.773	224.1000	.00	1474.00	34907.41
419.20	1518.63	735.609	224.2998	.00	1518.63	37122.10
419.40	1563.64	780.492	224.4997	.00	1563.64	39339.44
419.60	1609.04	825.414	224.6998	.00	1609.04	41559.09
419.80	1654.82	870.370	224.8998	.00	1654.82	43780.73
420.00	1700.97	915.373	225.1000	.00	1700.97	46005.02
420.20	1722.82	960.408	225.2896	.00	1722.82	48206.55
420.40	1744.62	1005.487	225.4794	.00	1744.62	50410.20
420.60	1766.41	1050.605	225.6692	.00	1766.41	52615.69
420.80	1788.20	1095.754	225.8590	.00	1788.20	54822.67
421.00	1809.99	1140.947	226.0490	.00	1809.99	57031.82
421.20	1831.77	1186.172	226.2390	.00	1831.77	59242.49
421.40	1853.57	1231.441	226.4292	.00	1853.57	61455.33
421.60	1875.36	1276.749	226.6194	.00	1875.36	63670.01
421.80	1897.15	1322.088	226.8096	.00	1897.15	65886.20
422.00	1918.94	1367.471	227.0000	.00	1918.94	68104.55
422.20	1940.72	1412.886	227.1896	.00	1940.72	70324.42
422.40	1973.72	1458.346	227.3794	.00	1973.72	72557.67
422.60	2007.68	1503.844	227.5692	.00	2007.68	74793.70
422.80	2041.63	1549.372	227.7590	.00	2041.63	77031.24
423.00	2074.62	1594.946	227.9490	.00	2074.62	79270.00

```
S/N: 021801A06A86    Parsons
PondPack Ver: 7.0 (312)        Compute Time: 13:13:09    Date: 02-22-2001
```

E-Q-V Table

```
Type.... Pond E-V-Q Table                                     Page 10.04
Name.... J/B POND
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH2.PPW

                    LEVEL POOL ROUTING DATA

 HYG Dir            = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - J/B POND      IN  ex100
 Outflow HYG file = NONE STORED - J/B POND      OUT ex100

 Pond Node   Data = J/B POND
 Pond Volume Data = newpond
 Pond Outlet Data = OUTLET3

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =   409.40 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
423.20	2107.24	1640.550	228.1390	.00	2107.24	81509.88
423.40	2139.28	1686.200	228.3292	.00	2139.28	83751.36
423.60	2170.94	1731.888	228.5194	.00	2170.94	85994.30
423.80	2202.23	1777.606	228.7096	.00	2202.23	88238.38
424.00	2232.74	1823.370	228.9000	.00	2232.74	90483.85
424.20	2263.26	1869.166	229.0998	.00	2263.26	92730.88
424.40	2293.02	1915.009	229.2997	.00	2293.02	94979.43
424.60	2322.77	1960.891	229.4997	.00	2322.77	97229.91
424.80	2351.76	2006.807	229.6998	.00	2351.76	99481.22
425.00	2380.75	2052.770	229.8999	.00	2380.75	101734.80

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312)   Compute Time: 13:13:09   Date: 02-22-2001

Pond Analysis Summary

```
Type.... Pond Routing Summary                                    Page 10.08
Name.... J/B POND      OUT   Tag: ex100                      Event: ex100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH2.PPW
Storm... ex100   Tag: ex100

                    LEVEL POOL ROUTING SUMMARY

 HYG Dir            = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - J/B POND       IN  ex100
 Outflow HYG file = NONE STORED - J/B POND       OUT ex100

 Pond Node   Data = J/B POND
 Pond Volume Data = newpond
 Pond Outlet Data = OUTLET3

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =    409.40 ft
 Starting Volume     =      .000 ac-ft
 Starting Outflow    =       .00 cfs
 Starting Infiltr.   =       .00 cfs
 Starting Total Qout=        .00 cfs
 Time Increment      =     .5000 hrs

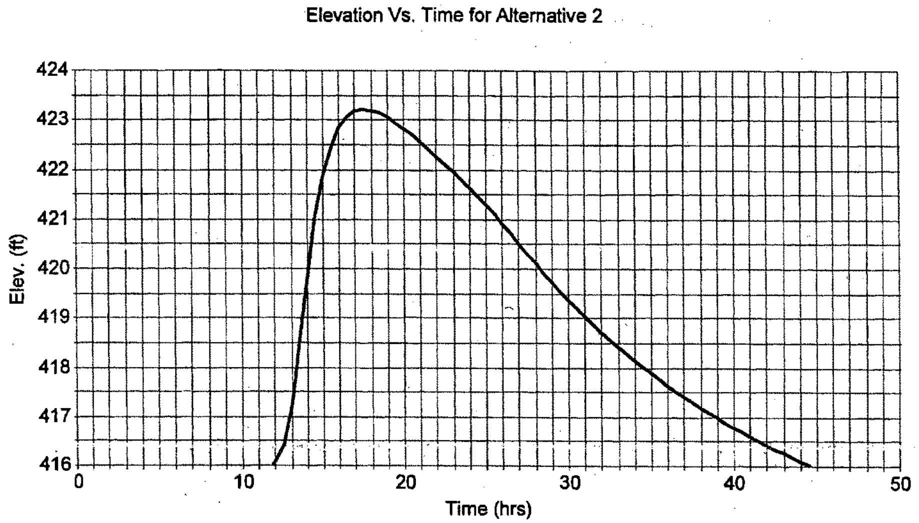
 INFLOW/OUTFLOW HYDROGRAPH SUMMARY
 =====================================================
 Peak Inflow       =   8977.00 cfs    at   13.5000 hrs
 Peak Outflow      =   2109.42 cfs    at   17.5000 hrs
 -----------------------------------------------------
 Peak Elevation    =     423.21 ft
 Peak Storage =        1643.649 ac-ft
 =====================================================

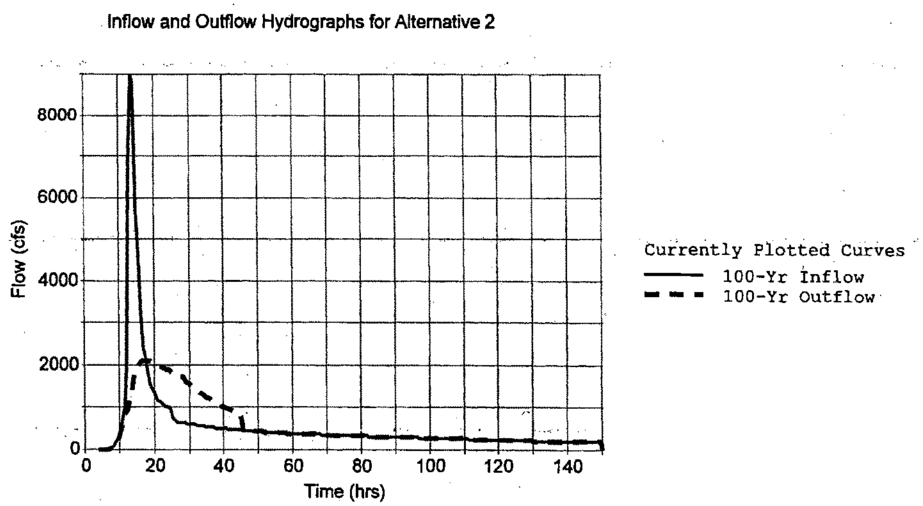
 MASS BALANCE (ac-ft)
 -------------------------
+ Initial Vol   =        .000
+ HYG Vol IN    =    6808.328
- Infiltration =         .000
- HYG Vol OUT   =    6808.331
- Retained Vol =         .000
                   ----------
 Unrouted Vol =          .003 ac-ft  (.000% of Outflow Volume)

 WARNING: Inflow hydrograph truncated on right side.



 S/N: 021801A06A86    Parsons
 PondPack Ver: 7.0 (312)       Compute Time: 13:13:09    Date: 02-22-2001
```


Elevation Vs. Time for Alternative 2
Elev. (ft)
424
423
422
421
420
419
418
417
416
0
10
20
30
40
50
Time (hrs)


Inflow and Outflow Hydrographs for Alternative 2
Flow (cfs)
8000
6000
4000
2000
0
0
20
40
60
80
100
120
140
Time (hrs)
Currently Plotted Curves
100-Yr Inflow
100-Yr Outflow

Excavation Calculation

Type.... Vol: Elev-Area Page 1.01
Name.... NEWPOND

File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH2.PPW
Title... Alternative 2. Excavation Estimate

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
416.00	-----	221.2000	.0000	.000	.000
418.00	-----	223.1000	666.4480	444.299	444.299
419.00	-----	224.1000	670.7994	223.600	667.899

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 13:45:16 Date: 02-22-2001

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ALTERNATIVE 3: CALCULATIONS

Storage Volume Calculation

Type.... Vol: Elev-Area   Page 1.01
Name.... NEWPOND

File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH3.PPW
Title... Alternative 3: Minimal Excavation

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
409.40	-----	.0100	.0000	.000	.000
410.00	-----	.4700	.5486	.110	.110
414.00	-----	3.2400	4.9440	6.592	6.702
416.00	-----	4.0800	10.9558	7.304	14.006
418.99	-----	5.4600	14.2598	14.212	28.218
419.00	-----	348.5301	397.6132	1.327	29.545
420.00	-----	349.7399	1047.4040	349.135	378.679
421.00	-----	350.9500	1051.0340	350.345	729.024
422.00	-----	352.1600	1054.6640	351.555	1080.579
423.00	-----	353.3701	1058.2950	352.765	1433.344
424.00	-----	354.5799	1061.9240	353.975	1787.318
425.00	-----	355.7899	1065.5540	355.185	2142.503

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312)   Compute Time: 14:19:08   Date: 02-22-2001

E-Q-V Table

```
Type.... Pond E-V-Q Table                                    Page 10.01
Name.... J/B POND
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH3.PPW

                    LEVEL POOL ROUTING DATA

 HYG Dir          = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - J/B POND     IN  ex100
 Outflow HYG file = NONE STORED - J/B POND     OUT ex100

 Pond Node   Data = J/B POND
 Pond Volume Data = newpond
 Pond Outlet Data = OUTLET3

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev   =   409.40 ft
 Starting Volume    =     .000 ac-ft
 Starting Outflow   =      .00 cfs
 Starting Infiltr.  =      .00 cfs
 Starting Total Qout=      .00 cfs
 Time Increment     =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
409.40	.00	.000	.0100	.00	.00	.00
409.60	5.05	.008	.0871	.00	5.05	5.46
409.80	13.92	.040	.2405	.00	13.92	15.86
410.00	25.27	.110	.4700	.00	25.27	30.58
410.20	38.72	.212	.5495	.00	38.72	48.96
410.40	53.79	.330	.6352	.00	53.79	69.76
410.60	70.38	.466	.7272	.00	70.38	92.94
410.80	88.31	.621	.8253	.00	88.31	118.38
411.00	107.38	.797	.9296	.00	107.38	145.94
411.20	127.79	.993	1.0402	.00	127.79	175.88
411.40	149.15	1.213	1.1570	.00	149.15	207.87
411.60	171.66	1.457	1.2799	.00	171.66	242.16
411.80	195.12	1.725	1.4091	.00	195.12	278.63
412.00	219.35	2.021	1.5445	.00	219.35	317.15
412.20	244.71	2.344	1.6861	.00	244.71	358.15
412.40	270.84	2.696	1.8339	.00	270.84	401.31
412.60	297.55	3.078	1.9880	.00	297.55	446.51
412.80	325.20	3.491	2.1482	.00	325.20	494.17
413.00	353.62	3.937	2.3146	.00	353.62	544.19
413.20	382.61	4.417	2.4873	.00	382.61	596.42
413.40	412.56	4.933	2.6661	.00	412.56	651.30
413.60	443.08	5.484	2.8512	.00	443.08	708.52
413.80	474.17	6.074	3.0425	.00	474.17	768.13

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 14:22:47   Date: 02-22-2001

E-Q-V Table

Type.... Pond E-V-Q Table Page 10.02
Name.... J/B POND
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH3.PPW

LEVEL POOL ROUTING DATA

HYG Dir = K:\STLCOE\ESTL-IFC\PONDPACK\
Inflow HYG file = NONE STORED - J/B POND IN ex100
Outflow HYG file = NONE STORED - J/B POND OUT ex100

Pond Node Data = J/B POND
Pond Volume Data = newpond
Pond Outlet Data = OUTLET3

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 409.40 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .5000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
414.00	506.02	6.702	3.2400	.00	506.02	830.38
414.20	538.44	7.358	3.3196	.00	538.44	894.55
414.40	571.44	8.030	3.4003	.00	571.44	960.08
414.60	605.01	8.718	3.4818	.00	605.01	1026.96
414.80	639.34	9.422	3.5644	.00	639.34	1095.39
415.00	674.06	10.144	3.6479	.00	674.06	1165.01
415.20	709.53	10.882	3.7324	.00	709.53	1236.20
415.40	745.39	11.637	3.8178	.00	745.39	1308.61
415.60	782.01	12.409	3.9043	.00	782.01	1382.60
415.80	818.63	13.198	3.9916	.00	818.63	1457.44
416.00	856.40	14.006	4.0800	.00	856.40	1534.27
416.20	894.17	14.830	4.1660	.00	894.17	1611.94
416.40	932.69	15.672	4.2530	.00	932.69	1691.22
416.60	971.60	16.531	4.3408	.00	971.60	1771.73
416.80	1010.90	17.408	4.4296	.00	1010.90	1853.46
417.00	1050.95	18.303	4.5192	.00	1050.95	1936.83
417.20	1091.39	19.216	4.6097	.00	1091.39	2021.45
417.40	1132.20	20.147	4.7012	.00	1132.20	2107.33
417.60	1173.40	21.097	4.7935	.00	1173.40	2194.49
417.80	1214.98	22.065	4.8867	.00	1214.98	2282.91
418.00	1257.32	23.052	4.9809	.00	1257.32	2373.02
418.20	1299.67	24.057	5.0759	.00	1299.67	2464.03
418.40	1342.77	25.082	5.1718	.00	1342.77	2556.74

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 14:22:47 Date: 02-22-2001

E-Q-V Table

```
Type.... Pond E-V-Q Table                                    Page 10.03
Name.... J/B POND
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH3.PPW

                    LEVEL POOL ROUTING DATA

 HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - J/B POND     IN  ex100
 Outflow HYG file = NONE STORED - J/B POND     OUT ex100

 Pond Node    Data = J/B POND
 Pond Volume Data = newpond
 Pond Outlet Data = OUTLET3

 No Infiltration

 INITIAL CONDITIONS
 ---------------------------------
 Starting WS Elev    =   409.40 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
418.60	1386.26	26.126	5.2686	.00	1386.26	2650.76
418.80	1429.75	27.189	5.3663	.00	1429.75	2745.71
419.00	1474.00	29.545	348.5301	.00	1474.00	2903.96
419.20	1518.63	99.268	348.7719	.00	1518.63	6323.22
419.40	1563.64	169.051	349.0138	.00	1563.64	9745.72
419.60	1609.04	238.882	349.2557	.00	1609.04	13170.95
419.80	1654.82	308.751	349.4977	.00	1654.82	16598.38
420.00	1700.97	378.679	349.7399	.00	1700.97	20029.05
420.20	1722.82	448.645	349.9817	.00	1722.82	23437.25
420.40	1744.62	518.670	350.2237	.00	1744.62	26848.24
420.60	1766.41	588.743	350.4657	.00	1766.41	30261.57
420.80	1788.20	658.854	350.7078	.00	1788.20	33676.73
421.00	1809.99	729.024	350.9500	.00	1809.99	37094.75
421.20	1831.77	799.232	351.1918	.00	1831.77	40514.59
421.40	1853.57	869.499	351.4337	.00	1853.57	43937.30
421.60	1875.36	939.814	351.6758	.00	1875.36	47362.35
421.80	1897.15	1010.167	351.9178	.00	1897.15	50789.21
422.00	1918.94	1080.579	352.1600	.00	1918.94	54218.96
422.20	1940.72	1151.029	352.4018	.00	1940.72	57650.51
422.40	1973.72	1221.537	352.6438	.00	1973.72	61096.14
422.60	2007.68	1292.095	352.8858	.00	2007.68	64545.06
422.80	2041.63	1362.690	353.1279	.00	2041.63	67995.80
423.00	2074.62	1433.344	353.3701	.00	2074.62	71448.46

```
S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)      Compute Time: 14:22:47    Date: 02-22-2001
```

E-Q-V Table

```
Type.... Pond E-V-Q Table                                        Page 10.04
Name.... J/B POND
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH3.PPW

                    LEVEL POOL ROUTING DATA

 HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - J/B POND     IN  ex100
 Outflow HYG file = NONE STORED - J/B POND     OUT ex100

 Pond Node   Data = J/B POND
 Pond Volume Data = newpond
 Pond Outlet Data = OUTLET3

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =    409.40 ft
 Starting Volume     =      .000 ac-ft
 Starting Outflow    =       .00 cfs
 Starting Infiltr.   =       .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =     .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
423.20	2107.24	1504.035	353.6118	.00	2107.24	74902.55
423.40	2139.28	1574.786	353.8538	.00	2139.28	78358.94
423.60	2170.94	1645.586	354.0957	.00	2170.94	81817.29
423.80	2202.23	1716.422	354.3377	.00	2202.23	85277.07
424.00	2232.74	1787.318	354.5799	.00	2232.74	88738.95
424.20	2263.26	1858.252	354.8217	.00	2263.26	92202.66
424.40	2293.02	1929.245	355.0637	.00	2293.02	95668.48
424.60	2322.77	2000.286	355.3057	.00	2322.77	99136.63
424.80	2351.76	2071.365	355.5478	.00	2351.76	102605.80
425.00	2380.75	2142.503	355.7899	.00	2380.75	106077.90

Pond Analysis Summary

```
Type.... Pond Routing Summary                                   Page 10.08
Name.... J/B POND      OUT   Tag: ex100                      Event: ex100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH3.PPW
Storm... ex100   Tag: ex100

                    LEVEL POOL ROUTING SUMMARY

  HYG Dir            = K:\STLCOE\ESTL-IFC\PONDPACK\
  Inflow  HYG file = NONE STORED - J/B POND      IN  ex100
  Outflow HYG file = NONE STORED - J/B POND      OUT ex100

  Pond Node   Data = J/B POND
  Pond Volume Data = newpond
  Pond Outlet Data = OUTLET3

  No Infiltration

  INITIAL CONDITIONS
  ----------------------------------
  Starting WS Elev   =   409.40 ft
  Starting Volume    =     .000 ac-ft
  Starting Outflow   =      .00 cfs
  Starting Infiltr.  =      .00 cfs
  Starting Total Qout=      .00 cfs
  Time Increment     =    .5000 hrs

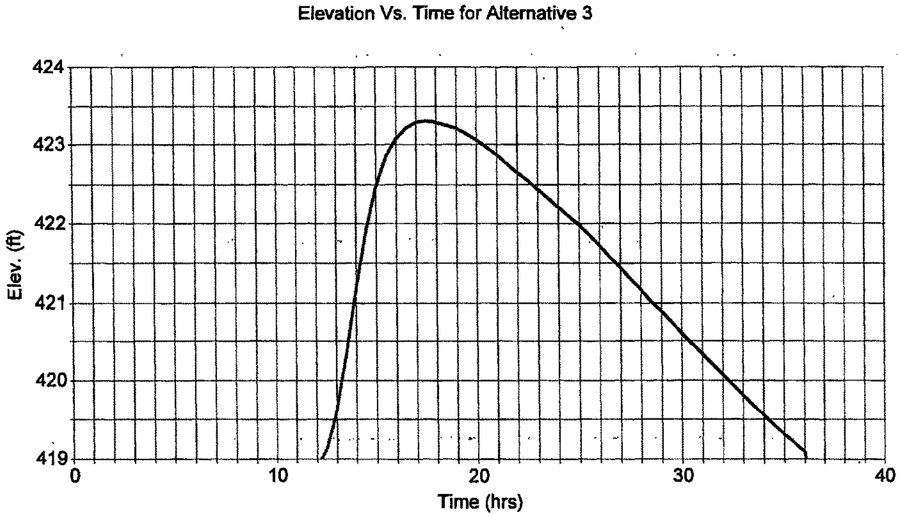

  INFLOW/OUTFLOW HYDROGRAPH SUMMARY
  ====================================================
  Peak Inflow       =   8977.00 cfs    at   13.5000 hrs
  Peak Outflow      =   2124.11 cfs    at   17.5000 hrs
  ----------------------------------------------------
  Peak Elevation    =    423.31 ft
  Peak Storage =       1541.294 ac-ft
  ====================================================

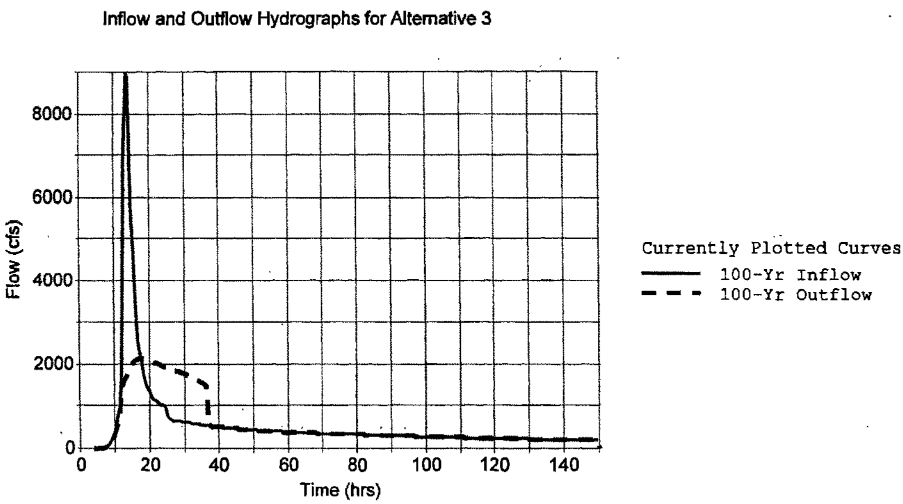

  MASS BALANCE (ac-ft)
  --------------------------
+ Initial Vol   =        .000
+ HYG Vol IN    =    6808.328
- Infiltration  =        .000
- HYG Vol OUT   =    6808.331
- Retained Vol  =        .000
                   ----------
  Unrouted Vol  =        .003 ac-ft   (.000% of Outflow Volume)

  WARNING: Inflow hydrograph truncated on right side.



 S/N: 021801A06A86   Parsons
 PondPack Ver: 7.0 (312)      Compute Time: 14:22:06     Date: 02-22-2001
```


Elevation Vs. Time for Alternative 3
424
423
422
421
420
419
Elev. (ft)
0
10
20
30
40
Time (hrs)


Inflow and Outflow Hydrographs for Alternative 3
8000
6000
4000
2000
0
Flow (cfs)
0
20
40
60
80
100
120
140
Time (hrs)
Currently Plotted Curves
100-Yr Inflow
100-Yr Outflow

Excavation Calculations

Type.... Vol: Elev-Area Page 1.01
Name.... NEWPOND

File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH3.PPW
Title... Alternative 3. Volume With Excavation to 419'

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
419.00	-----	348.5301	.0000	.000	.000
420.00	-----	349.7399	1047.4040	349.135	349.135
421.00	-----	350.9500	1051.0340	350.345	699.480
422.00	-----	352.1600	1054.6640	351.555	1051.034
423.00	-----	353.3701	1058.2950	352.765	1403.799
424.00	-----	354.5799	1061.9240	353.975	1757.774
425.00	-----	355.7899	1065.5540	355.185	2112.959

Type.... Vol: Elev-Area Page 1.01
Name.... POND

File.... K:\STLCOE\ESTL-IFC\PONDPACK\JBBRANCH3.PPW
Title... Alternative 3. Volume Without Excavation

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
419.00	-----	232.2401	.0000	.000	.000
420.00	-----	298.6400	794.2358	264.745	264.745
421.00	-----	326.5200	937.4290	312.476	577.222
422.00	-----	338.9899	998.2064	332.736	909.957
423.00	-----	346.6201	1028.3940	342.798	1252.755
424.00	-----	350.0500	1045.0010	348.334	1601.089
425.00	-----	355.7899	1058.7480	352.916	1954.005

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

DIFFERENCE = 1954 - 2113 = 159 AC-FT EXCAVATION

1857

SEDIMENT POND CALCULATIONS

Judy's/Burdick Site Sediment Pond Summary:

Assumptions:
1) Length basin greater than 2 x width basin for max efficiency.
2) No sediment is contributed by County Ditch, Area 13 or 15.
3) All sediment from Hwy. 157 reaches the pond.
4) The sediment basin has 70% trap efficiency.
5) Remaining 30% of sediment will be trapped by detention basin.
6) Sediment pond berms have 10' crown and 3:1 side slopes.
7) 3-year cleanout of sediment pond is target duration.

Dimensions:

	Pond Bottom Dimensions		Pond Top Dimensions		Sediment
J/B Branch	Length (ft)	Width (ft)	Length (ft)	Width (ft)	Pond depth (ft)
Alternative 1B	1600	525	1672	597	12
Alternative 2B	1900	900	1936	936	6
Alternative 3B	2600	1000	2624	1024	4*

* Excavated to 1' below detention pond bottom

Quantities:

J/B Branch	Cleanout Vol. (CY)	Berm Length* (ft)	Berm Height (ft)	Berm Footprint Area* (ac)	Berm Fill Req'd (ac-ft)	Add'l Excavation Required (CY)
Alternative 1B	72,273	2866	12	5.4	36.3	0
Alternative 2B	72,273	3808	6	4.0	14.7	0
Alternative 3B	72,273	4672	4	3.6	9.4	96,296

* Berm length and Berm footprint area exclude length along existing Cahokia Canal east levee.

Alternative 1B: Judy's/Burdick Sediment Pond Calculations

Given: 1. Existing Sediment Delivered to Hwy. 157 (from USDA-NRCS '99)

Judy's Branch =	27000	tons/yr	=	14.58 ac-ft/yr
Burdick Branch =	12500	tons/yr	=	6.75 ac-ft/yr
Avg. Specific Weight =	85	pcf	(estimate from COE)	
			TOTAL:	21.34 ac-ft/yr

2. Total Sediment Accummulation for Cleanout Frequency:
   3-year cleanout: Vol = **64.009** ac-ft

3. Average Annual inches of runoff (from ISWS)
   Runoff= 10.00 inches

4. Drainage Area
   DA = 7882 ac (HEC-1 subareas 88,89,13 and 15, plus planned detention area)

Compute: 1. Capacity of Basin:

Volume for Rectangular Sediment Basin:		
Bottom Length:	1600 ft	
Bottom Width:	525 ft	
Bottom Area:	19.3 ac-ft	
Depth:	12 ft	(Detention Pond depth = 15')
Top Length:	1672 ft	
Top Width:	597 ft	
Top Area:	22.9 ac	
Volume:	**252.9** ac-ft	

Capacity = 252.9 ac-ft

2. Annual Inflow:
   I = DA*Runoff/12
   I = 6568.3 ac-ft

3. Trap Efficiency of Basin:
   Goal = 70% Trap Efficiency
   70% Trap Efficiency = Capacity / Inflow ~.03
   Computed C/I = 0.038 ~.03

4. Cleanout Depth and Volume:

Volume for Rectangular Sediment Basin:		
Bottom Length:	1600 ft	
Bottom Width:	525 ft	
Bottom Area:	19.3 ac	
Depth:	2.29 ft =	27.5 inches
Top Length:	1614 ft	
Top Width:	538.7 ft	
Top Area:	20.0 ac	
Volume:	44.9 ac-ft	(Check vs. 3-yr target vol.)
Target Vol=70%	44.8 ac-ft	= 72273 CY

Depth = 2.29 feet
Volume: 72273 CY

5. Verify trap efficiency at end of cleanout period:

Volume for Rectangular Sediment Basin:	
Bottom Length:	1600 ft
Bottom Width:	525 ft
Bottom Area:	19.3 ac
Depth:	9.71 ft
Top Length:	1658 ft
Top Width:	583.3 ft
Top Area:	22.2 ac
Volume:	201.3 ac-ft

Trap Efficiency of Basin:

Goal = 70% Trap Efficiency
70% Trap Efficiency = Capacity / Inflow ~.03
Computed C/I = 0.031 ~.03

Alternative 2B: Judy's/Burdick Sediment Pond Calculations

Given: 1. Existing Sediment Delivered to Hwy. 157 (from USDA-NRCS '99)

Judy's Branch =	27000	tons/yr	=	14.58 ac-ft/yr
Burdick Branch =	12500	tons/yr	=	6.75 ac-ft/yr
Avg. Specific Weight =	85 pcf	(estimate from COE)		
			TOTAL:	21.34 ac-ft/yr

2. Total Sediment Accummulation for Cleanout Frequency:
3-year cleanout: Vol = **64.009** ac-ft

3. Average Annual inches of runoff (from ISWS)
Runoff= 10.00 inches

4. Drainage Area
DA = 7980 ac (HEC-1 subareas 88,89,13 and 15, plus planned detention area)

Compute: 1. Capacity of Basin:

Volume for Rectangular Sediment Basin:		
Bottom Length:	1900 ft	
Bottom Width:	900 ft	
Bottom Area:	39.3 ac	
Depth:	6 ft	(Detention Pond depth = 9')
Top Length:	1936 ft	
Top Width:	936 ft	
Top Area:	41.6 ac	
Volume:	**242.5** ac-ft	

Capacity = 242.5 ac-ft

2. Annual Inflow:
I = DA*Runoff/12
I = 6650.0 ac-ft

3. Trap Efficiency of Basin:
Goal = 70% Trap Efficiency
70% Trap Efficiency = Capacity / Inflow ~.03
Computed C/I = 0.036 ~.03

4. Cleanout Depth and Volume:

Volume for Rectangular Sediment Basin:		
Bottom Length:	1900 ft	
Bottom Width:	900 ft	
Bottom Area:	39.3 ac	
Depth:	1.14 ft =	13.7 inches
Top Length:	1907 ft	
Top Width:	906.8 ft	
Top Area:	39.7 ac	
Volume:	45 ac-ft	(Check vs. 3-yr target vol.)
Target Vol=70%	44.8 ac-ft	= 72273 CY

Depth = 1.14 feet
Volume: 72273 CY

5. Verify trap efficiency at end of cleanout period:

Volume for Rectangular Sediment Basin:	
Bottom Length:	1900 ft
Bottom Width:	900 ft
Bottom Area:	39.3 ac
Depth:	4.86 ft
Top Length:	1929 ft
Top Width:	929.2 ft
Top Area:	41.15 ac
Volume:	**195.4** ac-ft

Trap Efficiency of Basin:

Goal = 70% Trap Efficiency
70% Trap Efficiency = Capacity / Inflow ~.03
Computed C/I = 0.029 ~.03

Alternative 3B: Judy's/Burdick Sediment Pond Calculations

Given:

1. Existing Sediment Delivered to Hwy. 157 (from USDA-NRCS '99)

Judy's Branch =	27000	tons/yr	=	14.58 ac-ft/yr
Burdick Branch =	12500	tons/yr	=	6.75 ac-ft/yr
Avg. Specific Weight =	85 pcf	(estimate from COE)		
			TOTAL:	21.34 ac-ft/yr

2. Total Sediment Accummulation for Cleanout Frequency:
   3-year cleanout: Vol = **64.009** ac-ft

3. Average Annual inches of runoff (from ISWS)
   Runoff= 10.00 inches

4. Drainage Area
   DA = 8106 ac (HEC-1 subareas 88,89,13 and 15, plus planned detention area)

Compute: 1. Capacity of Basin:

Volume for Rectangular Sediment Basin:		
Bottom Length:	2600 ft	
Bottom Width:	1000 ft	
Bottom Area:	59.7 ac	
Depth:	4 ft	(Detention Pond depth = 6')
Top Length:	2624 ft	(Sed. Pond to 1' below bottom)
Top Width:	1024 ft	
Top Area:	61.7 ac	
Volume:	**242.7** ac-ft	

Capacity = 242.7 ac-ft

2. Annual Inflow:
   I = DA*Runoff/12
   I = 6755.0 ac-ft

3. Trap Efficiency of Basin:
   Goal = 70% Trap Efficiency
   70% Trap Efficiency = Capacity / Inflow ~.03
   Computed C/I = 0.036 ~.03

4. Cleanout Depth and Volume:

Volume for Rectangular Sediment Basin:		
Bottom Length:	2600 ft	
Bottom Width:	1000 ft	
Bottom Area:	59.7 ac	
Depth:	0.75 ft =	9.0 inches
Top Length:	2605 ft	
Top Width:	1005 ft	
Top Area:	60.1 ac	
Volume:	44.9 ac-ft	(Check vs. 3-yr target vol.)
Target Vol=70%	44.8 ac-ft	= 72273 CY

Depth = 0.75 feet
Volume: 72273 CY

5. Verify trap efficiency at end of cleanout period:

Volume for Rectangular Sediment Basin:	
Bottom Length:	2600 ft
Bottom Width:	1000 ft
Bottom Area:	59.7 ac
Depth:	3.25 ft
Top Length:	2620 ft
Top Width:	1020 ft
Top Area:	61.3 ac
Volume:	196.6 ac-ft

Trap Efficiency of Basin:

Goal = 70% Trap Efficiency
70% Trap Efficiency = Capacity / Inflow ~.03
Computed C/I = 0.029 ~.03

C.4.3 Brushy Lake Site

Summary of Engineering Calculations

Brushy Lake Site

East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project

Prepared for:
St. Louis District Army Corps of Engineers

Prepared by:
PARSONS
St. Louis, Missouri

May 2001

Brushy Lake Site

Description
Brushy Lake is one of the potential project sites of the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project for the St. Louis District Army Corps of Engineers (District). The Brushy Lake site is located between I-255 to the east, I-55 to the south, Cahokia Canal to the west and Schoolhouse Branch to the north. The engineering objectives for this site are to restore a flood pulse across Brushy Lake to increase the bio-diversity of the site, and provide sediment removal to improve water quality to Brushy Lake and Horseshoe Lake.

Hydrology
In order to determine the existing capacity of both Schoolhouse Branch and Brushy Lake, a preliminary hydrologic analysis was performed. Peak flows from the Schoolhouse Branch watershed to Highway 157 were computed using the HEC-1 base model for Schoolhouse Branch provided by the St. Louis District. This model provides an approximation of the overall runoff produced by the major contributing drainage basins of Schoolhouse Branch to the hydrologic point of interest at Highway 157. Flows and volumes computed with this model are considered preliminary in nature, and the conclusions reached will require verification during the design process. Peak flows and runoff volumes computed for the 2-, 5-, 10-, 25-, 50-, 100- and 500-year storm are listed in Table 1 below. The hydrograph for Schoolhouse Branch is included in the Appendix.

Table 1 Schoolhouse Branch Flows

Storm Frequency	Peak Flow (cfs)	Runoff Volume (ac-ft)
2-year	1,197	392
5-year	1,967	619
10-year	2,572	797
25-year	3,911	1,193
50-year	5,054	1,534
100-year	6,335	1,920
500-year	10,712	3,248

The most recent topographic information available for the site was in the form of aerial photomaps at 1"=200' scale, produced for the District in 1973. These predate the I-255 extension, which forms the eastern border of the Brushy Lake site. The inaccuracy and age of the data should be considered a significant deficiency, and results of this analysis are considered conceptual in nature.

The 410 NGVD contour was chosen for the ponding limits to provide a conservative estimate for the storage capacity of Brushy Lake. A planimeter was used to measure surface areas for the 408 and 410 NGVD contours on the topographic map, and the minimum pond elevation was determined to be at elevation 406.5 NGVD from the topographic map. The available storage volume for the habitat area was computed by entering the measured surface areas and elevations into the storage volume calculator in Haestad Methods' PondPack program, resulting in a capacity estimate of 936.6 acre-ft. The volume calculation is included in the Appendix.

Information about the outlet culverts that would drain Brushy Lake back into Cahokia Canal at the southwest edge of the site was not available. It was therefore impossible to perform a pond inflow/outflow analysis on Brushy Lake. However, the total incoming stormwater volume computed in the HEC-1 base model was approximately 1,920 ac-ft. Although this was significantly larger than the available storage in Brushy Lake, it was estimated that sufficient outflow could be attained by the combined outlets existing in Brushy Lake and if necessary through the existing Schoolhouse confluence with Cahokia Canal in order to keep the ponding elevation below the 410' contour.

Hydraulics

Schoolhouse Branch has previously been improved to a grass-lined channel from Highway 157 to Cahokia Canal. According to District personnel, Schoolhouse Branch has recently been cleaned out, but the data from this cleanout was not available. Existing conditions in Schoolhouse Branch were determined from channel profiles and typical cross-sections surveyed for the 1978 "Flood Control Studies Cahokia Canal & Tributaries". The surveyed slope was shown to be 0.00213 ft/ft, while the minimum channel cross-section was approximated as a triangular ditch with 2:1 horizontal to vertical (2H:1V) side slopes and an average flow depth of 12 feet. The channel was assumed to be grass-lined with regular maintenance. Using Haestad Methods' FlowMaster software, which utilizes Manning's equation to determine the normal depth of a channel for a given flow, the existing capacity of Schoolhouse Branch was computed to be approximately 2,018 cfs. By comparing this flow with the statistical storm peak flows listed in Table 1, the existing capacity was found to be less than a 10-year storm.

In order to improve Schoolhouse Branch to the design storm capacity, FlowMaster was utilized to approximate the required dimensions for various channel configurations. The flow depth was kept at 12 feet, and the longitudinal channel slope remained constant at 0.002 ft/ft. The improvements were assumed to begin just downstream of Highway 157 and continue approximately 6,650 feet to just west of the I-255 bridge, where the southern berm would be removed to allow the flow to enter Brushy Lake. All berms were assumed to extend at least one foot above the proposed water surface elevation in the channel, have a 10-foot wide minimum crown and 3H:1V grassed side slopes down to the existing ground on the land side of the channel.

The potential channel configurations analyzed included the standard grass-lined trapezoidal, concrete trapezoidal and concrete rectangular channels. Also, an option that combines the use of riprap side slopes with an earthen channel bottom, and a floodplain alternative with a pilot channel were included as more environmentally friendly alternatives to concrete lining. For all channel improvement alternatives, the design slope of 0.002 ft/ft was used, and a 12-foot flow depth was maintained. For the grass-lined trapezoidal channel, a 3H:1V side slope was used with a Manning's roughness coefficient (n-value) of 0.03. For the concrete and riprap sideslopes, a ratio of 2.5H:1V was used to size the channel. Concrete lining was evaluated with an n-value of 0.013, while riprap lining was evaluated with an n-value of 0.023. The riprap-earthen channel alternative included a 5-foot riprap toe at the bottom of the riprap slope for erosion protection, as directed by the District. For the first four configurations, the bottom width was adjusted until the capacity of 6,335 cfs was achieved.

The floodplain alternative consisted of a pilot channel with gently sloping sides leading to a short berm; that would provide a large wildlife corridor from the bluffs to Brushy Lake. The floodplain alternative was evaluated using a 15-foot bottom width for the grass-lined pilot channel, which was an average of the existing bottom width of Schoolhouse Branch. The pilot channel side slopes were set at 3H:1V and extended to the existing ground elevation, approximately 5 to 8 feet above the flow line. The berms, which would contain the remaining flow depth within the floodplain area, were moved outward from the pilot channel until the cross-section reached the design flood pulse capacity, maintaining a combined flow depth of 12 feet. This outer area was set at a slope of 0.002 ft/ft (500H:1V) in order to allow the floodplain to drain toward the pilot channel. The District directed that the outer area be given a Manning's roughness coefficient that represents wooded ground (n-value of 0.08) rather than prairie or other types of floodplain cover, because this would demonstrate the worst-case scenario of acreage required for a floodplain-type channel. Dimensions and characteristics of the various channel configurations for Schoolhouse Branch are shown in Table 2, and channel sizing calculations are included in the Appendix.

Table 2 Alternative Channel Improvement Configurations

Description of Channel Improvement	Bottom Width (ft)	Top Width (ft)	Side Slopes H:V	Depth (ft)
Grass-lined Trapezoidal	28	106	3:1	12
Concrete-lined Trapezoidal	3	68	2.5:1	12
Concrete Rectangular	30	30	Vertical	12
Riprap/Earthen Trapezoidal	22	87	2.5:1	12
Pilot Channel & Floodplain	15	186	3:1, 500:1	12

Note: Topwidth shown assumes 13' depth to top of berm

Bridge Structures
An analysis of the capacity of the Schoolhouse Branch channel through the Highway 157 bridge was performed in order to verify that the channel improvements did not need to extend upstream of the bridge. The existing bridge cross-section of Highway 157 was taken from the 1978 "Flood Control Studies, Cahokia Canal & Tributaries" survey of Schoolhouse Branch. Using FlowMaster, the channel cross-section was used with a slope of 0.002 ft/ft and the desired flow depth of 12 feet to compute a capacity of 7,112 cfs, which was greater than the 6,335 cfs. Therefore, the channel improvements were proposed to begin just downstream of Highway 157.

Three bridges span Schoolhouse Branch between Highway 157 and Brushy Lake; one bridge serves the minor roadway Black Lane while the other two are the dual bridges serving I-255. These bridges were evaluated to determine, whether they would require improvements to pass the design storm, or if the proposed Schoolhouse Branch channel improvements would be able pass through the design flood flows unimpeded. Results of all bridge analyses are shown in Table 3 on the following page.

The existing bridge cross-section of Black Lane was taken from the 1978 "Flood Control Studies, Cahokia Canal & Tributaries" survey of Schoolhouse Branch. The existing capacity of the channel through Black Lane was computed in FlowMaster as 3,146 cfs with 12 feet of flow depth.

This is significantly less than the desired design flood pulse capacity of Schoolhouse Branch, so bridge improvements will be necessary. The bridge has only 28 feet between its two piers; this opening is not large enough for even the narrowest channel improvement alternative (a 30-foot wide concrete rectangular channel). Other channel configurations would jeopardize the structural integrity of the existing piers, so it was determined that the Black Lane bridge would need to be replaced. Either a concrete trapezoidal or concrete rectangular channel was recommended for the channel improvement through the bridge section, in order to minimize topwidth and erosion.

The existing I-255 bridge cross-section was taken from the Illinois Department of Transportation "Plans for F.A.I. Route 255, Section 60-8BHVB" of 1985. It was determined that the depth from top of bank to flowline at this bridge was only 10 feet, and while additional depth is available above the bank, it interferes with the pier on one side and might encroach on the railroad right-of-way on the other side. It was decided an improved channel should be constructed through the bridge openings, approximately 300 feet long. The concrete rectangular channel alternative was selected for this reach because it required the least area, with a topwidth of 30 feet.

Calculations for all bridge capacity analyses are included in the Appendix.

Table 3 Bridge Analysis Results

Bridge Name	Existing Capacity	Proposed Action
Highway 157 Bridge	7,112 cfs, flow depth = 12'	No Action
Black Lane Bridge	3,146 cfs, flow depth = 12'	Replace bridge, Improve Channel
I-255 Dual Bridges	6,688 cfs, flow depth = 10'	Improve Channel

Sediment Control

One of the goals for Brushy Lake was to release cleaner water into Cahokia Canal and Horseshoe Lake; this could be achieved by allowing the flow from Schoolhouse Branch to pass through a sediment basin in Brushy Lake before continuing to flow overland to the outlets. The sediment load assumed to reach Schoolhouse Branch at Highway 157 was 26,500 tons/year, as provided by the District. The average specific weight of the sediment was taken as 85 pcf, a value also provided by the District. The value of the average annual inches of runoff was assumed to be 10.0 inches, a figure provided by Illinois State Water Survey.

The location of the sediment basin was chosen as the northeast corner of the Brushy Lake site, where the Schoolhouse Branch flow would enter it directly after passing under the I-255 bridge. Constraints on the sizing of the basin included achieving a seventy percent trap efficiency for the length of the cleanout period, which was set at three years, and keeping the length of the basin approximately twice as long as the width of the basin to optimize settling time. The cleanout period was chosen by the District as representative of realistic maintenance schedules from past experience. The resulting sediment basin had dimensions of 1,700 feet by 850 feet, a depth of five feet, and required approximately 48,487 CY to be excavated every three years. Complete sediment basin calculations are included in the Appendix.

It was decided by the St. Louis District that two alternatives would be proposed for the Brushy Lake site. Since sediment basins are also being sized for sites in the tributary streams, it might not be necessary to construct the sediment basin in Brushy Lake. One alternative would assume tributary stream sediment basins would reduce sediment in Schoolhouse Branch, while the other alternative would assume that the sediment load from the uplands would reach Brushy Lake.

Alternative 1

Alternative 1 was formulated on the assumption that there would be tributary stream sediment detention basins to control sediment, rather than requiring the sediment basin in Brushy Lake. The engineering aspects of this alternative include the following features: channel improvements for Schoolhouse Branch from Highway 157 to Brushy Lake, removal of southern berm of Schoolhouse Branch within Brushy Lake, and replacement of the Black Lane bridge over Schoolhouse Branch. Preliminary evaluation indicates that Alternative 1 could be further developed to achieve the goals of restoring a flood pulse across Brushy Lake.

Alternative 2

The engineering aspects of Alternative 2 are identical to Alternative 1 with the exception that it assumes no tributary stream sediment detention basins and incorporated the sediment basin into the conceptual plan for Brushy Lake on the floodplain in advance of the habitat area. Preliminary evaluation indicates that this alternative could be further developed to achieve the goals, restoring a flood pulse across Brushy Lake, and improving water quality to Brushy Lake and Horseshoe Lake.

Cost Features

A summary of major engineering cost features is included in Table 4. It should be noted that this is not intended to be an all-inclusive list, but only includes features requested by the St. Louis District. The District has computed additional cost features that would be combined with those listed in Table 4. Also, since no detailed hydrologic or hydraulic models were created for this analysis, it is possible that other major cost features might be required when a design analysis is performed.

Table 4 Engineering Cost Features

Alternative 1	
Features:	**Quantity**
Real Estate for Brushy Lake Ponding Area	472.1 acres
Real Estate for Brushy Lake Sheet Flow Area	237.6 acres
Concrete Rectangular Channel through I-255	BW=30', 13' deep, L=300'
Choose Channel Improvement Below	L=6326'
Choose Black Lane Bridge Improvement Below	L=24'

Table 4 - Continued

Alternative 2	
Additional Features:	**Quantity**
Detention Berm	3940 ft x 5' high
Silt Cleanout / 3 years	48,487 CY

Note: Alternative 2 includes all features listed for Alternative 1

Channel Improvement Alternatives:	**Quantity**
Concrete Trapedoidal Channel	BW=3', 2.5H:1V SS, 13' deep
Concrete Rectangular Channel	BW=30', 13' deep
Grass Trapezoidal Channel	BW=28', 3H:1V SS, 13' deep
Rip Rap with Earth Bottom Channel	BW=22', 2.5H:1V SS, 13' deep
Floodplain Channel with Pilot Channel	Floodplain Width=186'

Black Ln. Bridge Improvement Alternatives:	**Quantity**
Concrete Trapezoidal Opening	BW=3', 2.5H:1V SS, 13' deep
Concrete Rectangular Opening	BW=30', 13' deep

Note: Quantities for greenway areas, plantings, and tributary stream sediment detention basins data not included.

APPENDIX

SUPPORTING CALCULATIONS FOR BRUSHY LAKE

HEC-1 Base Model for Schoolhouse Branch
- HEC-1 Model Output
- Schoolhouse Branch 100-Year Hydrograph

Typical Schoolhouse Branch Cross-Section Capacity Calculation

Brushy Lake Storage Volume Calculation

Schoolhouse Branch Profile

Sizing of Channel Improvement Alternatives for Schoolhouse Branch
- Grass-Lined Trapezoidal Channel Alternative
- Concrete-Lined Trapezoidal Channel Alternative
- Concrete Rectangular Channel Alternative
- Riprap/Earthen Channel Alternative
- Floodplain with Pilot Channel Alternative

Existing Bridge Section Capacity Calculations
- Highway 157 Bridge
- Black Lane Bridge
- I-255 Bridges

Sediment Pond Summary and Calculations

HEC-1 Model Output

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*             JUN   1998                *                                                 *  HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                 *                                                 *        609 SECOND STREET            *
*                                       *                                                 *     DAVIS, CALIFORNIA 95616         *
* RUN DATE   08MAY01  TIME  09:36:46    *                                                 *         (916) 756-1104              *
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X       X  X         X     X        XX
X       X  X         X               X
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X       X  X         X     X         X
X       X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
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1                                              HEC-1 INPUT                                                   PAGE  1

     LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1        ID        SCHOOLHOUSE BRANCH - CAHOKIA CANAL WATERSHED
        2        ID        HEC-1 FLOOD HYDROGRAPH CALCULATED AT IL. HIGHWAY 157
        3        ID        1989 BULLETIN 70 RAINFALL WITH 15% ADJUSTMENT FOR ST. LOUIS ANOMALY
        4        ID        MULTI-RATIO:10-YR BASE FLOOD (1.0) /2-YR/5-YR/25-YR/50-YR/100-YR/500-YR
        5        ID        RAINFALL   :10-YR BASE FLOOD (5.47)/3.77/4.75/ 6.92/ 8.13/ 9.44 /13.80
        6        IT      10                        290
        7        IO       3
        8        JR    PREC     .69     .87    1.00    1.27    1.49    1.73    2.52

        9        KK       1  SCHOOLHOUSE BRANCH AT IL. HIGHWAY 157
       10        BA    7.21
       11        BP     5.0    -.03    1.43
                 *  BASED ON ISWS BULLETIN 70 -PROB=10.0% -- INTERVAL= 10MIN -- DURATION= 24HR
       12        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       13        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       14        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       15        PI    .008    .008    .008    .008    .008    .008    .018    .018    .018    .018
       16        PI    .018    .018    .018    .018    .018    .018    .018    .018    .018    .018
       17        PI    .018    .018    .018    .018    .029    .029    .029    .029    .029    .029
       18        PI    .029    .029    .029    .055    .056    .056    .080    .081    .081    .178
       19        PI    .183    .397    .894    .310    .181    .082    .081    .080    .056    .056
       20        PI    .056    .029    .029    .029    .029    .029    .029    .029    .029    .029
       21        PI    .018    .018    .018    .018    .018    .018    .018    .018    .018    .018
       22        PI    .018    .018    .018    .018    .018    .018    .018    .018    .008    .008
       23        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       24        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       25        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       26        PI    .008    .008    .008    .008
       27        LS       0    72.8
       28        UD    1.56
       29        ZZ
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*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                 *  U.S. ARMY CORPS OF ENGINEERS       *
*             JUN   1998                *                                                 *  HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                 *                                                 *        609 SECOND STREET            *
*                                       *                                                 *     DAVIS, CALIFORNIA 95616         *
* RUN DATE   08MAY01  TIME  09:36:46    *                                                 *         (916) 756-1104              *
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SCHOOLHOUSE BRANCH - CAHOKIA CANAL WATERSHED
HEC-1 FLOOD HYDROGRAPH CALCULATED AT IL. HIGHWAY 157
1989 BULLETIN 70 RAINFALL WITH 15% ADJUSTMENT FOR ST. LOUIS ANOMALY
MULTI-RATIO:10-YR BASE FLOOD (1.0) /2-YR/5-YR/25-YR/50-YR/100-YR/500-YR
RAINFALL   :10-YR BASE FLOOD (5.47)/3.77/4.75/ 6.92/ 8.13/ 9.44 /13.80
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  7 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

   IT           HYDROGRAPH TIME DATA
                       NMIN          10  MINUTES IN COMPUTATION INTERVAL
                      IDATE     1     0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         290  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     3     0  ENDING DATE
                     NDTIME        0010  ENDING TIME
                      ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL      .17 HOURS
                     TOTAL TIME BASE    48.17 HOURS

      ENGLISH UNITS
           DRAINAGE AREA           SQUARE MILES
           PRECIPITATION DEPTH     INCHES
           LENGTH, ELEVATION       FEET
           FLOW                    CUBIC FEET PER SECOND
           STORAGE VOLUME          ACRE-FEET
           SURFACE AREA            ACRES
           TEMPERATURE             DEGREES FAHRENHEIT

   JP           MULTI-PLAN OPTION
                      NPLAN           1  NUMBER OF PLANS

   JR           MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                      .69        .87       1.00       1.27       1.49       1.73       2.52

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

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            *            *
  9 KK      *      1     *       SCHOOLHOUSE BRANCH AT IL. HIGHWAY 157
            *            *
            **************

                SUBBASIN RUNOFF DATA

 10 BA          SUBBASIN CHARACTERISTICS
                      TAREA        7.21  SUBBASIN AREA

 11 BF          BASE FLOW CHARACTERISTICS
                      STRTQ        5.00  INITIAL FLOW
                      QRCSN        -.03  BEGIN BASE FLOW RECESSION
                      RTIOR     1.43000  RECESSION CONSTANT

                PRECIPITATION DATA

 10 PB                STORM        4.71  BASIN TOTAL PRECIPITATION

 10 PI            INCREMENTAL PRECIPITATION PATTERN
                      .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                      .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                      .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                      .01        .01        .01        .01        .01        .01        .02        .02        .02        .02
                      .02        .02        .02        .02        .02        .02        .02        .02        .02        .02
                      .02        .02        .02        .02        .03        .03        .03        .03        .03        .03
                      .03        .03        .03        .06        .06        .06        .08        .08        .08        .18
                      .18        .40        .89        .31        .18        .08        .08        .08        .06        .06
                      .06        .03        .03        .03        .03        .03        .03        .03        .03        .03
                      .02        .02        .02        .02        .02        .02        .02        .02        .02        .02
                      .02        .02        .02        .02        .02        .02        .02        .02        .01        .01
                      .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                      .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                      .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                      .01        .01        .01        .01

 27 LS          SCS LOSS RATE
                      STRTL         .75  INITIAL ABSTRACTION
                     CRVNBR       72.80  CURVE NUMBER
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

 28 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        1.56  LAG

                                                     ***

                                                UNIT HYDROGRAPH
                                            49 END-OF-PERIOD ORDINATES
             66.       217.       414.       676.      1025.      1428.      1761.      1986.      2101.      2117.
           2079.      1946.      1792.      1611.      1387.      1139.       939.       794.       671.       572.
            493.       419.       354.       297.       254.       215.       183.       154.       130.       110.
             94.        79.        68.        57.        49.        41.        35.        30.        25.        22.
```

19.	17.	14.	12.	9.	7.	5.	3.	1.

TOTAL RAINFALL = 4.71, TOTAL LOSS = 2.67, TOTAL EXCESS = 2.04

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	48.17-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2572.	13.83		1276.	401.	200.	200.
		(INCHES)	1.645	2.067	2.072	2.072
		(AC-FT)	633.	795.	797.	797.

CUMULATIVE AREA = 7.21 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 1
FOR PLAN 1, RATIO = .69

TOTAL RAINFALL = 3.25, TOTAL LOSS = 2.25, TOTAL EXCESS = 1.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	48.17-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1197.	13.83		615.	197.	99.	99.
		(INCHES)	.793	1.017	1.020	1.020
		(AC-FT)	305.	391.	392.	392.

CUMULATIVE AREA = 7.21 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 1
FOR PLAN 1, RATIO = .87

TOTAL RAINFALL = 4.10, TOTAL LOSS = 2.51, TOTAL EXCESS = 1.58

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	48.17-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1967.	13.83		985.	311.	155.	155.
		(INCHES)	1.270	1.605	1.609	1.609
		(AC-FT)	488.	617.	619.	619.

CUMULATIVE AREA = 7.21 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 1
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 4.71, TOTAL LOSS = 2.67, TOTAL EXCESS = 2.04

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	48.17-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2572.	13.83		1276.	401.	200.	200.
		(INCHES)	1.645	2.067	2.072	2.072
		(AC-FT)	633.	795.	797.	797.

CUMULATIVE AREA = 7.21 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 1
FOR PLAN 1, RATIO = 1.27

TOTAL RAINFALL = 5.98, TOTAL LOSS = 2.93, TOTAL EXCESS = 3.05

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	48.17-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3911.	13.83		1919.	600.	300.	300.
		(INCHES)	2.474	3.094	3.101	3.101
		(AC-FT)	952.	1190.	1193.	1193.

CUMULATIVE AREA = 7.21 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 1
FOR PLAN 1, RATIO = 1.49

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    TOTAL RAINFALL =    7.02, TOTAL LOSS =    3.09, TOTAL EXCESS =    3.93

  PEAK FLOW     TIME                               MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR     48.17-HR
+   (CFS)       (HR)
                            (CFS)
+    5054.     13.83                   2470.        772.        385.        385.
                          (INCHES)     3.185       3.980       3.989       3.989
                           (AC-FT)     1225.       1530.       1534.       1534.

                          CUMULATIVE AREA =    7.21 SQ MI


      ***            ***            ***            ***            ***

                           HYDROGRAPH AT STATION        1
                             FOR PLAN 1, RATIO = 1.73

    TOTAL RAINFALL =    8.15, TOTAL LOSS =    3.23, TOTAL EXCESS =    4.92

  PEAK FLOW     TIME                               MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR     48.17-HR
+   (CFS)       (HR)
                            (CFS)
+    6335.     13.83                   3087.        965.        482.        482.
                          (INCHES)     3.981       4.979       4.992       4.992
                           (AC-FT)     1531.       1915.       1920.       1920.

                          CUMULATIVE AREA =    7.21 SQ MI

      ***            ***            ***            ***            ***

                           HYDROGRAPH AT STATION        1
                             FOR PLAN 1, RATIO = 2.52

    TOTAL RAINFALL =   11.87, TOTAL LOSS =    3.54, TOTAL EXCESS =    8.32

  PEAK FLOW     TIME                               MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR     48.17-HR
+   (CFS)       (HR)
                            (CFS)
+   10712.     13.67                   5183.       1632.        816.        816.
                          (INCHES)     6.684       8.419       8.447       8.447
                           (AC-FT)     2570.       3237.       3248.       3248.

                          CUMULATIVE AREA =    7.21 SQ MI

1

              PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                             FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                            TIME TO PEAK IN HOURS


                                                               RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION      AREA    PLAN             RATIO 1  RATIO 2  RATIO 3  RATIO 4  RATIO 5  RATIO 6  RATIO 7
                                                           .69      .87     1.00     1.27     1.49     1.73     2.52

 HYDROGRAPH AT
+                      1      7.21      1   FLOW       1197.    1967.    2572.    3911.    5054.    6335.   10712.
                                            TIME       13.83    13.83    13.83    13.83    13.83    13.83    13.67

 *** NORMAL END OF HEC-1 ***
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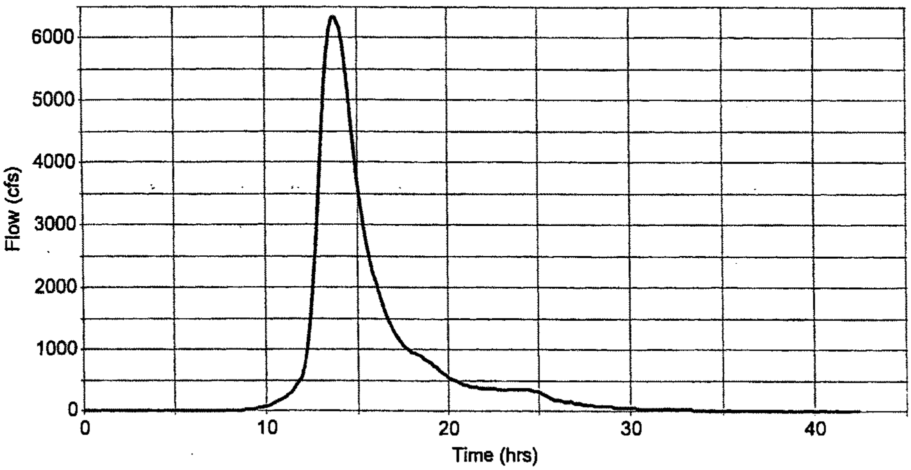
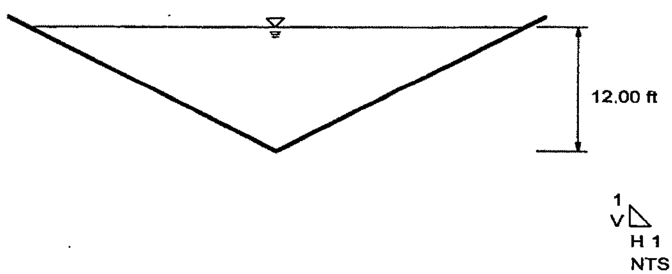
Schoolhouse Branch 100-Year Hydrograph



Typical Schoolhouse Cross-Section
Cross Section for Triangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\brushy lake\schoolho.fm2
Worksheet	Existing Section D-3
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Mannings Coefficient	0.030	
Channel Slope	0.002130	ft/ft
Depth	12.00	ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Discharge	2,018.00	cfs



Brushy Lake Storage Volume Calculation

Type.... Vol: Elev-Area Page 1.01
Name.... BRUSHY LAKE

File.... K:\STLCOE\ESTL-IFC\PONDPACK\BRUSHYLAKE.PPW
Title... Existing Contours

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
406.50	-----	.0000	.0000	.000	.000
408.00	-----	313.2899	313.2899	156.645	156.645
410.00	-----	472.0599	1169.9170	779.945	936.590

POND VOLUME EQUATIONS

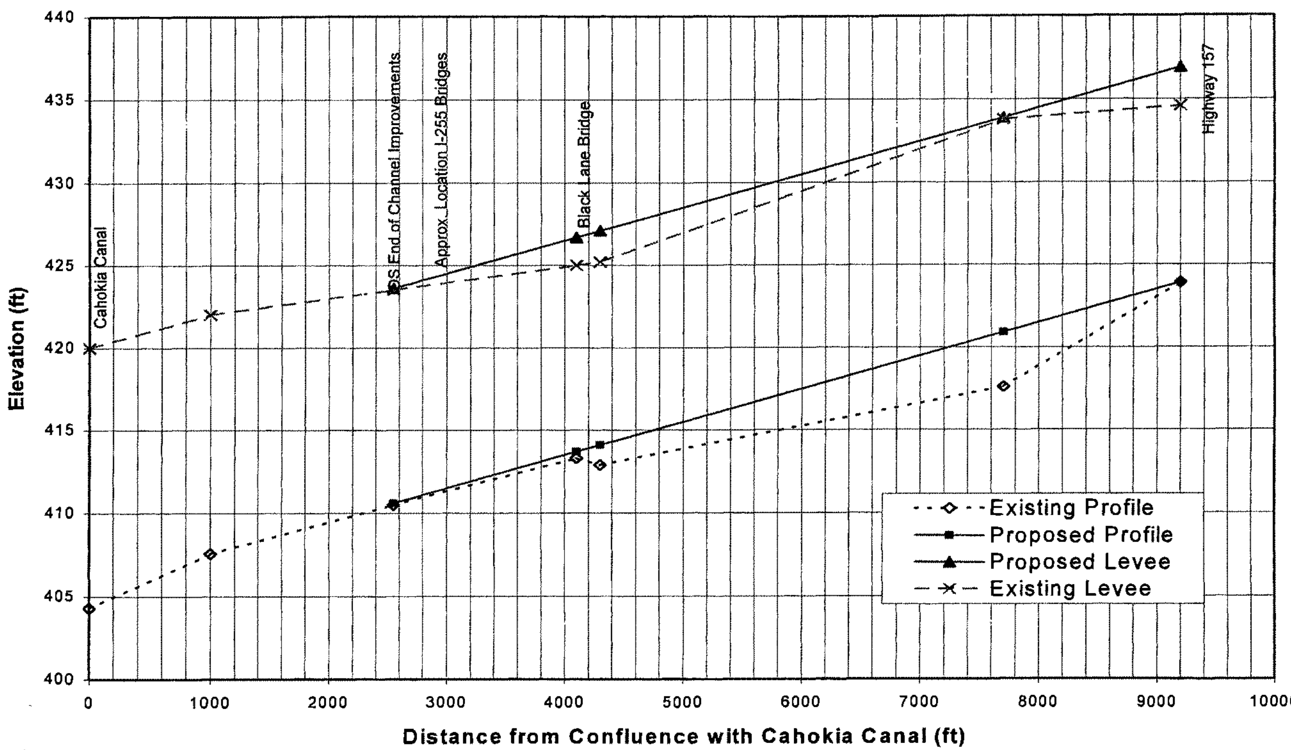
* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 14:36:42 Date: 01-31-2001

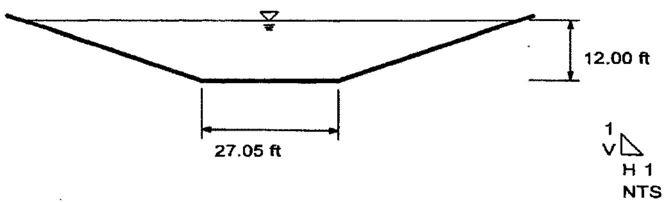
Schoolhouse Branch Profile



Grass-Lined Trapezoidal Channel
Cross Section for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\brushy lake\schoolho.fm2
Worksheet	Grass-lined trap
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

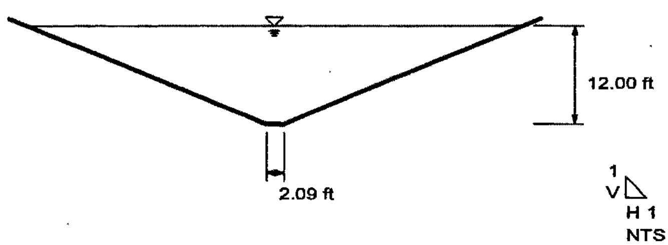
Section Data		
Mannings Coefficient	0.030	
Channel Slope	0.002000	ft/ft
Depth	12.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	27.05	ft
Discharge	6,335.00	cfs



Concrete Trapezoidal Channel
Cross Section for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\brushy lake\schoolho.fm2
Worksheet	Concrete trap
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

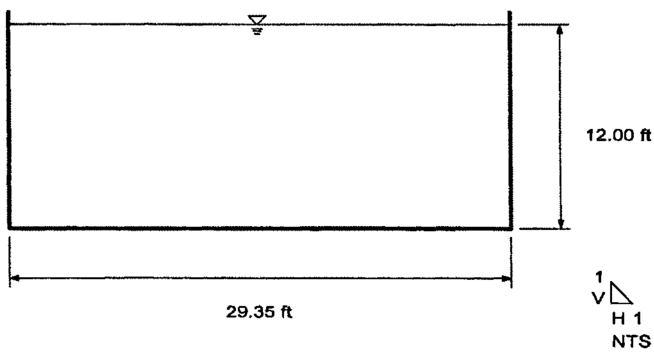
Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.002000	ft/ft
Depth	12.00	ft
Left Side Slope	2.500000	H : V
Right Side Slope	2.500000	H : V
Bottom Width	2.09	ft
Discharge	6,335.00	cfs



Concrete Rectangular Channel
Cross Section for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\brushy lake\schoolho.fm2
Worksheet	Concrete Rectangular
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Bottom Width

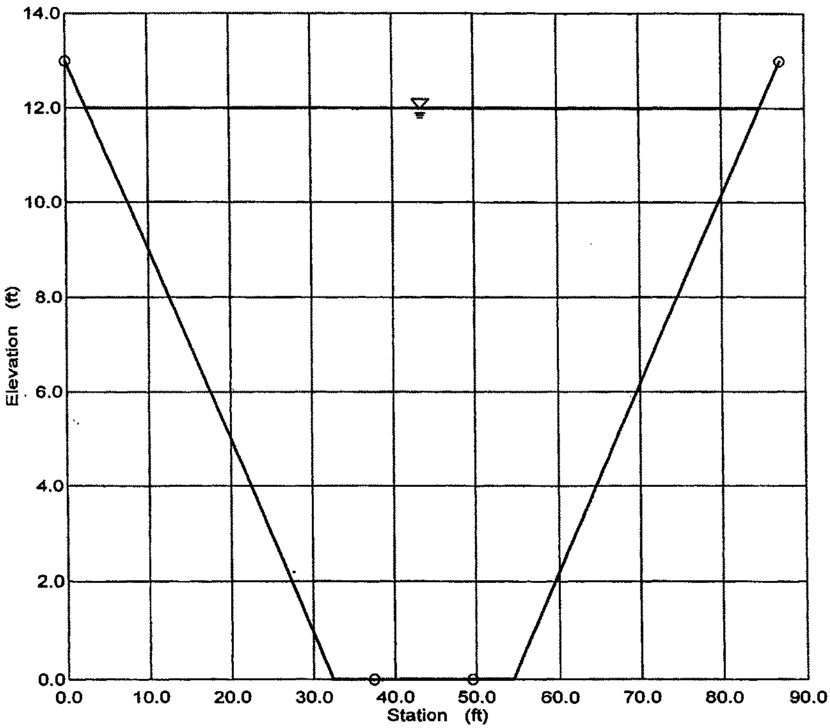
Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.002000	ft/ft
Depth	12.00	ft
Bottom Width	29.35	ft
Discharge	6,335.00	cfs



Riprap/Earthen Channel
Cross Section for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\brushy lake\schoolho.fm2
Worksheet	riprap/earthen
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

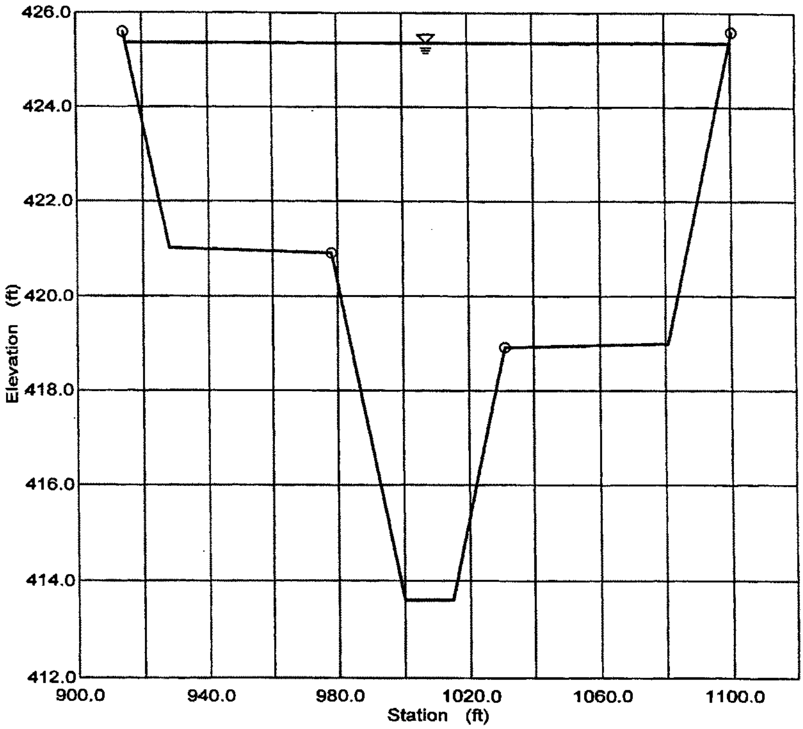
Section Data		
Wtd. Mannings Coefficient	0.024	
Channel Slope	0.002000	ft/ft
Water Surface Elevation	12.00	ft
Discharge	6,468.55	cfs



Floodplain with Pilot Channel
Cross Section for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\brushy lake\schoolho.fm2
Worksheet	Floodplain100yr
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

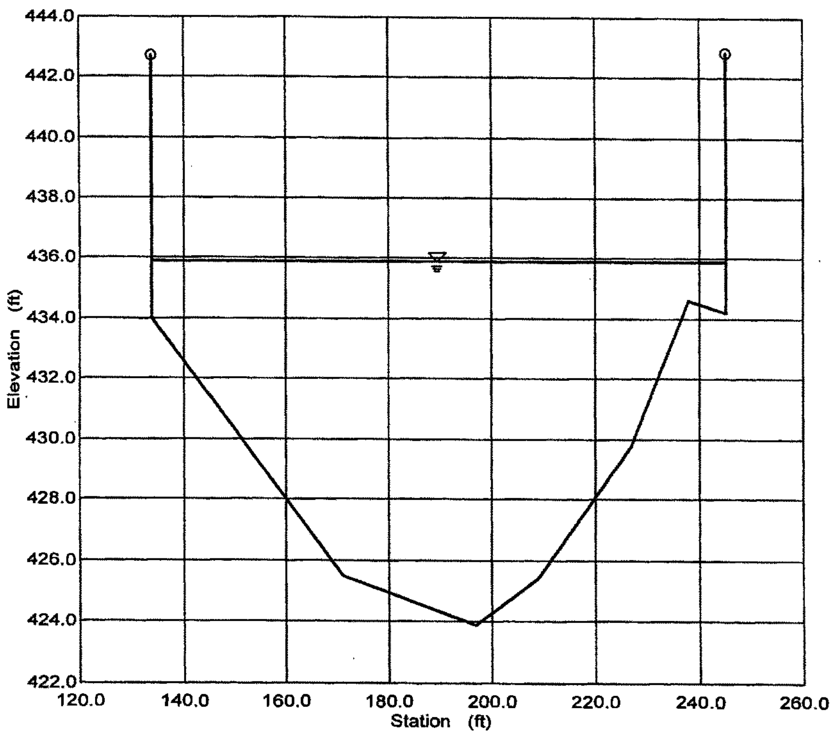
Section Data		
Wtd. Mannings Coefficient	0.039	
Channel Slope	0.002000	ft/ft
Water Surface Elevation	425.37	ft
Discharge	6,335.00	cfs



Schoolhouse Branch at Hwy. 157
Cross Section for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\brushy lake\hwy.fm2
Worksheet	Hwy. 157
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

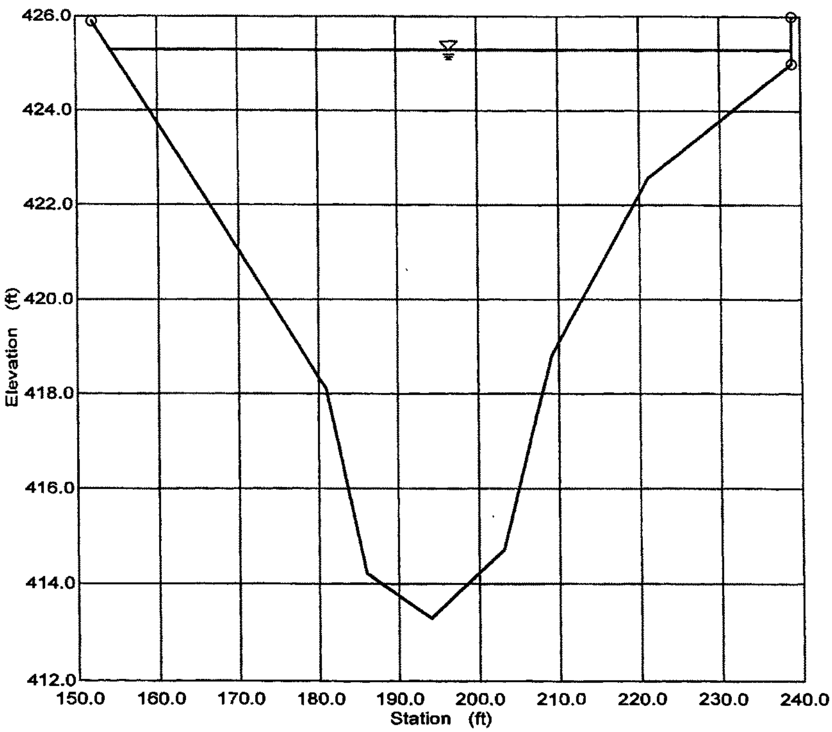
Section Data		
Wtd. Mannings Coefficient	0.030	
Channel Slope	0.002000	ft/ft
Water Surface Elevation	435.90	ft
Discharge	7,112.81	cfs



Schoolhouse Branch at Black Ln. Bridge
Cross Section for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\brushy lake\hwy.fm2
Worksheet	Black Lane
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

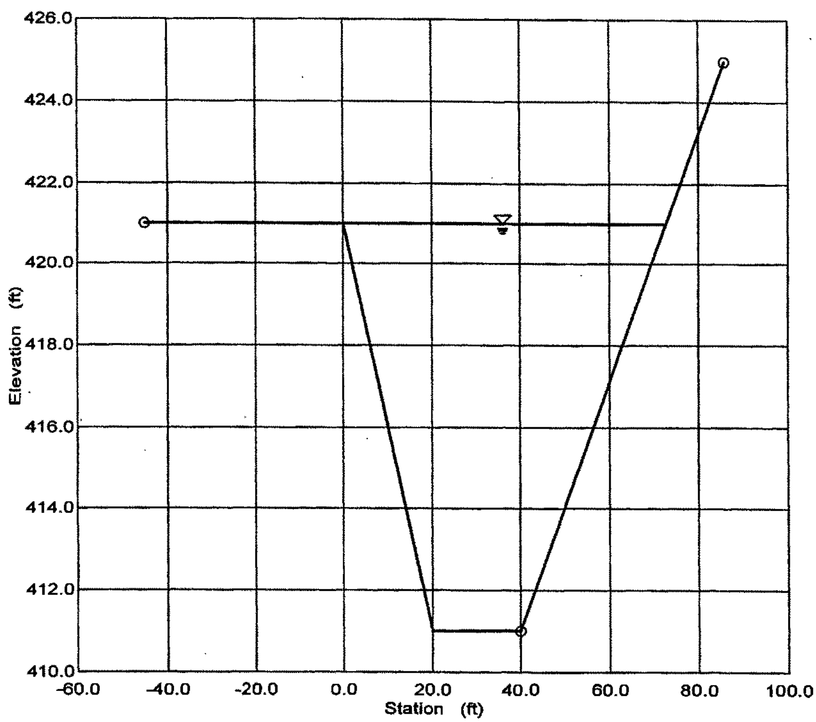
Section Data		
Wtd. Mannings Coefficient	0.030	
Channel Slope	0.002000	ft/ft
Water Surface Elevation	425.30	ft
Discharge	3,146.45	cfs



Schoolhouse Branch at I-255
Cross Section for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\brushy lake\hwy.fm2
Worksheet	I-255 Bridges
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.015	
Channel Slope	0.002000	ft/ft
Water Surface Elevation	421.00	ft
Discharge	6,688.47	cfs



1889

SEDIMENT POND CALCULATIONS

Brushy Lake Sediment Pond Summary:

Assumptions:
1) Length of basin greater than 2 x width of basin for max efficiency.
2) No sediment or runoff is contributed by Snyder Ditch.
3) All sediment from Hwy. 157 reaches the pond.
4) The sediment basin has 70% trap efficiency.
5) Remaining 30% of sediment is trapped by detention basin.
6) Sediment pond berms have 10' wide crown and 3:1 side slopes.
7) 3-year cleanout of sediment pond is target duration.

Dimensions:

Pond Bottom Dimensions		Pond Top Dimensions		Sediment
Length (ft)	Width (ft)	Length (ft)	Width (ft)	Pond depth (ft)
1700	850	1730	880	5

Quantities:

Cleanout Vol. (CY)	Berm Length* (ft)	Berm Height (ft)	Berm Footprint Area* (ac)	Berm Fill Req'd (ac-ft)
48,487	3490	5	3.2	10.0

* Note: Berm length and Berm footprint area exclude length along existing Schoolhouse Branch north levee.

See Brushy Lake Sediment Pond Calculations, following page

Brushy Lake Sediment Pond Calculations

Given: 1. Existing Sediment Delivered to Hwy. 157 (from USDA-NRCS '99)
Schoolhouse Branch = 26500 tons/yr = 14.31 ac-ft/yr
Avg. Specific Weight = 85 pcf (estimate from COE)
TOTAL: 14.31 ac-ft/yr

2. Total Sediment Accummulation for Cleanout Frequency:
3-year cleanout: Vol = **42.94** ac-ft

3. Average Annual inches of runoff (from ISWS)
Runoff= 10.00 inches

4. Drainage Area
DA = 5488 ac (HEC-1 subareas 99,21, and 22)

Compute: 1. Capacity of Basin:

Volume for Rectangular Sediment Basin:	
Bottom Length:	1700 ft
Bottom Width:	850 ft
Bottom Area:	33.17 ac
Depth:	5 ft
Top Length:	1730 ft
Top Width:	880 ft
Top Area:	34.95 ac
Volume:	**170.3** ac-ft

Capacity = 170.3 ac-ft

2. Annual Inflow:
I = DA * Runoff / 12
I = 4573 ac-ft

3. Trap Efficiency of Basin:
Goal = 70% Trap Efficiency
70% Trap Efficiency =Capacity / Inflow ~.03
Computed C/I = 0.037 ~.03

4. Cleanout Depth and Volume:

Volume for Rectangular Sediment Basin:			
Bottom Length:	1700 ft		
Bottom Width:	850 ft		
Bottom Area:	33.17 ac		
Depth:	0.91 ft =	10.9 inches	
Top Length:	1705 ft		
Top Width:	855.5 ft		
Top Area:	33.49 ac		
Volume:	30.33 ac-ft	(Check vs. 3-yr target vol.)	
Target Vol=70%	30.06 ac-ft	=	48487 CY

Depth = 0.91 feet
Volume: 48487 CY

5. Verify trap efficiency at end of cleanout period:

Volume for Rectangular Sediment Basin:	
Bottom Length:	1600 ft
Bottom Width:	850 ft
Bottom Area:	31.22 ac
Depth:	4.09 ft
Top Length:	1625 ft
Top Width:	874.5 ft
Top Area:	32.62 ac
Volume:	130.5 ac-ft

Trap Efficiency of Basin:

Goal = 70% Trap Efficiency
70% Trap Efficiency =Capacity / Inflow ~.03
Computed C/I = 0.029 ~.03

C.4.4 Spring Lake Site

Summary of Engineering Calculations

Spring Lake Site
Including St. Clair Farms and Indian Lake

East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project

Prepared for:
St. Louis District Army Corps of Engineers

Prepared by:
PARSONS
St. Louis, Missouri

May 2001

Spring Lake Site

Description
The Spring Lake, St. Clair Farms and Indian Lake sites were considered together for this potential project layout for the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project for the St. Louis District Army Corps of Engineers. Spring Lake is located between Forest Boulevard to the north, Bunkum Road to the south, Alton & Southern railroad to the west and I-255 to the east. The Spring Lake site includes an existing sand plant located in the southeast corner and an area of federal buyout property in the northwest corner. Harding Ditch currently passes through the center of this area, which is referred to as Spring Lake 1. An additional area north of Forest Boulevard is considered part of the Spring Lake area because it is currently connected to Spring Lake via pipes under Forest Boulevard; this area is referred to as Spring Lake 2. The St. Clair Farms site is located just downstream along Harding Ditch, bounded by the I-64/I-255 interchange and St. Clair Avenue; it also includes federal buyout property. Indian Lake is located farther west, just south of the Cahokia Canal. Interstate Highway 55/70 borders it to the northwest, by existing high ground along Collinsville Road to the southeast, Lansdowne Ditch on the west, and Illinois Highway 111 on the east. A remnant of Cahokia Creek meanders through Indian Lake, and part of an existing berm divides the site into two storage cells that remain hydraulically connected.

The engineering objectives for this site are to restore a flood pulse across Spring Lake to increase the bio-diversity of the site, and provide sediment removal to improve water quality. An additional objective was to alleviate potential flooding in the Cities of East St. Louis and Washington Park, just west of Spring Lake, by preventing possible overflow from Harding Ditch into Spring Lake from entering Lansdowne Ditch. This would serve to maximize the capacity in Lansdowne Ditch that would be available to accommodate local stormwater runoff. Combinations of channel improvements and/or new channels were evaluated to achieve these objectives.

Hydrology
Harding Ditch is a man-made channel, which begins at the CSX railroad bridge downstream of Illinois Highway 157 and is the continuation of Little Canteen Creek as it comes off the bluffs at Caseyville. A HEC-1 base model for the Little Canteen Creek/Harding Ditch watershed was provided by the District. Throughout the remainder of this report, the name Harding Ditch will be used to designate the channel downstream from Illinois Highway 157. The base model was used to compute the approximate runoff produced by the major contributing drainage areas from the bluffs to the confluence of Harding Ditch with Schoenberger Creek just downstream of the St. Clair Farms site. A hydrologic point is located at Highway 157 for computation of the full runoff to Harding Ditch at that location. Downstream of this point, the capacity of Harding Ditch was estimated as 2,300 cfs. The overflow from Harding Ditch was represented in the base model by a diversion that removed all flows exceeding 2,300 cfs from the existing channel upstream of the confluence with Schoenberger Creek. The contributing drainage area at this hydrologic point is approximately 7.95 square miles. The base model HEC-1 input and output for Harding Ditch are included in the Appendix.

A HEC-1 base model for the Canteen Creek watershed was also provided by the District. It was used to compute the approximate runoff produced by the major contributing drainage areas in the Cahokia Canal watershed, from the bluffs to the pump station at the Mississippi River. Several revisions were made to this base model in order to use it for the Spring Lake analysis. For the HEC-1 base model, the capacity of Canteen Creek downstream of Highway 157 had been estimated as 2,100 cfs; the overflow from Canteen Creek was represented in the base model by a diversion that removed all flows exceeding 2,100 cfs from the existing channel. According to the District, the existing capacity in this reach has been improved to approximately 3,300 cfs; therefore, the diversion in the base model was revised to represent this increased capacity by removing all flows exceeding 3,300 cfs from the channel. Precipitation data copied from another model of Cahokia Canal provided by the District was added to the model in order to compute a full range of storm frequencies. The revised base model HEC-1 input and output for Canteen Creek are included in the Appendix.

Peak flows and volumes computed for the 2-, 5-, 10-, 25-, 50-, 100- and 500-year storms for both Harding Ditch at Highway 157 and the Canteen Creek overflow downstream of Highway 157, are listed in Table 1. Peak flows and volumes computed with these models are considered preliminary in nature, and the conclusions reached will require verification during the design process.

Table 1 HEC-1 Peak Flows and Volumes

Storm Frequency	Harding Ditch at Hwy. 157		Canteen Creek Overflow at Hwy. 157	
	Peak Flow (cfs)	**Runoff Volume (ac-ft)**	**Peak Flow (cfs)**	**Runoff Volume (ac-ft)**
2-year	1,550	493	0	0
5-year	2,481	759	0	0
10-year	3,210	966	961	174
25-year	4,646	1,404	2,660	697
50-year	5,987	1,793	4,434	1,380
100-year	7,465	2,230	6,398	2,221
500-year	11,307	3,302	12,020	4,908

Under existing conditions defined by the HEC-1 base model, Harding Ditch is overtopped during larger storms so that only 2,300 cfs reaches the confluence with Schoenberger Creek. Channel improvements are proposed to increase the capacity of Little Canteen/Harding Ditch to the peak flow of 7,465 cfs downstream of Hwy. 157.

A new channel is proposed to convey the overflow from Canteen Creek, a peak flow of approximately 6,400 cfs, from Canteen Creek to a new confluence with Harding Ditch. This new ditch was named the New Canteen Relief Channel (Relief Channel). Other alternatives for conveying the overflow from Canteen Creek were evaluated but found to be insufficient, as described in a separate report entitled *Summary of Engineering Calculations, State Park Site.*

Harding Ditch downstream of the proposed confluence with the Relief Channel required channel improvements sized to convey the design flood pulse flow of Harding Ditch and the Canteen Creek overflow. The hydrographs for Harding Ditch and the Canteen Creek overflow computed with the two HEC-1 base models were added together to produce a hydrograph representing the combined flow in Harding Ditch downstream of the confluence with the Relief Channel. This hydrograph addition was performed using the hydrograph calculator in Haestad Methods' PondPack program.

The resulting peak flow was computed to be 9,877 cfs, and the combined volume was computed to be approximately 4,455 acre-ft. Hydrograph addition calculations and hydrographs are included in the Appendix.

Hydraulics
The existing channel profile of Harding Ditch from Highway 157 to I-64 was taken from channel improvement plans for Harding Ditch from the U.S. Department of Agriculture Soil Conservation Service, dated 1997. The approximate elevations of the top of the right and left levees were included on the profile. Using the profile, an average depth of channel was estimated to be 13 feet, allowing 1 foot of freeboard between the top of levee and the design flood pulse water surface elevation within the channel. The target flow depth for improvements to Harding Ditch was set at 12 feet. The existing Harding Ditch profile, which includes surveyed flowline and levee elevations, is included in the Appendix.

The average slope of the Harding Ditch varies along its length. Therefore, proposed Harding Ditch channel improvements were divided into three main reaches by average channel slope. Channel improvements for Harding Ditch were assumed to begin at the upstream end of St. Clair Farms and continue upstream to Highway 157. Reach 1 of the proposed Harding Ditch channel improvements extended from I-64 upstream to Bunkum Road, approximately 1,630 feet, at an average slope of 0.0004 ft/ft. No improvements were proposed through the Spring Lake area between Bunkum Road and Forest Boulevard, because this area was proposed to function as an inline storage/restoration area. Reach 2 extended from Forest Boulevard Road upstream to the CSX Railroad, approximately 7,000 feet, at an average slope of 0.0007 ft/ft. Reach 3 extended from the CSX Railroad upstream to Highway 157, approximately 4,950 feet, at an average slope of 0.0014 ft/ft. Reach 3 was further subdivided into Reach 3A and Reach 3B by the confluence with the Relief Channel. Upstream of the confluence, the channel improvements were proposed to convey the design flow from Harding Ditch; this reach was named Reach 3A. Downstream of the confluence, the channel improvements were proposed to convey the design flow of Harding Ditch and the Relief Channel; this reach was named Reach 3B.

Several different channel configurations were considered for the proposed Harding Ditch channel improvements. These alternatives included a grass-lined trapezoidal channel, a concrete-lined trapezoidal channel, a concrete rectangular channel, a combination concrete and earthen trapezoidal channel, and a combination riprap and earthen trapezoidal channel. A floodplain alternative with a pilot channel was also included for Reach 2, which was the only reach that was found to be conducive to this option, due to the large surface area required. For the grass-lined trapezoidal channel, a 3H:1V side slope was used with a Manning's roughness coefficient (n-value) of 0.03. For concrete-lined and riprap sideslopes, a ratio of 2.5H:1V was used to size the channel. Concrete lining was evaluated with an n-value of 0.013, while riprap lining was evaluated with an n-value of 0.023.

The concrete-earthen and riprap-earthen channel alternatives also included a 5-foot riprap toe at the bottom of the slope for erosion protection, as directed by the District. Haestad Methods' FlowMaster program was used to compute the approximate channel improvement dimensions with Manning's equation for flow at normal depth. The sizes were determined for all channel configurations except the floodplain alternative by adjusting the bottom width until the design flood pulse capacity was achieved at the design depth, allowing a 1-foot freeboard to the proposed top of levee. Proposed channel improvement alternatives for Harding Ditch Reaches 2, 3B and 3A are listed in Table 2 on the following page, and channel improvement calculations are included in the Appendix.

The floodplain alternative consisted of a pilot channel with gently sloping sides leading to a short berm; this would mimic more natural conditions along the improved Harding Ditch. The bottom width of the grass-lined pilot channel within the proposed floodplain alternative was assumed to be 15 feet, which is equivalent to the existing bottom width of Harding Ditch in Reach 2. The pilot channel side slopes were set at 3H:1V and extended up to the existing ground elevation, approximately 5 to 8 feet above the flow line. The berms, which would constrict the remaining flow volume to the floodplain area, were moved outward from the pilot channel until the cross-section could convey the design flood pulse capacity, maintaining a maximum flow depth of 12 feet. This outer area was set at a slope of 0.002 ft/ft (500H:1V) in order to allow the floodplain to drain toward the pilot channel. The District directed that the outer area be given a Manning's roughness coefficient representing prairie (n-value of 0.035) rather than wooded or other types of floodplain cover.

The location of the confluence of the Relief Channel and Harding Ditch was constrained by several factors. The East St. Louis Flood Protection Rehabilitation Project, Channel Improvements plans dated 1997 provided a cross-section of Canteen Creek just downstream of Highway 157, which indicated that the Canteen Creek flowline elevation at this location is 421 NGVD. The upstream flowline of the Relief Channel was thus limited by this minimum elevation. The approximate top of levee elevation at Canteen Creek is 437.5 NGVD, which set the maximum upstream water surface elevation for the Relief Channel at 436.5 NGVD in order to preserve a 1-foot freeboard. A new bridge would be required to convey the Relief Channel design flow under the Penn Central Railroad to a confluence with Harding Ditch. The location of the confluence was proposed to be upstream of CSX railroad, which is roughly parallel to and south of the Penn Central Railroad, in order to avoid an additional new bridge to convey the flow under the CSX Railroad as well. The flowline of Harding Ditch at the CSX railroad crossing was approximately 419.5 NGVD, which set the minimum flowline elevation for the Relief Channel. The minimum desirable slope for the relief channel was approximately 0.0003 ft/ft, as recommended by the District. The proposed flow depth in the improved Harding Ditch had been set at 12 feet, so the proposed depth in the relief channel was also set at 12 feet. Through an iterative process taking all of these constraints into account, the confluence was located approximately 3,000 feet downstream of Highway 157 on Harding Ditch. The proposed length of the Relief Channel was 4,020 feet, and the proposed slope was approximately 0.0005 ft/ft.

Channel improvement alternatives for the Relief Channel were limited to the concrete rectangular channel configuration, which uses the least acreage of all the channel configurations, as directed by the District. The proposed channel dimensions for the Relief Channel is included at the bottom of Table 2.

Table 2 Channel Improvement Alternatives

Location	Description	Depth (ft)	Slope (ft/ft)	BW (ft)	TW (ft)	Area (ac)
Reach 2	Grass-lined Trapezoidal	13	0.0007	106	184	29.6
Reach 2	Concrete-lined Trapezoidal	13	0.0007	39	104	16.7
Reach 2	Concrete Rectangular	13	0.0007	65	65	10.4
Reach 2	Concrete/earthen	13	0.0007	69	134	21.5
Reach 2	Riprap/earthen channel	13	0.0007	96	161	25.9
Reach 2	Floodplain with pilot channel	13	0.0007	N/A	623	100.1
Reach 3B	Grass-lined Trapezoidal	13	0.0014	70	148	6.6
Reach 3B	Concrete-lined Trapezoidal	13	0.0014	22	87	3.9
Reach 3B	Concrete Rectangular	13	0.0014	49	49	2.2
Reach 3B	Concrete/earthen	13	0.0014	34	99	4.4
Reach 3B	Riprap/earthen channel	13	0.0014	61	126	5.6
Reach 3A	Grass-lined Trapezoidal	13	0.0014	48	126	8.7
Reach 3A	Concrete-lined Trapezoidal	13	0.0014	12	77	5.3
Reach 3A	Concrete Rectangular	13	0.0014	39	39	2.7
Reach 3A	Concrete/earthen	13	0.0014	14	79	5.4
Reach 3A	Riprap/earthen channel	13	0.0014	42	107	7.4
Relief Channel	Concrete Rectangular	13	0.0005	52	52	4.8

Site Calculations

The most recent topographic information available for the Spring Lake/St. Clair Farms/Indian Lake site was in the form of aerial photomaps with 2-foot contours at 1"=200' scale, produced for the District in 1973. These maps predate the I-255 extension, which forms the southern boundary of the St. Clair Farms site. The inaccuracy and age of the data for representation of existing conditions should be acknowledged when considering the results of this analysis for design purposes. NAPP aerial photographs dated 1998 were also available for the site, but without topographic information. These maps were used in conjunction with the contour maps to identify more recent land use throughout the site. In order to determine the potential storage capacity of the Spring Lake, St. Clair Farms and Indian Lake areas, the surface area of the existing contours within the areas were examined. Volume calculations described in the following sections are included in the Appendix.

Spring Lake 1: From the topographic map, it was noted that the existing contours within Spring Lake 1 varied from elevation 408 to 422 NGVD, with the lower ground elevations toward the western boundary where there is an existing connection with Lansdowne Ditch. The area in the southeast section of Spring Lake is elevated above the 422 NGVD contour in some locations. It was assumed that the existing sand plant pit would be filled using excavated material from the project, so it's storage capacity was not evaluated. The existing ground does not naturally slope toward Harding Ditch through Spring Lake 1, and due to the irregular topography it was assumed that some excavation would be needed.

The lowest point along the top of Forest Boulevard adjacent to the Spring Lake sites is shown on the topographic maps as 413.2 NGVD at the northwestern corner of Spring Lake 1, while the roadway to the west of the site is at elevation 416 NGVD. At the northeastern corner of Spring Lake 1, Forest Boulevard crosses over Harding Ditch and I-255. The lowest point along the top of Bunkum Road was shown on the topographic map as approximately 416.5 NGVD just west of Harding Ditch, while the majority of the road east of Harding Ditch was at approximately elevation 420 to 422 NGVD. The Alton & Southern Railroad is raised well above the 416' contour, as is I-255. For the purposes of this conceptual plan, it was assumed that the target water surface elevation within Spring Lake would be approximately elevation 416.5 NGVD. It was also assumed that Forest Boulevard would either be separated from the proposed Spring Lake habitat area by a berm, or be. . Runoff from Spring Lake 2 ponds in the low-lying areas north of Forest Boulevard before draining into Spring Lake 1 through existing culverts under Forest Boulevard. The perimeter of Spring Lake 1 was drawn on the aerial map, and the available surface area was measured as approximately 368 acres.

The flowline elevation in Harding Ditch at the downstream end of Spring Lake 1, estimated from the Harding Ditch profile as elevation 409.2 NGVD, was assumed to be the minimum allowable pond bottom elevation for excavation. Assuming 3H:1V side slopes from elevation 416.5 NGVD down to this minimum proposed pond bottom elevation, an elevation-area relationship was developed and used to compute the available storage volume using the volume calculator in PondPack. This potential maximum storage volume of Spring Lake was computed to be 2,624 acre-ft at an elevation of 416.5 NGVD.

Spring Lake 2: The area designated as Spring Lake 2 lies in an old meander scar and is adjacent to some World Heritage Site features such as Rattlesnake Mound. No excavation is proposed within this area, due to the high probability of disturbing artifacts. The use of berms to maximize available storage area was not proposed, due to potential impacts of increasing the depth of stormwater ponding on the World Heritage Site. The approximate perimeter of Spring Lake 2 was delineated by roughly following the existing 414 NGVD contour and by avoiding existing mound features north of Forest Boulevard. The area within this site slopes generally southward toward Spring Lake 1. The surface area of Spring Lake 2 was measured to be 141.9 acres. Areas enclosed by the existing contours were measured in Spring Lake 2, and the existing volume from elevation 414 NGVD to the low point of 410.8 NGVD near Forest Boulevard was computed in PondPack to be approximately 163 acre-ft.

St. Clair Farms: Existing ground elevations within the St. Clair Farms site varied from approximately 413.5 to 415.5 NGVD, according to the available topographic map. St. Clair Avenue, which forms the southwestern boundary of the site, is shown to have a minimum top elevation of approximately 414.5 NGVD; therefore, a berm around St. Clair Farms would be required to contain flows in the proposed habitat area. I-64, which is located directly north of St. Clair Farms, is elevated well above elevation 420 NGVD, which is the elevation of the ramp along the northwest corner of the site. An existing ridge runs also along the western edge of St. Clair Farms at approximately elevation 420 NGVD. The perimeter of St. Clair Farms was delineated on the aerial map and the available surface area was measured to be approximately 180.5 acres.

The existing storage within this site was estimated by delineating the 414 NGVD contour on the topographic map and assuming a short berm to protect St. Clair Avenue. Elevation 407.7 NGVD was computed to be the minimum elevation in Harding Ditch at the downstream end of the site and elevation 415.5 NGVD was chosen as the maximum elevation in the pond. An elevation-area relationship was developed for the existing contours in St. Clair Farms, and the resulting volume was computed in PondPack to be approximately 225 acre-ft. In order to evaluate the maximum available storage possible in the St. Clair Farms, the volume was also computed assuming a maximum allowable water surface of 419 NGVD and the maximum allowable depth of excavation. This scenario would require a perimeter berm up to an elevation of 420 NGVD around the northern, western and southern sides of the proposed habitat area, while the existing Harding Ditch levee would serve as the berm on the eastern boundary. The approximate volume available with this configuration was computed to be 1,898 acre-ft.

Indian Lake: The Indian Lake site includes existing wetland areas and vacant land that was previously used as a golf course. The existing contours within Indian Lake varied from elevation 400 NGVD to elevation 406 NGVD. The majority of the adjacent roadways were located at elevation 410 NGVD or higher. The perimeter of Indian Lake was delineated and the available surface area was measured to be 619.2 acres. It is partially divided into two sections by remaining portions of an existing berm through the site. The combined storage volume available within the two sections was computed by measuring the surface area corresponding to each existing contour within Indian Lake. The resulting elevation-area relationship was used to compute an estimate of the combined storage volume, which was approximately 2,355 ac-ft.

In order to maintain the existing load on the pump stations at the Mississippi River, the combined runoff volume from the Canteen Creek overflow and Harding Ditch should be separated and directed toward their respective pump stations. The runoff volumes computed for the two inflow hydrographs were nearly equivalent, so for the purposes of this conceptual plan, it was assumed that if the peak outflow directed toward Cahokia Canal was equal to the peak outflow directed toward Harding Ditch, this would represent a proportional volume distribution. The existing capacity of Harding Ditch downstream of the Spring Lake and St. Clair Farms sites was estimated in the HEC-1 base model as 2,300 cfs; this value was assumed to represent the maximum allowable outflow from a proposed habitat site back into Harding Ditch. Therefore, if a maximum of 2,300 cfs were allowed to flow to Harding Ditch, an equivalent amount would need to be directed toward Cahokia Canal. Using a total allowable peak outflow of 4,600 cfs, the approximate volume required for design flood pulse hydrograph of Harding Ditch and the Canteen Creek overflow was computed with the volume calculator in PondPack. Using a linear approximation, the resulting volume requirement was 2,246 ac-ft.

It was assumed that the combined flow from Harding Ditch and the Relief Channel would enter a proposed habitat site in Spring Lake 1 before continuing to flow towards Indian Lake and/or St. Clair Farms.

Pond Inflow/Outflow Analysis
Indian Lake, Spring Lake and St. Clair Farms were evaluated in combination with each other.

Indian Lake: The existing connection within Spring Lake to Lansdowne Ditch was not to be utilized as an outlet for flows in Spring Lake 1 in order to alleviate local flooding problems downstream through the Cities of East St. Louis and Washington Park. Therefore, a new ditch would be required to convey the proportional Canteen Creek overflow volume back toward Cahokia Canal. The alignment of this new ditch, which is referred to as the Fairmont City Ditch, is proposed to begin at the northwest corner of Spring Lake 1 and continue north and west to Indian Lake, avoiding areas of high elevation in order to minimize excavation for the channel. The outfall of the proposed ditch was located on the eastern side of Indian Lake rather than conveying the flow directly into Cahokia Canal. This alignment was chosen in order to restore a flood pulse through the site. The available storage volume in Indian Lake, computed as 2,355 acre-ft, is greater than the proposed outflow volume from Spring Lake 1, which would approximately equal 2,221 acre-ft. It could therefore be assumed that regardless of the size and location of the existing outlets from Indian Lake to Lansdowne Ditch and Cahokia Canal, which were not available for this study, Indian Lake would be able to contain the design flood pulse flow. The operation of these outlet pipes would in reality reduce the volume within Indian Lake. Therefore, although a pond inflow/outflow analysis was not performed on Indian Lake, the conservative assumption was made that Indian Lake would have sufficient capacity to accommodate the inflow from the proposed Fairmont City Ditch.

Spring Lake 1 and St. Clair Farms:

A pond inflow/outflow analysis for Spring Lake 1 was performed in PondPack, using the design flood pulse hydrograph as the inflow and the elevation-area relationship developed for the maximum excavation of Spring Lake 1 to represent the detention pond. Two sets of outlet structures were sized for the system by an iterative process, using the constraints of maximum water surface elevation in the pond and maximum outflow from the pond to find a sufficient configuration. The two outlets were located at the same invert elevation within the pond in order to insure that similar outflow hydrographs would be created, thereby achieving the volume balance requirement. The resulting outlets consisted of 4-11'x7' concrete box culverts at both outlets. The total peak outflow from the system was computed as approximately 4,300 cfs, balanced between the two outlets for a peak outflow of 2,150 cfs to both Harding Ditch and Fairmont City Ditch. This peak flow was under the maximum amount of 2,300 cfs set by the Harding Ditch existing capacity.

The peak ponding elevation for Spring Lake 1 was calculated to be slightly higher than elevation 416 NGVD, so the top of the corresponding perimeter berm was proposed at elevation 417.5 NGVD. The length of perimeter berm was estimated as 14,360 feet, which excluded the northwestern boundary where the existing ridge would serve as the berm protecting area to the west. The lowest elevation shown on the topographic map along the boundary of Spring Lake 1 was approximately 410'. Since the I-255 improvements were not shown on the topographic map, the raised areas shown along this border were not considered reliable. Therefore, a conservative estimate of 7.5' height for the perimeter berm was used for cost estimation. Calculations for the Spring Lake 1 inflow/outflow analysis are included in the Appendix, including the elevation versus time graph and inflow and outflow hydrographs for the Spring Lake 1 detention pond. An approximate depth-duration relationship for the Spring Lake 1 was developed using the elevation versus time graph and is shown in Table 3. Runoff in Spring Lake 2 would be drained into Spring Lake 1 through one proposed 2'x1' flap-gated RCB or three proposed 12" flap-gated RCP culverts under Forest Boulevard after the water surface elevation in Spring Lake 1 receded.

These sizes were assumed to represent the existing drainage structures under Forest Boulevard, for which no data is available. The flap gates were proposed in order to prevent water in Spring Lake 1 from flooding into Spring Lake 2.

Next, a pond inflow/outflow analysis for St. Clair Farms was performed. Using the outflow hydrograph from the Spring Lake 1 outlet to Harding Ditch, an estimate of the storage volume in St. Clair Farms was computed. This outflow hydrograph volume was computed to be approximately 2,216 ac-ft. Since Harding Ditch passes along the eastern boundary of St. Clair Farms, this site lends itself to a side-weir type of overflow rather than a flow-through. It was assumed that inflow to St. Clair Farms from Spring Lake 1 would be conveyed under I-64 through the proposed improved ditch. Upon entering St. Clair Farms, it would be divided between the existing Harding Ditch and the habitat area by breaking down the existing west levee of Harding Ditch to allow overflow into the Spring Lake 1 area. By using a lower west levee boundary elevation to represent a side-weir configuration, the storage volume required to reduce the proposed peak inflow of 2,150 cfs into St. Clair Farms to a peak outflow of 770 cfs to the existing Harding Ditch downstream was estimated. In order to simulate the hydrograph for flow entering the St Clair Farms habitat area, the inflow hydrograph from Harding Ditch was manipulated by subtracting 770 cfs at each point on the hydrograph, as shown on the hydrograph construction graph and calculations included in the Appendix. The required depth of excavation was computed in PondPack using an iterative process that increased the excavation depth by 1-foot increments until a sufficient storage volume was achieved. The resulting configuration consisted of excavation down to elevation 411.0 NGVD, which is approximately 3 feet below the average ground elevation within St. Clair Farms, and included perimeter berms along the north and south boundaries up to elevation 416.5 NGVD. The total length of the proposed perimeter berms was measured as 6,620 feet, and the average height of the berm was estimated to be 2.5', assuming an average existing ground elevation of 414'. Calculations for the St. Clair Farms inflow/outflow analysis are included in the Appendix, including inflow and outflow hydrographs. An approximate depth-duration relationship for the St. Clair Farms detention pond was developed and is shown in Table 3.

Table 3 Depth-Duration Relationship for Detention Ponds

Depth of Ponding (ft)	**Approximate Duration of Ponding (hrs)**	
	Spring Lake 1	**St. Clair Farms**
≥6	5	N/A
≥4	8	N/A
≥3	15	19
≥2	21	47
≥1	36	112

Approximately 1,630 feet of ditch improvements would be required to convey the outflow of Spring Lake 1 downstream to St. Clair Farms through Harding Ditch Reach 1. The same ditch improvement configurations were evaluated for Reach 1 as for Reach 2 in Harding Ditch, except that the floodplain alternative was not included due to limited area. The slope of the improved flowline for proposed Reach 1 channel improvements was assumed equal to the existing Harding Ditch slope of 0.0004 ft/ft. The proposed alignment of Fairmont City Ditch was drawn using the aerial map for recent land use and the topographic map in order to minimize required excavation for the channel; the length of the resulting alignment was approximately 12,850 feet. The slope of the flowline in the proposed Fairmont City Ditch was computed from the length of the proposed alignment, the upstream flowline elevation of 409.2 NGVD in Spring Lake and a proposed outfall into Indian Lake at the existing minimum elevation along the eastern limits of 402 NGVD. The resulting slope for the proposed Fairmont City Ditch channel was computed to be approximately 0.0006 ft/ft. The proposed channel sizes for Harding Ditch Reach 1 and Fairmont City Ditch were computed with Manning's equation for normal depth using FlowMaster, assuming a peak flow of 2,150 cfs in each channel at an approximate flow depth of 7 feet. These calculations are included in the Appendix. Proposed channel improvement sizes are listed in Table 4 for Reach 1 of Harding Ditch and Fairmont City Ditch.

The confluence of Schoenberger Creek with Harding Ditch is located south of the I-64/I-255 interchange, which is just downstream of the St. Clair Farms site. The top of the Harding Ditch levees in this area extend up to elevation 422.5 NGVD, which is approximately six feet higher than the berm elevation proposed around the St. Clair Farms pond and around the Spring Lake 1 pond. Therefore, a flap-gated control structure was proposed within the existing channel of Harding Ditch downstream of St. Clair Farms. The flap gates would prevent flow from Schoenberger Creek from backing up into and exceeding the berms of the proposed St. Clair Farms and Spring Lake 1 ponds. Two concrete box culverts were sized for this purpose, using inlet control nomographs and assuming the maximum outflow of 770 cfs; this calculation resulted in a proposed combination of one 8'x7' RCB and one 7'x7' RCB.

A 100-meter (328-foot) greenway was proposed along both sides of the channel improvements along Harding Ditch Reach 1 in order to provide a wildlife corridor between the Spring Lake 1 and St. Clair Farms. The approximate acreage of 4.5 acres required for the greenway was computed as the product of the length of Reach 1, which was 1,630 feet, by a total width of 656 feet.

Table 4 Channel Improvement Alternatives for Reach 1 and Fairmont City Ditch

Location	Description	Depth (ft)	Slope (ft/ft)	BW (ft)	TW (ft)	Area (ac)
Reach 1	Grass-lined Trapezoidal	8	0.0004	78	126	4.7
Reach 1	Concrete-lined Trapezoidal	8	0.0004	30	70	2.6
Reach 1	Concrete Rectangular	8	0.0004	44	44	1.6
Reach 1	Concrete/earthen	8	0.0004	52	92	3.4
Reach 1	Riprap/earthen channel	8	0.0004	70	110	4.1

Table 4 Continued

Location	Description	Depth (ft)	Slope (ft/ft)	BW (ft)	TW (ft)	Area (ac)
Fairmont City Ditch	Grass-lined Trapezoidal	8	0.0006	61	109	32.2
Fairmont City Ditch	Concrete-lined Trapezoidal	8	0.0006	22	62	18.3
Fairmont City Ditch	Concrete Rectangular	8	0.0006	38	38	11.2
Fairmont City Ditch	Concrete/earthen	8	0.0006	36	76	22.4
Fairmont City Ditch	Riprap/earthen channel	8	0.0006	55	95	28.0

Bridge Improvements
In order to complete the proposed channel improvement hydraulic analysis for Reaches 1 through 3 of Harding Ditch, for the New Canteen Relief Channel and for Fairmont City Ditch, a review of the existing bridges flow conveyance along the paths was performed. Revisions to some existing bridges would be necessary, and new bridges would be required at locations where the proposed new channels (Fairmont City Ditch and New Canteen Relief Channel) would cross under existing roadway or railway structures. Table 5 lists the bridge crossing locations along the proposed channel improvements. Proposed outlet structures are not included in this table.

Each existing bridge was evaluated using either available survey information or data from construction plans, and its approximate dimensions were utilized to determine whether channel improvements would be sufficient to convey the proposed flow through the crossing or whether the bridge structure would need to be replaced. The existing bridges and the proposed bridge revision alternatives at each location along Harding Ditch are listed in Table 10 with the cost features. The minimum topwidth of channel improvements through the bridge section was determined from the dimensions computed for the relevant reach of channel shown in Table 2. The two concrete-lined channel improvement configurations were proposed as alternatives through existing bridges. Other channel improvement alternatives were not considered, both for erosion control purposes and because the concrete-lined trapezoidal and rectangular channels required the least topwidths for the bridges to span. A list of approximate bridge dimensions and the source of information for each existing bridge along Harding Ditch is included in the Appendix.

Table 5 Existing and Proposed Bridges

Existing Bridges along Harding Ditch	Proposed Bridges along Fairmont City Ditch	Proposed Bridge along Relief Channel
Highway 157	Forest Boulevard	Penn Central RR
Long Street	CSX & Conrail RR	
CSX Railroad	Maryland Avenue	
Black Lane	Highway 111	
I-255 Northbound	North 51st Street	
I-255 Southbound	Collinsville Road	
Forest Boulevard		
Bunkum Road		
I-64 Eastbound		
I-64 Westbound		

At the northbound and southbound I-255 bridges over Harding Ditch just upstream of Spring Lake 1, the existing piers would fall within the channel improvement alternatives with wider topwidths (namely concrete/earthen and riprap/earthen trapezoidal channels) but might require stabilization. No improvements were necessary at the I-255 bridges just south of St. Clair Farms, since channel improvements are not proposed for the existing Harding Ditch channel downstream of I-64.

Three alternatives for new bridge configurations along Fairmont City Ditch were considered. These included concrete box culverts, concrete pipe culverts and single span bridges. The approximate dimensions required for the culvert alternatives were determined at the design flow capacity using Haestad Methods' CulvertMaster program. The approximate dimensions for single span bridge alternatives were determined by the minimum topwidth of the proposed channel improvement through that section. Only concrete rectangular channel improvements were considered through proposed single-span bridge alternatives, in order to minimize the required bridge length. The proposed new bridge alternatives are listed within Tables 10,11, and 12. The topwidth for concrete rectangular channel improvements at each bridge location was determined from the dimensions shown in Table 4. Calculations for the culvert alternatives are included in the Appendix. Proposed bridge alternatives for Fairmont City Ditch are listed in Table 11 with the cost features.

The proposed locations of the Conrail and CSX railroad crossings along Fairmont City Ditch were not sized for concrete culverts or a single span bridge. It was decided that a pipe should be jacked under the two railroad crossings in order to minimize impact on the operation of the railroads. The approximate length of this tunneling was estimated from the aerial map to be 300 feet.

Penn Central Railroad was the only proposed bridge location along the Relief Channel. Two bridge alternatives were considered for this location, including concrete box culverts and a single span bridge. The only type of channel improvements proposed for the Relief Channel was the concrete rectangular channel; therefore, it was the only channel improvement proposed with the single span bridge alternative. Concrete box culverts were sized using CulvertMaster; concrete pipe culverts were not sized as an alternative for this bridge location, because the railroad bridge opening length was to be minimized as much as possible. The topwidth for the channel improvements through this bridge was determined from the dimensions shown in Table 4. Calculations for the culvert alternatives are included in the Appendix. Proposed bridge alternatives for the Relief Channel are listed in Table 12 with the cost features.

Cost Features

A summary of major engineering cost features is included in the tables on the following pages. It should be noted that this is not intended to be an all-inclusive list, but only includes major features requested by the District. The District has computed additional cost features that would be combined with those listed in the tables. Also, since no detailed hydrologic or hydraulic models were created for this analysis, it is possible that other major cost features might be required when a design analysis is performed.

Table 6 Engineering Cost Features

Features:	Quantity
Real Estate for Spring Lake 1	368.0 acres
Real Estate for Spring Lake 2	141.9 acres
Real Estate for St. Clair Farms	180.5 acres
Real Estate for Indian Lake	619.2 acres
Perimeter Berm Spring Lake 1	14,360 ft x 7.5 feet
Perimeter Berm St. Clair Farms	6,790 ft x 2.5 feet
Excavation Spring Lake 1	2,670,067 CY
Excavation St. Clair Farms	831,000 CY
Outlet Culverts for St. Clair Farms	3-36" RCP's, L=37 feet, flap-gated
Flap-gated Culverts on Harding Ditch, upstream of Schoenberger Creek	1-8'x7' and 1-7'x7' RCB, L=106'
Outlet Culverts (south) for Spring Lake 1	4-11'x7' RCB's, L=58'
Outlet Culverts (west) for Spring Lake 1	4-11'x7' RCB's, L=60'
Tunneling under Conrail and CSX RR	L = 300', 7' opening
Concrete rectangular channel for New Canteen Relief Channel	13' deep, BW = 52', L = 4020'

Alternative Features:	Quantity
Choose Culvert Connector Alternative for Spring Lake 1 and 2	(see Table 7)
Choose Channel Improvement Alternative for Fairmont City Ditch	(see Table 8)
Choose Channel Improvement Alternative for Harding Ditch Reaches	(see Table 9)
Choose Bridge Revision Alternative for each Existing Bridge	(see Table 10)
Choose New Bridge Alternative for each Proposed New Bridge	(see Tables 11 and 12)

Table 7 Forest Boulevard Culvert Connector Alternatives

Forest Blvd. Culvert Connector Alternatives	**Quantity**
Concrete Box Culverts	1-2'x1' RCB, flap-gated
Concrete Pipe Culverts	3-12" RCP's, flap-gated

Table 8 Fairmont City Ditch Channel Improvement Alternatives

Description	**Quantity**
Grass Trapezoidal Channel, 3H:1V Side Slopes	BW = 61', Total channel depth = 8'
Concrete Trapezoidal Channel, 2.5H:1V Side Slopes	BW = 22', Total channel depth = 8'
Concrete Rectangular Channel	BW = 38', Total channel depth = 8'
Concrete/Earthen Trapezoidal Channel, 2.5H:1V Side Slopes	BW = 36', Total channel depth = 8'
Riprap/Earthen Trapezoidal Channel, 2.5H:1V Side Slopes	BW = 55', Total channel depth = 8'

Note: Total Length of New Fairmont City Ditch is proposed to be approximately 12,850'

Table 9 Harding Ditch Channel Improvement Alternatives

Designation	**Description**	**Quantity**
Reach 1	Grass-lined channel, 3:1 SS	BW = 78', Total channel depth = 8'
	Concrete trapezoidal channel, 2.5:1 SS	BW = 30', Total channel depth = 8'
	Concrete rectangular channel	BW = 44', Total channel depth = 8'
	Concrete/earthen channel, 2.5:1 SS	BW = 52', Total channel depth = 8'
	Riprap/earthen channel, 2:5:1 SS	BW = 70', Total channel depth = 8'
Reach 2	Grass-lined channel, 3:1 SS	BW = 106', Total channel depth = 13'
	Concrete trapezoidal channel, 2.5:1 SS	BW = 39', Total channel depth = 13'
	Concrete rectangular channel	BW = 65', Total channel depth = 13'
	Concrete/earthen channel, 2.5:1 SS	BW = 69', Total channel depth = 13'
	Riprap/earthen channel, 2:5:1 SS	BW = 96', Total channel depth = 13'
	Floodplain with pilot channel, outer area prairie	Topwidth = 623', Total channel depth = 13'
Reach 3B	Grass-lined channel, 3:1 SS	BW = 70', Total channel depth = 13'
	Concrete trapezoidal channel, 2.5:1 SS	BW = 22', Total channel depth = 13'
	Concrete rectangular channel	BW = 49', Total channel depth = 13'
	Concrete/earthen channel, 2.5:1 SS	BW = 34', Total channel depth = 13'
	Riprap/earthen channel, 2.5:1 SS	BW = 61', Total channel depth = 13'

Table 9 Continued

Designation	Description	Quantity
Reach 3A	Grass-lined channel, 3:1 SS	BW = 48', Total channel depth = 13'
	Concrete trapezoidal channel, 2.5:1 SS	BW = 12', Total channel depth = 13'
	Concrete rectangular channel	BW = 39', Total channel depth = 13'
	Concrete/earthen channel, 2.5:1 SS	BW = 14', Total channel depth = 13'
	Riprap/earthen channel, 2.5:1 SS	BW = 42', Total channel depth = 13'

Notes:

1) Reach 1 extends from Bunkum Road to the inlet of St. Clair Farms pond, approximately 1630'
2) Reach 2 extends from CSX RR to Forest Blvd., approximately 7000'
3) Reach 3B extends from the confluence with Canteen Creek to CSX RR, approximately 1950'
4) Reach 3A extends from Hwy. 157 to the confluence with Canteen Creek, approximately 3000'

Table 10 Bridge Revision Alternatives along Harding Ditch

Existing Bridge		Alternatives		Channel Improvement Alternatives through Bridge Section (ft)	
Crossing Identification	**Structure Width (ft)**	**Bridge Replacement**	**Channel Impr. Only**	**Concrete Trapezoidal**	**Concrete Rectangular**
Hwy. 157	48	x		BW = 12', 13' deep	BW = 39', 13' deep
Long Street	24		x	N/A	BW = 39', 13' deep
CSX Railroad	30	x		BW = 22', 13' deep	BW = 49', 13' deep
Black Lane	46	x		BW = 39', 13' deep	BW = 65', 13' deep
I-255 Northbound	56(74)		x	BW = 39', 13' deep	BW = 65', 13' deep
I-255 Southbound	56(74)		x	BW = 39', 13' deep	BW = 65', 13' deep
Forest Blvd.	44(66)		x	BW = 39', 13' deep	BW = 65', 13' deep
Bunkum Rd.	24		x	BW = 30', 8' deep	BW = 44', 8' deep
I-64 Eastbound	90		x	BW = 30', 8' deep	BW = 44', 8' deep
I-64 Westbound	63		x	BW = 30', 8' deep	BW = 44', 8' deep

Note: Structure widths shown as (x) are measured along the flowline when the bridge is at a skew angle; this corresponds with the length of channel improvement needed.

Table 11 New Bridge Alternatives for Fairmont City Ditch

Crossing Identification	Reinforced Concrete Box Culverts			Reinforced Concrete Pipe Culverts			Single-span Bridge		Raise Road
	Length (ft)	#	Dimensions	Length (ft)	#	Dimensions	Length (ft)	Width (ft)	
Forest Blvd.	58	6	8'x6'	58	10	72"	38	58	yes~1.5'
Maryland Ave.	36	6	8'x6'	36	10	72"	38	58	no
Hwy. 111	60	6	8'x6'	60	10	72"	38	58	no
N. 51st Street	36	6	8'x6'	36	10	72"	38	58	no
Collinsville Rd.	70	6	8'x6'	70	10	72"	38	58	no

Note: Single-span bridge sizing assumes concrete rectangular channel section; length given is equal to minimum channel width.

Table 12 New Bridge Alternatives for Canteen Creek Relief Channel

Crossing Identification	Reinforced Concrete Box Culverts			Single-span Bridge		Raise Railroad
	Length (ft)	#	Dimensions	Length (ft)	Width (ft)	
Penn Central RR	46	5	11'x11'	52	40	No

Note: Single-span bridge sizing assumes concrete rectangular channel section; length shown is equal to minimum required channel width.

APPENDIX

SUPPORTING CALCULATIONS FOR SPRING LAKE SITE, INCLUDING ST. CLAIR FARMS AND INDIAN LAKE

Base Information and Calculations
- HEC-1 Base Model for Harding Ditch Output
- HEC-1 Base Model for Canteen Creek Output
- Hydrograph Addition Calculations and Hydrographs

Channel Improvement Calculations
- Harding Ditch Existing and Proposed Profile
- Harding Ditch – Reach 1
- Harding Ditch – Reach 2
- Harding Ditch – Reach 3A
- Harding Ditch – Reach 3B
- New Canteen Relief Channel
- Fairmont City Ditch

Storage Volume Calculations
- Spring Lake 1, maximum excavation
- Spring Lake 2, existing contours
- St. Clair Farms, existing contours
- St. Clair Farms, maximum excavation and berms
- Indian Lake, existing contours
- Detention Storage Estimate

Spring Lake Inflow/Outflow Calculations
- Existing Harding Ditch Capacity
- E-Q-V Table
- Pond Analysis Summary
- Graph of Elevation Vs. Time for Pond
- Inflow and Outflow Hydrographs for Pond

St. Clair Farms Inflow/Outflow Calculations
- Detention Storage Estimate
- Hydrograph Construction Calculations
- Storage Volume Calculation
- E-Q-V Table
- Pond Analysis Summary
- Graph of Elevation Vs. Time for Pond
- Inflow and Outflow Hydrographs for Pond

Additional Information
- Bridge Data Table for Harding Ditch
- New Bridge Culvert Sizing Calculation Summaries

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BASE INFORMATION AND CALCULATIONS

HEC-1 Base Model for Harding Ditch Output

```
1*****************************************                                        ***************************************
*                                         *                                        *                                     *
*   FLOOD HYDROGRAPH PACKAGE   (HEC-1)    *                                        *   U.S. ARMY CORPS OF ENGINEERS      *
*             JUN    1998                 *                                        *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                   *                                        *         609 SECOND STREET           *
*                                         *                                        *     DAVIS, CALIFORNIA 95616         *
*  RUN DATE   10MAY01   TIME  02:00:22    *                                        *        (916) 756-1104               *
*                                         *                                        *                                     *
*****************************************                                        ***************************************


                         X       X  XXXXXXX   XXXXX          X
                         X       X  X        X     X        XX
                         X       X  X        X               X
                         XXXXXXX    XXXX     X       XXXXX   X
                         X       X  X        X               X
                         X       X  X        X     X         X
                         X       X  XXXXXXX   XXXXX         XXX


 THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                          HEC-1 INPUT                                                PAGE  1

 LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1        ID        FROM BASE FILE: CAHOK.FI1
   2        ID        REVISED TO COMPUTE ALL STORM FREQUENCIES, REVISED CANTEEN CREEK
   3        ID             CAPACITY AT HWY. 157 TO 3300 CFS AND TRUNCATED MODEL
   4        ID             DOWNSTREAM OF HWY. 157
   5        ID        CAHOKIA CANAL HEC-1 MODEL FOR FUTURE CONDITIONS
   6        ID        ASSUMES FULL DEVELOPMENT OF HILLSIDE WATERSHEDS
   7        ID        MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
   8        ID        BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
   9        ID        MADISON COUNTY, IL  (Design FLOOD)
  10        ID        INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC.)
  11        IT      30                    300
  12        IO       5
  13        JR    PREC     .37     .51     .60     .73     .86     1.0    1.39

  14        KK       1
  15        KM        COMPUTE RUNOFF FOR SUBAREA 1 (UPPER COUNTY DITCH)
  16        BA    1.99
  17        BF       0    -.03   1.074
  18        PH       1    91.1    0.99    2.22    3.86    4.84    5.25    6.16    7.14    8.21
  19        LS       0   87.40
  20        UD    1.43

  21        KK       2
  22        KM        ROUTE TO AREA 2
  23        RS       1    STOR      -1
  24        SV       0      20      50     560    1400    1710    2969
  25        SQ       0      50     100     200     300     400     500

  26        KK       3
  27        KM        COMPUTE RUNOFF FOR SUBAREA 3
  28        BA     .22
  29        LS       0   87.90
  30        UD     .88

  31        KK       2
  32        KM        COMPUTE RUNOFF FOR SUBAREA 2
  33        BA    1.39
  34        LS       0   83.70
  35        UD    1.74

  36        KK       2
  37        KM        COMBINE 3 HYDROGRAPHS AT 2
  38        HC       3

  39        KK       5
  40        KM        ROUTE TO AREA 5
  41        RS       1    STOR      -1
  42        SV       0       4       8      15     300     666    1190    1670
  43        SQ       0      50     100     200     300     400     500     600
1                                          HEC-1 INPUT                                                PAGE  2
```

HEC-1 Base Model for Harding Ditch Output

```
LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  44           KK       4
  45           KM         COMPUTE RUNOFF FOR SUBAREA 4
  46           BA     1.34
  47           LS        0   90.40
  48           UD     1.16

  49           KK       5
  50           KM         COMPUTE RUNOFF FOR SUBAREA 5
  51           BA      .79
  52           LS        0   78.70
  53           UD     1.24

  54           KK       5
  55           KM         COMBINE 3 HYDORGRAPHS AT 5
  56           HC       3

  57           KK       8
  58           KM         ROUTE TO SUBAREA 8
  59           RS       1     STOR      -1
  60           SV       0       11       70     2100     3200     3800
  61           SQ       0       50      100      200      300      400

  62           KK       8
  63           KM         COMPUTE RUNOFF FOR SUBAREA 8
  64           BA     1.55
  65           LS        0   90.60
  66           UD     1.37

  67           KK       8
  68           KM         COMBINE 2 HYDROGRAPHS AT 8
  69           HC       2

  70           KK      10
  71           KM         ROUTE TO SUBAREA 10 AT I-270
  72           RS       1     STOR      -1
  73           SV       0       18      120     3000     4000     6200     8600
  74           SQ       0       50      100      115      150      200      250

  75           KK      10
  76           KM         COMPUTE RUNOFF FOR SUBAREAS 79,80,81,82,83,84,85,6,7,AND 10
  77           BA     7.28
  78           LS        0   75.00
  79           UD     5.76

  80           KK      10
  81           KM         COMBINE 2 HYDROGRAPHS AT 10
  82           HC       2

  83           KK      11
  84           KM         COMPUTE RUNOFF FOR SUBAREAS 86 AND 11
  85           BA      .97
  86           LS        0   75.00
  87           UD     1.74
                                          HEC-1 INPUT                                             PAGE  3

LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  88           KK      11
  89           KM         COMBINE 2 HYDROGRAPHS AT SUBAREA 11
  90           HC       2

  91           KK      12
  92           KM         COMPUTE RUNOFF FOR SUBAREAS 87 AND 12
  93           BA     1.50
  94           LS        0   81.00
  95           UD     1.48

  96           KK       9
  97           KM         COMPUTE RUNOFF FOR SUBAREA 9
  98           BA     1.50
  99           LS        0   90.00
 100           UD     1.11

 101           KK      13
 102           KM         COMBINE 3 HYDROGRAPHS AT 13
 103           HC       3

 104           KK      13
 105           KM         ROUTE TO SUBAREA 13 AT ILL. HIGHWAY 162
 106           RS       1     STOR      -1
 107           SV       0       16       25     1000     1600     2550     3350     3950     4678     5405
 108           SQ       0       50      100      200      300      400      500      600      700      800

 109           KK      13
```

HEC-1 Base Model for Harding Ditch Output

```
 110          KM       COMPUTE RUNOFF FOR SUBAREAS 88 AND 13 (JUDY'S BRANCH)
 111          BA    9.01
 112          LS       0    75.00
 113          UD    1.54

 114          KK      13
 115          KM       DIVERSION OF SPILL OUT OF JUDY'S BRANCH
 116          DT    NORTH
 117          DI       0     1500     1501     5476    10000
 118          DQ       0        0        1     3976     8500

 119          KK      13
 120          KM       COMBINE CAHOKIA CANAL AND JUDY'S BRANCH
 121          HC       2

 122          KK      89
 123          KM       COMPUTE RUNOFF FOR SUBAREAS 89 AND 15 (BURDICK BRANCH)
 124          BA    3.11
 125          LS       0    75.00
 126          UD    1.13

 127          KK      15
 128          KM       DIVERSION OF SPILL OUT OF BURDICK BRANCH
 129          DT    NORTH
 130          DI       0      500      501     2158    10000
 131          DQ       0        0        1     1658     9500
1                                    HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 132          KK      15
 133          KM       COMBINE CAHOKIA CANAL AND BURDICK BRANCH AT SUBAREA 15
 134          HC       2

 135          KK      18
 136          KM       DIVERSION OF SPILL OUT OF CAHOKIA CANAL TO MCDONOUGH LAKE
 137          DT    NORTH
 138          DI       0     2000     2001     2304    15000
 139          DQ       0        0        1      304    13000

 140          KK      21
 141          KM       ROUTE TO SUBAREA 21 AT HORSESHOE LAKE ROAD
 142          RS       4     STOR       -1
 143          SV       0       97      170      196      287
 144          SQ       0      500     1000     1500     2000

 145          KK      21
 146          KM       COMPUTE RUNOFF FOR SUBAREAS 99 AND 21 (SCHOOLHOUSE BRANCH)
 147          BA    7.38
 148          LS       0    75.00
 149          UD    1.49

 150          KK      21
 151          KM       DIVERSION OF SPILL OUT OF SCHOOLHOUSE BRANCH TO THE SOUTH
 152          DT    SOUTH
 153          DI       0     2500     2501     4503    20000
 154          DQ       0        0        1     2003    17500

 155          KK      15
 156          KM       COMBINE 2 HYDROGRAPHS AT SUBAREA 15 (SCHOOLHOUSE BR. AND CAHOKIA CANAL)
 157          HC       2

 158          KK      22
 159          KM    DIVERSION OF SPILL OUT OF CAHOKIA CANAL TO THE SOUTH
 160          DT    SOUTH
 161          DI       0     3000     3001     4468    20000
 162          DQ       0        0        1     1468    17000

 163          KK      22
 164          KM       ROUTE FROM SCHOOLHOUSE BRANCH TO JUNCTION WITH CAHOKIA CANAL
 165          RS       2     STOR       -1
 166          SV       0       55       97      138      176      212      245
 167          SQ       0      500     1000     1500     2000     2500     3000

 168          KK      98
 169          KM       COMPUTE RUNOFF FOR SUBAREA 98 (CANTEEN CREEK)
 170          BA   22.90
 171          LS       0    75.00
 172          UD    3.50
1                                    HEC-1 INPUT                                          PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 173          KK      25
 174          KM       DIVERSION OF SPILL FROM CANTEEN CREEK
 175          DT      CAN
```

HEC-1 Base Model for Harding Ditch Output

```
        176           DI        0    3300    3301   11752   20000
        177           DQ        0       0       1    8452   16700
        178           ZZ
1****************************************                                             **************************************
*                                       *                                             *                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                             *    U.S. ARMY CORPS OF ENGINEERS    *
*              JUN   1998               *                                             *   HYDROLOGIC ENGINEERING CENTER    *
*            VERSION 4.1                *                                             *         609 SECOND STREET          *
*                                       *                                             *     DAVIS, CALIFORNIA 95616        *
*  RUN DATE   10MAY01  TIME  02:00:22   *                                             *          (916) 756-1104            *
*                                       *                                             *                                    *
****************************************                                              **************************************


                            FROM BASE FILE: CAHOK.FI1
                            REVISED TO COMPUTE ALL STORM FREQUENCIES, REVISED CANTEEN CREEK
                                 CAPACITY AT HWY. 157 TO 3300 CFS AND TRUNCATED MODEL
                                 DOWNSTREAM OF HWY. 157
                            CAHOKIA CANAL HEC-1 MODEL FOR FUTURE CONDITIONS
                            ASSUMES FULL DEVELOPMENT OF HILLSIDE WATERSHEDS
                            MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
                            BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
                            MADISON COUNTY, IL  (Design FLOOD)
                            INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC.)

   12 IO          OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN         30  MINUTES IN COMPUTATION INTERVAL
                        IDATE     1    0  STARTING DATE
                        ITIME       0000  STARTING TIME
                           NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE     7    0  ENDING DATE
                       NDTIME       0530  ENDING TIME
                        ICENT         19  CENTURY MARK

                   COMPUTATION INTERVAL     .50 HOURS
                        TOTAL TIME BASE  149.50 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT

      JP          MULTI-PLAN OPTION
                        NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                     .37       .51       .60       .73       .86      1.00      1.39
1

             PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                               FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                              TIME TO PEAK IN HOURS
```

OPERATION	STATION	AREA	PLAN		RATIO 1 .37	RATIO 2 .51	RATIO 3 .60	RATIO 4 .73	RATIO 5 .86	RATIO 6 1.00	RATIO 7 1.39
HYDROGRAPH AT											
+	1	1.99	1	FLOW	502.	801.	999.	1287.	1575.	1885.	2743.
				TIME	14.00	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO											
+	2	1.99	1	FLOW	109.	124.	134.	149.	165.	182.	220.
				TIME	17.50	18.50	19.00	19.50	19.50	20.00	21.00
HYDROGRAPH AT											
+	3	.22	1	FLOW	74.	117.	145.	186.	227.	270.	391.
				TIME	13.00	13.00	13.00	13.00	13.00	13.00	13.00
HYDROGRAPH AT											
+	2	1.39	1	FLOW	263.	444.	566.	744.	925.	1120.	1663.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
3 COMBINED AT											
+	2	3.60	1	FLOW	412.	626.	770.	981.	1193.	1423.	2065.

HEC-1 Base Model for Harding Ditch Output

Operation	Station	Area	Plan								
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
ROUTED TO +	5	3.60	1	FLOW	212.	232.	246.	268.	291.	313.	371.
				TIME	17.00	18.50	19.00	19.50	20.50	21.00	22.50
HYDROGRAPH AT +	4	1.34	1	FLOW	446.	678.	827.	1043.	1257.	1487.	2122.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
HYDROGRAPH AT +	5	.79	1	FLOW	137.	251.	330.	449.	570.	702.	1074.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
3 COMBINED AT +	5	5.73	1	FLOW	783.	1135.	1368.	1708.	2050.	2421.	3453.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO +	8	5.73	1	FLOW	111.	121.	128.	138.	148.	159.	189.
				TIME	29.00	37.50	42.50	50.00	57.00	64.00	82.00
HYDROGRAPH AT +	8	1.55	1	FLOW	470.	717.	877.	1107.	1336.	1582.	2262.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
2 COMBINED AT +	8	7.28	1	FLOW	559.	819.	980.	1212.	1444.	1693.	2381.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO +	10	7.28	1	FLOW	100.	101.	102.	103.	104.	105.	108.
				TIME	60.50	88.00	105.00	129.00	148.50	149.50	149.50
HYDROGRAPH AT +	10	7.28	1	FLOW	366.	704.	945.	1320.	1712.	2147.	3397.
				TIME	19.00	19.00	18.50	18.50	18.50	18.50	18.50
2 COMBINED AT +	10	14.56	1	FLOW	466.	805.	1046.	1421.	1813.	2249.	3500.
				TIME	19.00	19.00	18.50	18.50	18.50	18.50	18.50
HYDROGRAPH AT +	11	.97	1	FLOW	107.	211.	285.	400.	519.	650.	1025.
				TIME	14.50	14.00	14.00	14.00	14.00	14.00	14.00
2 COMBINED AT +	11	15.53	1	FLOW	494.	854.	1113.	1508.	1922.	2380.	3703.
				TIME	19.00	18.50	18.50	18.50	18.50	18.50	18.00
HYDROGRAPH AT +	12	1.50	1	FLOW	270.	471.	607.	808.	1012.	1234.	1862.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	13.50
HYDROGRAPH AT +	9	1.50	1	FLOW	501.	764.	934.	1179.	1423.	1684.	2406.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
3 COMBINED AT +	13	18.53	1	FLOW	940.	1562.	1988.	2623.	3269.	3980.	6014.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO +	13	18.53	1	FLOW	153.	197.	242.	308.	356.	411.	616.
				TIME	33.00	32.50	32.00	31.50	31.50	31.50	31.00
HYDROGRAPH AT +	13	9.01	1	FLOW	1089.	2139.	2882.	4012.	5183.	6473.	10138.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
DIVERSION TO +	NORTH	9.01	1	FLOW	0.	639.	1382.	2512.	3683.	4973.	8638.
				TIME	.00	14.00	14.00	14.00	14.00	14.00	14.00
HYDROGRAPH AT +	13	9.01	1	FLOW	1089.	1500.	1500.	1500.	1500.	1500.	1500.
				TIME	14.00	13.50	13.00	13.00	12.50	12.50	12.00
2 COMBINED AT +	13	27.54	1	FLOW	1197.	1627.	1642.	1666.	1694.	1746.	1895.
				TIME	14.00	15.00	15.50	16.00	16.50	17.00	18.50
HYDROGRAPH AT +	89	3.11	1	FLOW	448.	883.	1189.	1655.	2137.	2668.	4175.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
DIVERSION TO +	NORTH	3.11	1	FLOW	0.	383.	689.	1155.	1637.	2168.	3675.
				TIME	.00	13.50	13.50	13.50	13.50	13.50	13.50

HEC-1 Base Model for Harding Ditch Output

HYDROGRAPH AT											
+	15	3.11	1	FLOW	448.	500.	500.	500.	500.	500.	500.
				TIME	13.50	13.00	12.50	12.50	12.50	12.00	11.50
2 COMBINED AT											
+	15	30.65	1	FLOW	1606.	2123.	2137.	2159.	2185.	2228.	2378.
				TIME	14.00	14.50	15.00	15.50	16.00	16.50	18.00
DIVERSION TO											
+	NORTH	30.65	1	FLOW	0.	123.	137.	159.	185.	228.	378.
				TIME	.00	14.50	15.00	15.50	16.00	16.50	18.00
HYDROGRAPH AT											
+	18	30.65	1	FLOW	1606.	2000.	2000.	2000.	2000.	2000.	2000.
				TIME	14.00	13.50	13.00	13.00	12.50	12.50	12.00
ROUTED TO											
+	21	30.65	1	FLOW	1439.	1868.	1942.	1977.	1992.	1997.	2000.
				TIME	15.00	16.00	16.50	17.00	17.50	18.00	19.50
HYDROGRAPH AT											
+	21	7.38	1	FLOW	909.	1779.	2393.	3325.	4292.	5355.	8375.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
DIVERSION TO											
+	SOUTH	7.38	1	FLOW	0.	0.	0.	825.	1792.	2855.	5875.
				TIME	.00	.00	.00	14.00	14.00	14.00	14.00
HYDROGRAPH AT											
+	21	7.38	1	FLOW	909.	1779.	2393.	2500.	2500.	2500.	2500.
				TIME	14.00	14.00	14.00	13.50	13.00	13.00	12.50
2 COMBINED AT											
+	15	38.03	1	FLOW	2112.	3235.	3784.	4245.	4360.	4433.	4492.
				TIME	15.00	14.50	14.50	14.50	15.00	15.50	16.50
DIVERSION TO											
+	SOUTH	38.03	1	FLOW	0.	235.	784.	1245.	1360.	1433.	1492.
				TIME	.00	14.50	14.50	14.50	15.00	15.50	16.50
HYDROGRAPH AT											
+	22	38.03	1	FLOW	2112.	3000.	3000.	3000.	3000.	3000.	3000.
				TIME	15.00	14.50	14.00	13.50	13.00	13.00	12.00
ROUTED TO											
+	22	38.03	1	FLOW	1785.	2835.	2982.	2999.	3000.	3000.	3000.
				TIME	16.00	15.50	16.00	16.50	17.00	18.00	18.00
HYDROGRAPH AT											
+	98	22.90	1	FLOW	1627.	3152.	4261.	5960.	7734.	9698.	15320.
				TIME	16.50	16.00	16.00	16.00	16.00	16.00	16.00
DIVERSION TO											
+	CAN	22.90	1	FLOW	0.	0.	961.	2660.	4434.	6398.	12020.
				TIME	.00	.00	16.00	16.00	16.00	16.00	16.00
HYDROGRAPH AT											
+	25	22.90	1	FLOW	1627.	3152.	3300.	3300.	3300.	3300.	3300.
				TIME	16.50	16.00	15.00	14.50	14.00	13.50	13.00

*** NORMAL END OF HEC-1 ***

HEC-1 Base Model for Canteen Creek Output

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1**************************************                    ****************************************
*                                        *                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                  *   U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998                *                  *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                  *                  *        609 SECOND STREET             *
*                                        *                  *     DAVIS, CALIFORNIA 95616          *
*  RUN DATE   08MAY01  TIME  12:52:03    *                  *        (916) 756-1104                *
*                                        *                  *                                      *
******************************************                  ****************************************


                    X     X  XXXXXXX   XXXXX          X
                    X     X  X        X     X        XX
                    X     X  X        X               X
                    XXXXXXX  XXXX     X       XXXXX   X
                    X     X  X        X               X
                    X     X  X        X     X         X
                    X     X  XXXXXXX   XXXXX         XXX


    THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

    THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
    THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
    NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
    DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
    KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                       HEC-1 INPUT                                                  PAGE  1

    LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

      1          ID       HARDING DITCH WATERSHED
      2          ID       HEC-1 ROUTING
      3          ID       MULTI-RATIO:10-YR BASE FLOOD (1.0) /2-YR/5-YR/25-YR/50-YR/100-YR/500-YR
      4          IT     10                     290
      5          IO      5
      6          JR   PREC     .69     .87    1.00    1.26    1.48    1.72    2.29

      7          KK    145  LITTLE CANTEEN CREEK TRIB 145
      8          BA   2.98
      9          BF    5.0    -.03    1.43
                 *  BASED ON ISWS BULLETIN 70 -PROB=10.0% -- INTERVAL= 10MIN -- DURATION=24HR
     10          PI   .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
     11          PI   .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
     12          PI   .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
     13          PI   .008    .008    .008    .008    .008    .008    .018    .018    .018    .018
     14          PI   .018    .018    .018    .018    .018    .018    .018    .018    .018    .018
     15          PI   .018    .018    .018    .018    .029    .029    .029    .029    .029    .029
     16          PI   .029    .029    .029    .055    .056    .056    .080    .081    .081    .178
     17          PI   .183    .397    .894    .310    .181    .082    .081    .080    .056    .056
     18          PI   .056    .029    .029    .029    .029    .029    .029    .029    .029    .029
     19          PI   .018    .018    .018    .018    .018    .018    .018    .018    .018    .018
     20          PI   .018    .018    .018    .018    .018    .018    .018    .018    .008    .008
     21          PI   .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
     22          PI   .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
     23          PI   .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
     24          PI   .008    .008    .008    .008
     25          LS      0    75.0
     26          UD   1.22

     27          KK    146  LITTLE CANTEEN CREEK TRIB 146
     28          BA   2.91
     29          LS      0    75.0
     30          UD    .99

     31          KK      1  COMBINE 145 AND 146
     32          HC      2

     33          KK    146  ROUTE COMBINED FLOWS TO ILLINOIS HIGHWAY 157
     34          RS      4    FLOW      -1       0
     35          SV      0      20      39      67     121     173     230     283     339     433
     36          SQ      0     200     500    1000    2000    3000    4000    5000    6000    8000

     37          KK    144  LITTLE CANTEEN CREEK TRIB 144
     38          BA   2.06
     39          LS      0    75.0
     40          UD    .74

     41          KK      2  COMBINE FLOWS AT ILLINOIS HIGHWAY 157 IN CASEYVILLE
     42          HC      2
1                                       HEC-1 INPUT                                                  PAGE  2
```

HEC-1 Base Model for Canteen Creek Output

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  43          KK      35 DIVERSION OF SPILL ABOVE 2300 CFS
  44          DT    HARD
  45          DI       0    2300   20000
  46          DQ       0       0   17700

  47          KK      15 ROUTE TO JUNCTION OF SCHOENBERGER CREEK
  48          RT       0       2      14

  49          KK     155  SCHOENBERGER CREEK TRIB 155
  50          BA   4.40
  51          BF    5.0    -.03    1.43
  52          LS       0    75.7
  53          UD    1.24

  54          KK     152  SCHOENBERGER CREEK SUBAREA 152
  55          BA    1.16
  56          LS       0    75.0
  57          UD    0.73

  58          KK       1  COMBINE 155 AND 152
  59          HC       2

  60          KK     156  SCHOENBERGER CREEK SUBAREA 156
  61          BA    4.36
  62          LS       0    75.0
  63          UD    1.09

  64          KK       2  COMBINE 155,152,156
  65          HC       2

  66          KK       3  ROUTE COMBINED FLOWS
  67          RS       0    FLOW      -1       0
  68          SV       0       9      18      31      51      97     140     244     300
  69          SQ       0     200     500    1000    2000    4000    6000   10000   12000

  70          KK    150,151,153 SCHOENBERGER CREEK TRIBS 150,151,153
  71          BA    2.12
  72          LS       0    75.0
  73          UD     .66

  74          KK       2  COMBINE FLOWS AT ILLINOIS HIGHWAY 157 IN CASEYVILLE
  75          HC       2

  76          KK      14  DIVERSION OF SPILL ABOVE 3950 CFS
  77          DT     SCH
  78          DI       0    3950   20000
  79          DQ       0       0   16050

  80          KK       2  COMBINE FLOWS AT JUNCTION OF SCHOENBERGER WITH HARDING DITCH
  81          HC       2
  82          ZZ
1****************************************                                          ****************************************
 *                                      *                                          *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                          *   U.S. ARMY CORPS OF ENGINEERS       *
 *               JUN   1998             *                                          *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                                          *          609 SECOND STREET           *
 *                                      *                                          *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   08MAY01  TIME  12:52:03  *                                          *          (916) 756-1104              *
 *                                      *                                          *                                      *
****************************************                                          ****************************************



                              HARDING DITCH WATERSHED
                              HEC-1 ROUTING
                              MULTI-RATIO:10-YR BASE FLOOD (1.0) /2-YR/5-YR/25-YR/50-YR/100-YR/500-YR

   5 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                        NMIN         10  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1   0  STARTING DATE
                       ITIME       0000  STARTING TIME
                          NQ        290  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      3   0  ENDING DATE
                      NDTIME       0010  ENDING TIME
                       ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL     .17 HOURS
                      TOTAL TIME BASE   48.17 HOURS
```

HEC-1 Base Model for Canteen Creek Output

```
ENGLISH UNITS
    DRAINAGE AREA          SQUARE MILES
    PRECIPITATION DEPTH    INCHES
    LENGTH, ELEVATION      FEET
    FLOW                   CUBIC FEET PER SECOND
    STORAGE VOLUME         ACRE-FEET
    SURFACE AREA           ACRES
    TEMPERATURE            DEGREES FAHRENHEIT

JP          MULTI-PLAN OPTION
                 NPLAN            1  NUMBER OF PLANS

JR          MULTI-RATIO OPTION
                RATIOS OF PRECIPITATION
                 .69      .87      1.00      1.26      1.48      1.72      2.29

WARNING --- ROUTED OUTFLOW (   8527.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9461.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9819.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9674.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9140.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   8343.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   8508.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9345.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9642.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9468.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   8931.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   8161.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   8477.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9228.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9470.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9270.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   8735.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   8436.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9111.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   9302.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW .(  9081.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   8549.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (  12030.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (  13691.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (  14775.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (  15227.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (  15108.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (  14510.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (  13547.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (  12358.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE
1

          PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                           FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
                                        TIME TO PEAK IN HOURS
```

OPERATION	STATION	AREA	PLAN		RATIO 1 .69	RATIO 2 .87	RATIO 3 1.00	RATIO 4 1.26	RATIO 5 1.48	RATIO 6 1.72	RATIO 7 2.29
					RATIOS APPLIED TO PRECIPITATION						
HYDROGRAPH AT											
+	145	2.98	1	FLOW	674.	1069.	1375.	2024.	2599.	3238.	4785.
				TIME	13.50	13.50	13.50	13.33	13.33	13.33	13.33

HEC-1 Base Model for Canteen Creek Output

HYDROGRAPH AT											
+	146	2.91	1	FLOW	757.	1206.	1553.	2283.	2923.	3634.	5351.
				TIME	13.17	13.17	13.17	13.17	13.17	13.17	13.17
2 COMBINED AT											
+	1	5.89	1	FLOW	1408.	2238.	2878.	4228.	5431.	6771.	10011.
				TIME	13.33	13.33	13.33	13.17	13.17	13.17	13.17
ROUTED TO											
+	146	5.89	1	FLOW	1281.	2048.	2643.	3857.	4956.	6183.	9302.
				TIME	14.00	14.00	14.00	14.00	14.00	13.83	13.83
HYDROGRAPH AT											
+	144	2.06	1	FLOW	641.	1018.	1314.	1935.	2479.	3086.	4548.
				TIME	13.00	12.83	12.83	12.83	12.83	12.83	12.83
2 COMBINED AT											
+	2	7.95	1	FLOW	1550.	2481.	3210.	4646.	5987.	7465.	11307.
				TIME	13.83	13.83	13.83	13.83	13.83	13.83	13.67
DIVERSION TO											
+	HARD	7.95	1	FLOW	0.	181.	910.	2346.	3687.	5165.	9007.
				TIME	.00	13.83	13.83	13.83	13.83	13.83	13.67
HYDROGRAPH AT											
+	35	7.95	1	FLOW	1550.	2300.	2300.	2300.	2300.	2300.	2300.
				TIME	13.83	13.50	13.17	12.67	12.50	12.50	12.17
ROUTED TO											
+	15	7.95	1	FLOW	1550.	2300.	2300.	2300.	2300.	2300.	2300.
				TIME	16.33	16.00	15.67	15.17	15.00	15.00	14.67
HYDROGRAPH AT											
+	155	4.40	1	FLOW	1027.	1616.	2069.	3019.	3859.	4798.	7063.
				TIME	13.50	13.50	13.50	13.50	13.33	13.33	13.33
HYDROGRAPH AT											
+	152	1.16	1	FLOW	363.	579.	747.	1099.	1408.	1752.	2581.
				TIME	13.00	12.83	12.83	12.83	12.83	12.83	12.83
2 COMBINED AT											
+	1	5.56	1	FLOW	1289.	2036.	2610.	3839.	4918.	6120.	9021.
				TIME	13.33	13.33	13.33	13.17	13.17	13.17	13.17
HYDROGRAPH AT											
+	156	4.36	1	FLOW	1064.	1691.	2174.	3189.	4086.	5094.	7530.
				TIME	13.33	13.33	13.33	13.33	13.17	13.17	13.17
2 COMBINED AT											
+	2	9.92	1	FLOW	2354.	3726.	4784.	7020.	9004.	11213.	16551.
				TIME	13.33	13.33	13.33	13.17	13.17	13.17	13.17
ROUTED TO											
+	3	9.92	1	FLOW	2225.	3502.	4520.	6601.	8397.	10403.	15227.
				TIME	13.67	13.67	13.50	13.50	13.50	13.50	13.50
HYDROGRAPH AT											
+	150	2.12	1	FLOW	716.	1137.	1460.	2138.	2731.	3390.	4975.
				TIME	12.83	12.83	12.83	12.83	12.83	12.83	12.83
2 COMBINED AT											
+	2	12.04	1	FLOW	2612.	4112.	5295.	7756.	9834.	12191.	17788.
				TIME	13.50	13.50	13.50	13.33	13.33	13.33	13.33
DIVERSION TO											
+	SCH	12.04	1	FLOW	0.	162.	1345.	3806.	5884.	8241.	13838.
				TIME	.00	13.50	13.50	13.33	13.33	13.33	13.33
HYDROGRAPH AT											
+	14	12.04	1	FLOW	2612.	3950.	3950.	3950.	3950.	3950.	3950.
				TIME	13.50	13.33	12.83	12.67	12.50	12.33	12.17
2 COMBINED AT											
+	2	19.99	1	FLOW	2613.	3969.	4074.	5263.	6250.	6250.	6250.
				TIME	13.50	13.67	14.17	15.00	15.00	15.00	14.67

*** NORMAL END OF HEC-1 ***

Hydrograph Addition Calculations

```
Type.... Node: Addition Summary                               Page 4.01
Name.... CHANNEL                                          Event: ex100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\SPRINGSYS.PPW
Storm... ex100   Tag: ex100

                SUMMARY FOR HYDROGRAPH ADDITION
                at Node: CHANNEL

 HYG Directory: K:\STLCOE\ESTL-IFC\PONDPACK\
```

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
NEW CHANNEL	CANTEEN OVERFLOW		cantdiv_100tc	
WARNING: Adding in hydrograph that is truncated on left...				
IMPROVED CHANNEL	HARDING TOTAL		lcanteen	ex100

INFLOWS TO: CHANNEL

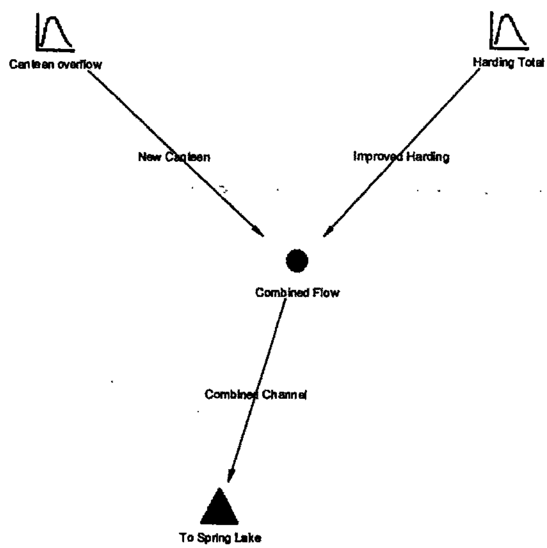
HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	cantdiv_100tc		2220.900	16.0320	6383.92
	lcanteen	ex100	2234.604	13.8610	7465.00

TOTAL FLOW INTO: CHANNEL

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	CHANNEL	ex100	4455.508	14.3620	9876.69

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:23:20 Date: 03-09-2001

Hydrograph Addition Calculations



Hydrograph Addition Calculations

```
Type.... Node: Addition Summary                                Page 4.02
Name.... CHANNEL                                          Event: ex100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\SPRINGSYS.PPW
Storm... ex100   Tag: ex100

         TOTAL NODE INFLOW...
         HYG file =
         HYG ID   = CHANNEL
         HYG Tag  = ex100
         ----------------------------------
         Peak Discharge =     9876.69 cfs
         Time to Peak   =     14.3620 hrs
         HYG Volume     =    4455.508 ac-ft
         ----------------------------------

         WARNING: Hydrograph truncated on left side.
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .1670 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	15.00	15.00	14.00	14.00	14.00
.8350	13.00	13.00	13.00	12.00	12.00
1.6700	11.00	11.00	10.00	9.00	9.00
2.5050	8.00	8.00	8.00	7.00	7.00
3.3400	6.00	6.00	6.00	5.00	5.00
4.1750	5.00	4.00	4.00	4.00	4.00
5.0100	3.00	3.00	3.00	3.00	3.00
5.8450	3.00	2.00	2.00	2.00	2.00
6.6800	2.00	2.00	2.00	2.00	2.00
7.5150	3.00	4.00	6.00	9.00	12.00
8.3500	16.00	21.00	26.00	32.00	39.00
9.1850	47.00	57.00	70.00	86.00	103.00
10.0200	122.00	141.00	162.00	183.00	208.00
10.8550	240.00	281.00	336.00	407.00	508.00
11.6900	633.00	791.00	1040.00	1516.00	2270.00
12.5250	3281.00	4294.00	5134.00	5853.82	6549.51
13.3600	7175.20	7797.09	8626.27	9271.44	9618.67
14.1950	9788.18	9876.69	9860.12	9687.02	9564.92
15.0300	9492.12	9283.29	9097.46	8937.94	8709.44
15.8650	8537.93	8378.92	8124.44	7897.96	7669.44
16.7000	7370.40	7087.37	6801.33	6464.79	6137.26
17.5350	5806.26	5436.27	5075.29	4726.13	4401.20
18.3700	4077.26	3761.09	3481.27	3200.44	2927.04
19.2050	2681.29	2434.54	2195.97	1984.29	1774.61
20.0400	1573.00	1385.35	1199.70	1020.31	858.03
20.8750	699.75	567.24	509.48	452.72	410.00
21.7100	404.00	399.00	396.00	393.00	390.00
22.5450	388.00	387.00	386.00	385.00	384.00
23.3800	384.00	383.00	383.00	383.00	382.00
24.2150	381.00	376.00	370.00	363.00	355.00

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 09:23:20   Date: 03-09-2001

Hydrograph Addition Calculations

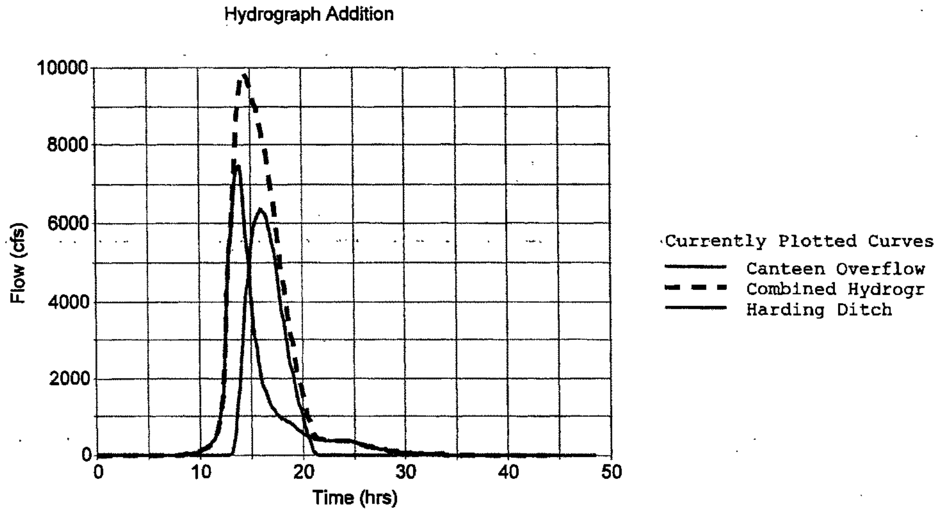
```
Type.... Node: Addition Summary                            Page 4.03
Name.... CHANNEL                                        Event: ex100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\SPRINGSYS.PPW
Storm... ex100   Tag: ex100

         WARNING: Hydrograph truncated on left side.
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .1670 hrs
Time on left represents time for first value in each row.

Time hrs					
25.0500	344.00	330.00	313.00	295.00	278.00
25.8850	262.00	250.00	241.00	231.00	221.00
26.7200	210.00	199.00	189.00	179.00	169.00
27.5550	160.00	151.00	142.00	134.00	126.00
28.3900	119.00	112.00	106.00	100.00	94.00
29.2250	88.00	83.00	78.00	74.00	70.00
30.0600	66.00	62.00	58.00	55.00	52.00
30.8950	49.00	46.00	43.00	41.00	38.00
31.7300	36.00	34.00	32.00	30.00	28.00
32.5650	27.00	25.00	24.00	22.00	21.00
33.4000	20.00	19.00	18.00	17.00	16.00
34.2350	15.00	14.00	13.00	12.00	12.00
35.0700	11.00	10.00	10.00	9.00	9.00
35.9050	8.00	8.00	7.00	7.00	6.00
36.7400	6.00	6.00	5.00	5.00	5.00
37.5750	4.00	4.00	4.00	4.00	4.00
38.4100	3.00	3.00	3.00	3.00	3.00
39.2450	2.00	2.00	2.00	2.00	2.00
40.0800	2.00	2.00	2.00	2.00	1.00
40.9150	1.00	1.00	1.00	1.00	1.00
41.7500	1.00	1.00	1.00	1.00	1.00
42.5850	1.00	1.00	1.00	1.00	1.00
43.4200	1.00	1.00	.00		

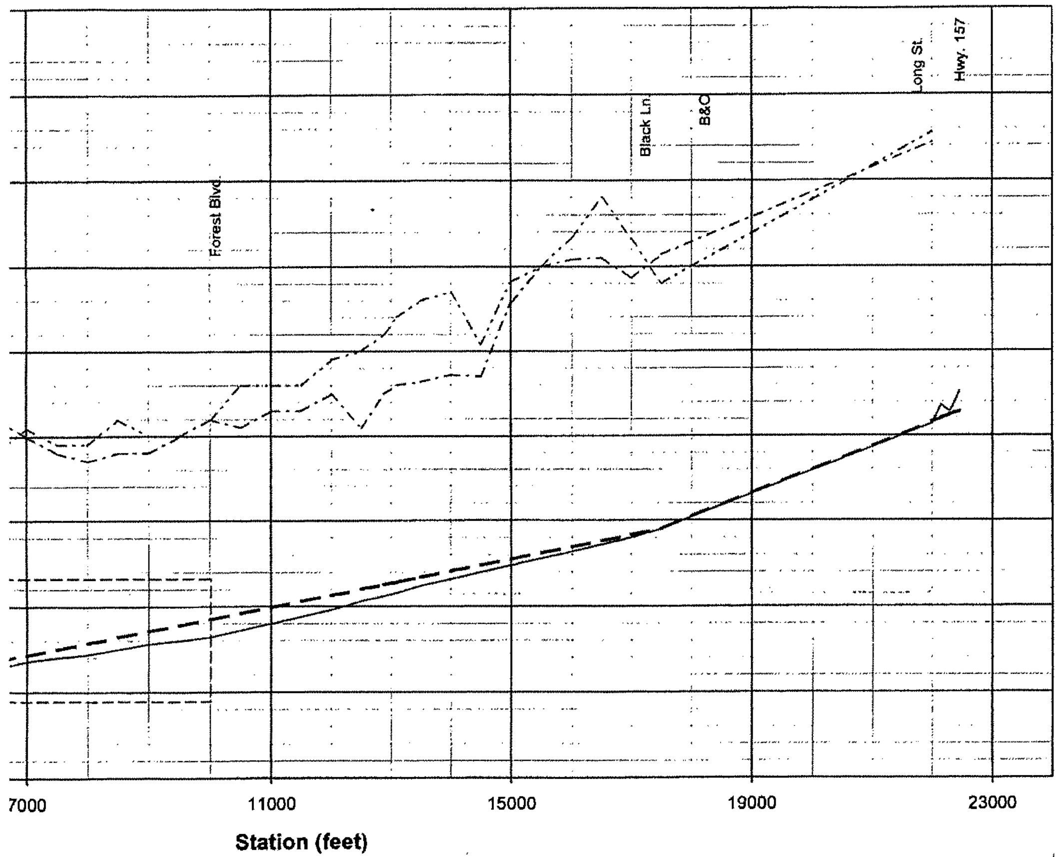
Hydrograph Addition Calculations



1927

CHANNEL IMPROVEMENTS CALCULATIONS

Harding ˈch Existing and Proposed Profile



Reach 1 - Grass-lined Trapezoidal
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Grass-lined Trapezoidal, Reach 1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.000400	ft/ft
Depth	7.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Discharge	2,150.00	cfs

Results		
Bottom Width	76.70	ft
Flow Area	683.90	ft²
Wetted Perimeter	120.97	ft
Top Width	118.70	ft
Critical Depth	2.79	ft
Critical Slope	0.009732	ft/ft
Velocity	3.14	ft/s
Velocity Head	0.15	ft
Specific Energy	7.15	ft
Froude Number	0.23	
Flow is subcritical.		

Reach 1 - Concrete Trapezoidal
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Concrete Trapezoidal, Reach 1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.000400	ft/ft
Depth	7.00	ft
Left Side Slope	2.500000	H : V
Right Side Slope	2.500000	H : V
Discharge	2,150.00	cfs

Results		
Bottom Width	29.16	ft
Flow Area	326.65	ft²
Wetted Perimeter	66.86	ft
Top Width	64.16	ft
Critical Depth	4.79	ft
Critical Slope	0.001665	ft/ft
Velocity	6.58	ft/s
Velocity Head	0.67	ft
Specific Energy	7.67	ft
Froude Number	0.51	
Flow is subcritical.		

Reach 1 - Concrete Rectangular
Worksheet for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Rectangular Ditch, Reach 1
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.000400	ft/ft
Depth	7.00	ft
Discharge	2,150.00	cfs

Results		
Bottom Width	44.12	ft
Flow Area	308.85	ft²
Wetted Perimeter	58.12	ft
Top Width	44.12	ft
Critical Depth	4.19	ft
Critical Slope	0.001926	ft/ft
Velocity	6.96	ft/s
Velocity Head	0.75	ft
Specific Energy	7.75	ft
Froude Number	0.46	
Flow is subcritical.		

Reach 1 - Concrete-earthen
Worksheet for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\st. clair farms\i64.fm2
Worksheet	concrete-earthen
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.000400 ft/ft

Elevation range: 0.00 ft to 8.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	8.00	0.00	25.00	0.013
20.00	0.00	25.00	67.00	0.030
25.00	0.00	67.00	92.00	0.013
67.00	0.00			
72.00	0.00			
92.00	8.00			

Discharge 2,150.00 cfs

Results		
Wtd. Mannings Coefficient	0.020	
Water Surface Elevation	6.95	ft
Flow Area	481.99	ft²
Wetted Perimeter	89.42	ft
Top Width	86.74	ft
Height	6.95	ft
Critical Depth	3.54	ft
Critical Slope	0.004998	ft/ft
Velocity	4.46	ft/s
Velocity Head	0.31	ft
Specific Energy	7.26	ft
Froude Number	0.33	
Flow is subcritical.		

Reach 1- Riprap-earthen
Worksheet for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\st. clair farms\i64.fm2
Worksheet	concrete-riprap
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.000400 ft/ft

Elevation range: 0.00 ft to 8.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	8.00	0.00	25.00	0.023
20.00	0.00	25.00	85.00	0.030
25.00	0.00	85.00	110.00	0.023
85.00	0.00			
90.00	0.00			
110.00	8.00			

Discharge 2,150.00 cfs

Results		
Wtd. Mannings Coefficient	0.027	
Water Surface Elevation	6.99	ft
Flow Area	611.94	ft²
Wetted Perimeter	107.67	ft
Top Width	104.97	ft
Height	6.99	ft
Critical Depth	2.97	ft
Critical Slope	0.008326	ft/ft
Velocity	3.51	ft/s
Velocity Head	0.19	ft
Specific Energy	7.19	ft
Froude Number	0.26	
Flow is subcritical.		

Reach 2 - Grass-lined channel
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Grass-lined Trapezoidal, Reach 2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.000700	ft/ft
Depth	12.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Discharge	9,877.00	cfs

Results		
Bottom Width	105.42	ft
Flow Area	1,697.05	ft²
Wetted Perimeter	181.32	ft
Top Width	177.42	ft
Critical Depth	6.10	ft
Critical Slope	0.007654	ft/ft
Velocity	5.82	ft/s
Velocity Head	0.53	ft
Specific Energy	12.53	ft
Froude Number	0.33	
Flow is subcritical.		

Reach 2 - Concrete Trapezoidal
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Concrete Trapezoidal, Reach 2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.000700	ft/ft
Depth	12.00	ft
Left Side Slope	2.500000	H : V
Right Side Slope	2.500000	H : V
Discharge	9,877.00	cfs

Results		
Bottom Width	38.26	ft
Flow Area	819.13	ft²
Wetted Perimeter	102.88	ft
Top Width	98.26	ft
Critical Depth	10.15	ft
Critical Slope	0.001347	ft/ft
Velocity	12.06	ft/s
Velocity Head	2.26	ft
Specific Energy	14.26	ft
Froude Number	0.74	
Flow is subcritical.		

Reach 2 - Concrete rectangular
Worksheet for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Rectangular Ditch, Reach 2
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.000700	ft/ft
Depth	12.00	ft
Discharge	9,877.00	cfs

Results		
Bottom Width	64.18	ft
Flow Area	770.11	ft²
Wetted Perimeter	88.18	ft
Top Width	64.18	ft
Critical Depth	9.03	ft
Critical Slope	0.001646	ft/ft
Velocity	12.83	ft/s
Velocity Head	2.56	ft
Specific Energy	14.56	ft
Froude Number	0.65	
Flow is subcritical.		

Reach 2, Concrete/earthen
Worksheet for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	conc/earthen channel, Reach 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.000700 ft/ft

Elevation range: 0.00 ft to 13.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	13.00	0.00	37.50	0.013
32.50	0.00	37.50	96.50	0.030
37.50	0.00	96.50	134.00	0.013
96.50	0.00			
101.50	0.00			
134.00	13.00			

Discharge 9,877.00 cfs

Results		
Wtd. Mannings Coefficient	0.020	
Water Surface Elevation	12.00	ft
Flow Area	1,187.48	ft²
Wetted Perimeter	133.60	ft
Top Width	128.98	ft
Height	12.00	ft
Critical Depth	7.79	ft
Critical Slope	0.003805	ft/ft
Velocity	8.32	ft/s
Velocity Head	1.08	ft
Specific Energy	13.07	ft
Froude Number	0.48	
Flow is subcritical.		

Reach 2 - Riprap/earthen
Worksheet for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Riprap/earthen channel, Reach 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.000700 ft/ft

Elevation range: 0.00 ft to 12.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	12.00	0.00	35.00	0.023
30.00	0.00	35.00	138.00	0.030
35.00	0.00	138.00	173.00	0.023
138.00	0.00			
143.00	0.00			
173.00	12.00			

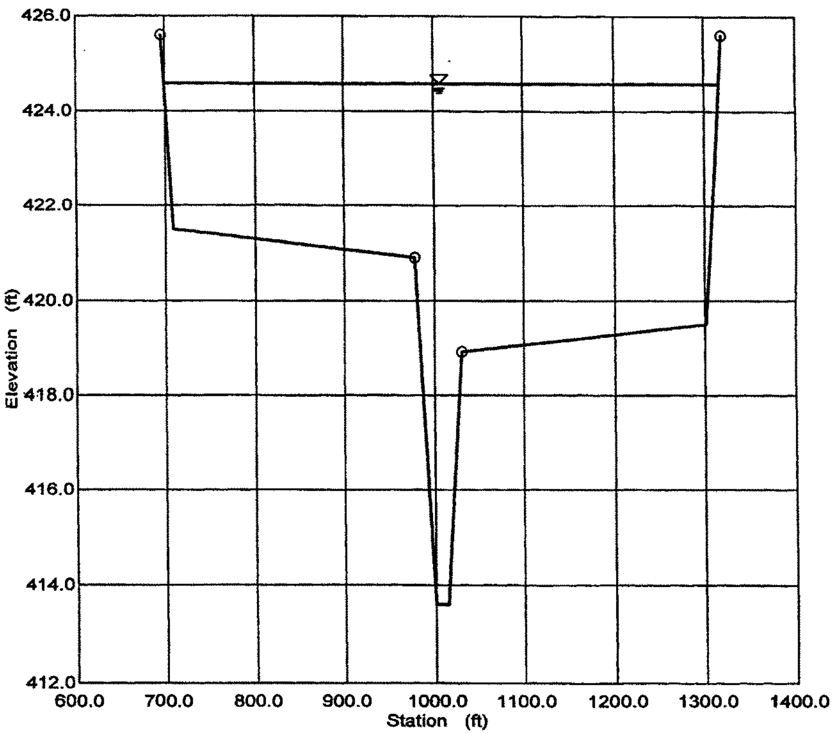
Discharge 9,877.00 cfs

Results		
Wtd. Mannings Coefficient	0.027	
Water Surface Elevation	11.13	ft
Flow Area	1,568.10	ft²
Wetted Perimeter	172.96	ft
Top Width	168.67	ft
Height	11.13	ft
Critical Depth	5.92	ft
Critical Slope	0.006706	ft/ft
Velocity	6.30	ft/s
Velocity Head	0.62	ft
Specific Energy	11.75	ft
Froude Number	0.36	
Flow is subcritical.		

Reach 2 - 100-year Floodplain
Cross Section for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Prairie, 100-yr floodplain combined
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.032	
Channel Slope	0.000700 ft/ft	
Water Surface Elevation	424.60	ft
Discharge	9,877.00	cfs



Reach 3A - Grass-lined
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Grass-lined Trapezoidal, Reach 3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.001400	ft/ft
Depth	12.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Discharge	7,465.00	cfs

Results		
Bottom Width	47.16	ft
Flow Area	997.92	ft²
Wetted Perimeter	123.05	ft
Top Width	119.16	ft
Critical Depth	7.75	ft
Critical Slope	0.007551	ft/ft
Velocity	7.48	ft/s
Velocity Head	0.87	ft
Specific Energy	12.87	ft
Froude Number	0.46	
Flow is subcritical.		

Reach 3A - Concrete Trapezoidal
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Concrete Trapezoidal, Reach 3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.001400	ft/ft
Depth	12.00	ft
Left Side Slope	2.500000	H : V
Right Side Slope	2.500000	H : V
Discharge	7,465.00	cfs

Results		
Bottom Width	11.56	ft
Flow Area	498.77	ft²
Wetted Perimeter	76.19	ft
Top Width	71.56	ft
Critical Depth	12.00	ft
Critical Slope	0.001402	ft/ft
Velocity	14.97	ft/s
Velocity Head	3.48	ft
Specific Energy	15.48	ft
Froude Number	1.00	
Flow is subcritical.		

Reach 3A - Concrete Rectangular
Worksheet for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Rectangular Ditch, Reach 3A
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.001400	ft/ft
Depth	12.00	ft
Discharge	7,465.00	cfs

Results		
Bottom Width	38.37	ft
Flow Area	460.39	ft²
Wetted Perimeter	62.37	ft
Top Width	38.37	ft
Critical Depth	10.56	ft
Critical Slope	0.002014	ft/ft
Velocity	16.21	ft/s
Velocity Head	4.09	ft
Specific Energy	16.09	ft
Froude Number	0.83	
Flow is subcritical.		

Reach 3A - Concrete/earthen
Worksheet for Irregular Channel

Project Description	
Project File	k:\sticoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	conc/earthen channel, Reach 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.001400 ft/ft

Elevation range: 0.00 ft to 13.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	13.00	0.00	37.50	0.013
32.50	0.00	37.50	41.50	0.030
37.50	0.00	41.50	79.00	0.013
41.50	0.00			
46.50	0.00			
79.00	13.00			

Discharge 7,465.00 cfs

Results		
Wtd. Mannings Coefficient	0.014	
Water Surface Elevation	11.93	ft
Flow Area	522.81	ft²
Wetted Perimeter	78.24	ft
Top Width	73.65	ft
Height	11.93	ft
Critical Depth	11.61	ft
Critical Slope	0.001584	ft/ft
Velocity	14.28	ft/s
Velocity Head	3.17	ft
Specific Energy	15.10	ft
Froude Number	0.94	
Flow is subcritical.		

Reach 3A - Riprap/earthen
Worksheet for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	riprap/earthen channel, Reach 3A
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.001400 ft/ft

Elevation range: 0.00 ft to 13.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	13.00	0.00	37.50	0.023
32.50	0.00	37.50	69.50	0.030
37.50	0.00	69.50	107.00	0.023
69.50	0.00			
74.50	0.00			
107.00	13.00			

Discharge 7,465.00 cfs

Results		
Wtd. Mannings Coefficient	0.025	
Water Surface Elevation	11.78	ft
Flow Area	842.06	ft²
Wetted Perimeter	105.46	ft
Top Width	100.92	ft
Height	11.78	ft
Critical Depth	8.36	ft
Critical Slope	0.005433	ft/ft
Velocity	8.87	ft/s
Velocity Head	1.22	ft
Specific Energy	13.01	ft
Froude Number	0.54	
Flow is subcritical.		

Reach 3B - Grass-lined
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Grass-lined Trapezoidal, Reach 3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.001400	ft/ft
Depth	12.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Discharge	9,877.00	cfs

Results		
Bottom Width	69.02	ft
Flow Area	1,260.26	ft²
Wetted Perimeter	144.92	ft
Top Width	141.02	ft
Critical Depth	7.65	ft
Critical Slope	0.007376	ft/ft
Velocity	7.84	ft/s
Velocity Head	0.95	ft
Specific Energy	12.95	ft
Froude Number	0.46	
Flow is subcritical.		

Reach 3B - Concrete Trapezoidal
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Concrete Trapezoidal, Reach 3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.001400	ft/ft
Depth	12.00	ft
Left Side Slope	2.500000	H : V
Right Side Slope	2.500000	H : V
Discharge	9,877.00	cfs

Results		
Bottom Width	21.68	ft
Flow Area	620.18	ft²
Wetted Perimeter	86.30	ft
Top Width	81.68	ft
Critical Depth	12.11	ft
Critical Slope	0.001345	ft/ft
Velocity	15.93	ft/s
Velocity Head	3.94	ft
Specific Energy	15.94	ft
Froude Number	1.02	
Flow is supercritical.		

Reach 3B - Concrete Rectangular
Worksheet for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Rectangular Ditch, Reach 3A
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.001400	ft/ft
Depth	12.00	ft
Discharge	9,877.00	cfs

Results		
Bottom Width	48.09	ft
Flow Area	577.12	ft²
Wetted Perimeter	72.09	ft
Top Width	48.09	ft
Critical Depth	10.94	ft
Critical Slope	0.001829	ft/ft
Velocity	17.11	ft/s
Velocity Head	4.55	ft
Specific Energy	16.55	ft
Froude Number	0.87	
Flow is subcritical.		

Reach 3B - Concrete/earthen
Worksheet for Irregular Channel

Project Description	
Project File	k:\sticoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	conc/earthen channel, Reach 3B combine
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.001400 ft/ft

Elevation range: 0.00 ft to 13.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	13.00	0.00	37.50	0.013
32.50	0.00	37.50	61.50	0.030
37.50	0.00	61.50	99.00	0.013
61.50	0.00			
66.50	0.00			
99.00	13.00			

Discharge 9,877.00 cfs

Results		
Wtd. Mannings Coefficient	0.017	
Water Surface Elevation	11.99	ft
Flow Area	766.89	ft²
Wetted Perimeter	98.56	ft
Top Width	93.94	ft
Height	11.99	ft
Critical Depth	10.60	ft
Critical Slope	0.002366	ft/ft
Velocity	12.88	ft/s
Velocity Head	2.58	ft
Specific Energy	14.57	ft
Froude Number	0.79	
Flow is subcritical.		

Reach 3B - Riprap/earthen
Worksheet for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\harding ditch\hardingd.fm2
Worksheet	Reach 3B riprap-earthen
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.001400 ft/ft

Elevation range: 0.00 ft to 13.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	13.00	0.00	37.50	0.023
32.50	0.00	37.50	88.50	0.030
37.50	0.00	88.50	126.00	0.023
88.50	0.00			
93.50	0.00			
126.00	13.00			

Discharge 9,877.00 cfs

Results		
Wtd. Mannings Coefficient	0.026	
Water Surface Elevation	11.95	ft
Flow Area	1,085.89	ft²
Wetted Perimeter	125.35	ft
Top Width	120.75	ft
Height	11.95	ft
Critical Depth	8.29	ft
Critical Slope	0.005632	ft/ft
Velocity	9.10	ft/s
Velocity Head	1.29	ft
Specific Energy	13.24	ft
Froude Number	0.53	
Flow is subcritical.		

New Canteen Relief Channel
Worksheet for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\state park\canteen .fm2
Worksheet	Canteen Relief to Spring Lake
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.000500	ft/ft
Depth	12.00	ft
Discharge	6,400.00	cfs

Results		
Bottom Width	51.40	ft
Flow Area	616.78	ft²
Wetted Perimeter	75.40	ft
Top Width	51.40	ft
Critical Depth	7.84	ft
Critical Slope	0.001768	ft/ft
Velocity	10.38	ft/s
Velocity Head	1.67	ft
Specific Energy	13.67	ft
Froude Number	0.53	
Flow is subcritical.		

Fairmont City - Grass-Lined Trapez.
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\spring lake\tailwate.fm2
Worksheet	outlet 1 (to New Lansdowne) - grass
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.000600	ft/ft
Depth	7.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Discharge	2,150.00	cfs

Results		
Bottom Width	60.76	ft
Flow Area	572.29	ft²
Wetted Perimeter	105.03	ft
Top Width	102.76	ft
Critical Depth	3.21	ft
Critical Slope	0.009443	ft/ft
Velocity	3.76	ft/s
Velocity Head	0.22	ft
Specific Energy	7.22	ft
Froude Number	0.28	
Flow is subcritical.		

Fairmont City Ditch - Concrete Trapez.
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\spring lake\tailwate.fm2
Worksheet	outlet 1 (to New Lansdowne) - concrete
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.000600	ft/ft
Depth	7.00	ft
Left Side Slope	2.500000	H : V
Right Side Slope	2.500000	H : V
Discharge	2,150.00	cfs

Results		
Bottom Width	21.98	ft
Flow Area	276.39	ft²
Wetted Perimeter	59.68	ft
Top Width	56.98	ft
Critical Depth	5.40	ft
Critical Slope	0.001652	ft/ft
Velocity	7.78	ft/s
Velocity Head	0.94	ft
Specific Energy	7.94	ft
Froude Number	0.62	
Flow is subcritical.		

Fairmont City Ditch - Conc. Rectangular
Worksheet for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-lfc\spring lake\tailwate.fm2
Worksheet	outlet 1 (to New Lansdowne) - rectangula
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.000600	ft/ft
Depth	7.00	ft
Discharge	2,150.00	cfs

Results		
Bottom Width	37.11	ft
Flow Area	259.77	ft²
Wetted Perimeter	51.11	ft
Top Width	37.11	ft
Critical Depth	4.71	ft
Critical Slope	0.001986	ft/ft
Velocity	8.28	ft/s
Velocity Head	1.06	ft
Specific Energy	8.06	ft
Froude Number	0.55	
Flow is subcritical.		

Fairmont City Ditch - Concrete/earthen
Worksheet for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\spring lake\tailwate.fm2
Worksheet	outlet 1 (New Lansdowne, conc-earth)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.000600 ft/ft

Elevation range: 0.00 ft to 8.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	8.00	0.00	25.00	0.013
20.00	0.00	25.00	51.00	0.030
25.00	0.00	51.00	76.00	0.013
51.00	0.00			
56.00	0.00			
76.00	8.00			

Discharge 2,150.00 cfs

Results		
Wtd. Mannings Coefficient	0.019	
Water Surface Elevation	6.96	ft
Flow Area	371.73	ft²
Wetted Perimeter	73.49	ft
Top Width	70.80	ft
Height	6.96	ft
Critical Depth	4.32	ft
Critical Slope	0.003838	ft/ft
Velocity	5.78	ft/s
Velocity Head	0.52	ft
Specific Energy	7.48	ft
Froude Number	0.45	
Flow is subcritical.		

Fairmont City Ditch - Riprap/earthen
Worksheet for Irregular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\spring lake\tailwate.fm2
Worksheet	outlet 1 (New Lansdowne, riprap-earth)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.000600 ft/ft

Elevation range: 0.00 ft to 8.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	8.00	0.00	25.00	0.023
20.00	0.00	25.00	70.00	0.030
25.00	0.00	70.00	95.00	0.023
70.00	0.00			
75.00	0.00			
95.00	8.00			

Discharge 2,150.00 cfs

Results		
Wtd. Mannings Coefficient	0.026	
Water Surface Elevation	6.96	ft
Flow Area	504.26	ft²
Wetted Perimeter	92.50	ft
Top Width	89.82	ft
Height	6.96	ft
Critical Depth	3.43	ft
Critical Slope	0.007748	ft/ft
Velocity	4.26	ft/s
Velocity Head	0.28	ft
Specific Energy	7.25	ft
Froude Number	0.32	
Flow is subcritical.		

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STORAGE VOLUME CALCULATIONS

Spring Lake 1, Maximum Excavation

Type.... Vol: Elev-Area Page 1.01
Name.... CELL 1

File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SL.PPW
Title... Volume of Spring Lake with Max Excavation

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
409.20	-----	1.0000	.0000	.000	.000
409.50	-----	364.0500	384.1302	38.411	38.411
410.00	-----	365.3999	1094.1740	182.362	220.774
412.00	-----	368.1001	1100.2470	733.498	954.272
414.00	-----	370.8000	1108.3480	738.899	1693.171
415.00	-----	372.2000	1114.4990	371.500	2064.670
416.00	-----	373.6001	1118.6990	372.900	2437.570
417.00	-----	375.0000	1122.8990	374.300	2811.870

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 15:24:23 Date: 03-16-2001

Spring Lake 2, Existing Contours

Type.... Vol: Elev-Area
Name.... POND2

Page 1.01

File.... K:\STLCOE\ESTL-IFC\PONDPACK\SPRINGCELL2.PPW
Title... Available Volume in Spring Lake Cell 2

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
410.80	-----	.0000	.0000	.000	.000
412.00	-----	26.2200	26.2200	10.488	10.488
414.00	-----	141.9000	229.1169	152.745	163.233

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

St. Clair Farms, Existing Contours

```
Type.... Vol: Elev-Area                                          Page 1.01
Name.... EXIST

File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SC.PPW
Title... Volume of St. Clair Farms, existing contours
```

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
407.70	-----	.0000	.0000	.000	.000
408.00	-----	.2000	.2000	.020	.020
410.00	-----	1.3000	2.0099	1.340	1.360
412.00	-----	1.6000	4.3422	2.895	4.255
414.00	-----	64.6000	76.3666	50.911	55.166
415.50	-----	171.7000	341.6177	170.809	225.975

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

```
Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2      = Lower and upper elevations of the increment
       Area1,Area2   = Areas computed for EL1, EL2, respectively
       Volume        = Incremental volume between EL1 and EL2
```

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 15:25:38 Date: 03-16-2001

St. Clair Farms, Maximum Excavation and Berms

Type.... Vol: Elev-Area   Page 1.01
Name.... MAXEX

File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SC.PPW
Title... St. Clair Farms with max excavation, berms to 420'

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
407.70	-----	.0000	.0000	.000	.000
408.00	-----	166.1000	166.1000	16.609	16.609
410.00	-----	167.5000	500.3985	333.599	350.208
412.00	-----	168.9000	504.5985	336.399	686.607
414.00	-----	170.3000	508.7986	339.199	1025.806
416.00	-----	171.7000	512.9986	341.999	1367.806
418.00	-----	179.1000	526.1609	350.774	1718.579
419.00	-----	179.8000	538.3497	179.450	1898.029

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 10:30:42   Date: 03-14-2001

Indian Lake, Existing Contours

Type.... Vol: Elev-Area Page 1.01
Name.....COMBINED

File.... K:\STLCOE\ESTL-IFC\PONDPACK\INDIANLAKE.PPW
Title... Storage Capacity of Indian Lake, Combined Cells

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
400.00	-----	32.5000	.0000	.000	.000
402.00	-----	355.2000	495.1430	330.095	330.095
404.00	-----	529.0000	1317.6750	878.450	1208.545
406.00	-----	619.0999	1720.3790	1146.920	2355.465

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 15:41:11 Date: 03-12-2001

Detention Storage Estimate

```
Type.... Vol.Est: Peak Estimate                                Page 3.01
Name.... VOL100

File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SL.PPW
Title... Storage Volume Required with 2 outlets of 2300 cfs
```

DETENTION STORAGE ESTIMATE
Estimated from Max Allowable Outflow
(Outflow Hydrograph Approximation)

Peak Inflow = 9876.69 cfs
Max Outflow = 4600.00 cfs

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	1414.684	12.7528	18.1008
Linear	2246.434	11.5230	18.1008
Curvilinear	3447.273	-.1630	18.1008
Upper Boundary	3656.093	.0000	18.1008
Total Inflow	4455.508	.0000	43.7540

Stretch Factor = .000 % (Curvilinear Estimate Only)

WARNING: Hydrographs did not cross on
rising limb of inflow hydrograph.

1963

SPRING LAKE INFLOW/OUTFLOW CALCULATIONS

Existing Harding d.s. of Spring Lake
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\spring~1\tailwate.fm2
Worksheet	Existing Channel
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.000400	ft/ft
Depth	7.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	20.00	ft

Results		
Discharge	770.95	cfs
Flow Area	287.00	ft²
Wetted Perimeter	64.27	ft
Top Width	62.00	ft
Critical Depth	3.06	ft
Critical Slope	0.010242	ft/ft
Velocity	2.69	ft/s
Velocity Head	0.11	ft
Specific Energy	7.11	ft
Froude Number	0.22	
Flow is subcritical.		

E-Q-V Table

```
Type.... Pond E-V-Q Table                                        Page 10.01
Name.... CELL 1
File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SL.PPW

                    LEVEL POOL ROUTING DATA

 HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - CELL 1        IN  ex100
 Outflow HYG file = NONE STORED - CELL 1        OUT ex100

 Pond Node   Data = CELL 1
 Pond Volume Data = CELL 1
 Pond Outlet Data = OUTLET1A
                    OUTLET2A

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =   409.20 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .1670 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
409.20	.00	.000	1.0000	.00	.00	.00
409.40	13.80	12.299	170.4232	.00	13.80	1796.09
409.60	35.01	74.832	364.3198	.00	35.01	10878.96
409.80	91.51	147.755	364.8597	.00	91.51	21502.65
410.00	145.71	220.774	365.3999	.00	145.71	32138.09
410.20	204.58	293.885	365.6695	.00	204.58	42791.54
410.40	206.15	367.051	365.9392	.00	206.15	53395.52
410.60	287.15	440.259	366.2089	.00	287.15	64085.12
410.80	434.07	513.532	366.4788	.00	434.07	74850.08
411.00	520.59	586.848	366.7487	.00	520.59	85560.84
411.20	612.73	660.229	367.0189	.00	612.73	96286.66
411.40	709.30	733.664	367.2890	.00	709.30	107024.80
411.60	810.37	807.143	367.5593	.00	810.37	117773.50
411.80	916.25	880.686	367.8297	.00	916.25	128536.60
412.00	1025.50	954.272	368.1001	.00	1025.50	139309.30
412.20	1138.57	1027.924	368.3697	.00	1138.57	150095.20
412.40	1256.51	1101.629	368.6393	.00	1256.51	160893.80
412.60	1377.87	1175.377	368.9091	.00	1377.87	171702.00
412.80	1502.71	1249.190	369.1789	.00	1502.71	182523.10
413.00	1630.81	1323.047	369.4488	.00	1630.81	193353.70
413.20	1762.45	1396.968	369.7189	.00	1762.45	204197.30
413.40	1897.71	1470.943	369.9890	.00	1897.71	215052.30
413.60	2035.84	1544.961	370.2593	.00	2035.84	225916.40

```
S/N: 021801A06A86    Parsons
PondPack Ver: 7.0 (312)        Compute Time: 08:57:19     Date: 03-13-2001
```

E-Q-V Table

```
Type.... Pond E-V-Q Table                                        Page 10.02
Name.... CELL 1
File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SL.PPW

                  LEVEL POOL ROUTING DATA

 HYG Dir          = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - CELL 1       IN  ex100
 Outflow HYG file = NONE STORED - CELL 1       OUT ex100

 Pond Node   Data = CELL 1
 Pond Volume Data = CELL 1
 Pond Outlet Data = OUTLET1A
                    OUTLET2A

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =   409.20 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .1670 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
413.80	2177.34	1619.044	370.5296	.00	2177.34	236793.40
414.00	2322.24	1693.171	370.8000	.00	2322.24	247679.90
414.20	2469.89	1767.363	371.0798	.00	2469.89	258578.80
414.40	2620.17	1841.612	371.3597	.00	2620.17	269488.50
414.60	2773.82	1915.905	371.6397	.00	2773.82	280407.90
414.80	2930.18	1990.265	371.9198	.00	2930.18	291339.90
415.00	3089.10	2064.670	372.2000	.00	3089.10	302280.80
415.20	3251.36	2139.143	372.4798	.00	3251.36	313234.90
415.40	3415.82	2213.671	372.7597	.00	3415.82	324199.30
415.60	3583.39	2288.244	373.0397	.00	3583.39	335173.30
415.80	3753.15	2362.885	373.3199	.00	3753.15	346159.30
416.00	3925.72	2437.570	373.6001	.00	3925.72	357154.50
416.20	4100.77	2512.323	373.8799	.00	4100.77	368161.90
416.40	4278.05	2587.131	374.1598	.00	4278.05	379179.80
416.60	4458.52	2661.984	374.4397	.00	4458.52	390207.20
416.80	4640.32	2736.905	374.7198	.00	4640.32	401245.70
417.00	4825.38	2811.870	375.0000	.00	4825.38	412294.00

```
S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)       Compute Time: 08:57:19    Date: 03-13-2001
```

Pond Analysis Summary

```
Type.... Pond Routing Summary                                Page 10.06
Name.... CELL 1        OUT    Tag: ex100                  Event: ex100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SL.PPW
Storm... ex100   Tag: ex100

                     LEVEL POOL ROUTING SUMMARY

 HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - CELL 1        IN  ex100
 Outflow HYG file = NONE STORED - CELL 1        OUT ex100

 Pond Node   Data = CELL 1
 Pond Volume Data = CELL 1
 Pond Outlet Data = OUTLET1A
                    OUTLET2A

 No Infiltration

 INITIAL CONDITIONS
 ---------------------------------
 Starting WS Elev   =   409.20 ft
 Starting Volume    =     .000 ac-ft
 Starting Outflow   =      .00 cfs
 Starting Infiltr.  =      .00 cfs
 Starting Total Qout=      .00 cfs
 Time Increment     =    .1670 hrs

 INFLOW/OUTFLOW HYDROGRAPH SUMMARY
 ================================================
 Peak Inflow       =   9876.69 cfs    at   14.3620 hrs
 Peak Outflow      =   4297.56 cfs    at   18.2030 hrs
 ------------------------------------------------
 Peak Elevation    =    416.42 ft
 Peak Storage =       2595.227 ac-ft
 ================================================

 MASS BALANCE (ac-ft)
 --------------------------
+ Initial Vol   =       .000
+ HYG Vol IN    =   4455.508
- Infiltration  =       .000
- HYG Vol OUT   =   4455.494
- Retained Vol  =       .000
                  ----------
  Unrouted Vol  =      -.014 ac-ft  (.000% of Inflow Volume)

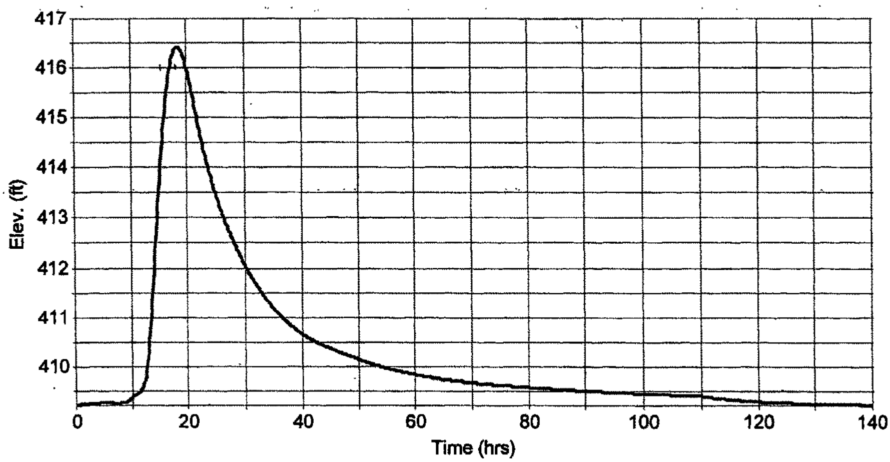
 WARNING: Inflow hydrograph truncated on left side.



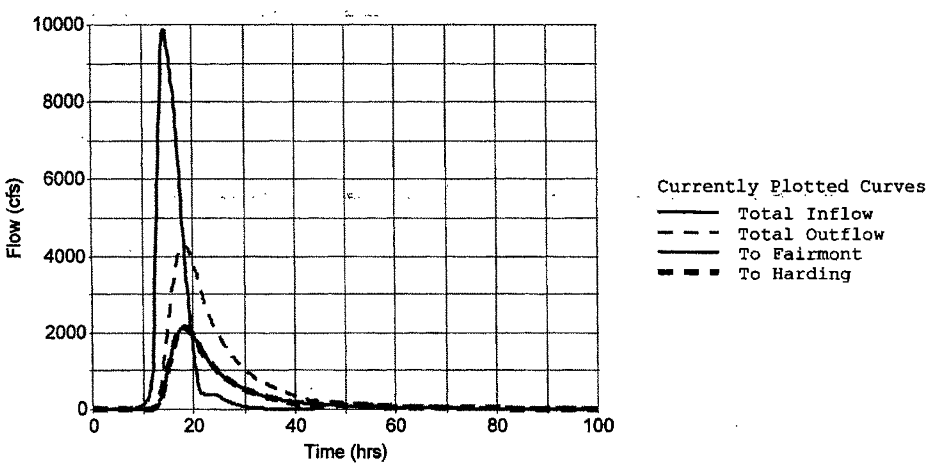

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)      Compute Time: 08:48:38    Date: 03-13-2001
```

1968

Elevation Vs. Time for Spring Lake Pond



Inflow and Outflow Hydrographs



1969

ST. CLAIR FARMS INFLOW/OUTFLOW CALCULATIONS

Detention Storage Estimate

Type.... Vol.Est: Peak Estimate Page 2.01
Name.... VOL100

File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SC.PPW
Title... Estimate of Required Storage in St. Clair Farms

DETENTION STORAGE ESTIMATE
Estimated from Max Allowable Outflow
(Outflow Hydrograph Approximation)

Peak Inflow = 2145.05 cfs
Max Outflow = 770.00 cfs

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	728.056	14.5034	26.7527
Linear	1081.607	12.3580	26.7527
Curvilinear	1506.551	.0000	26.7527
Upper Boundary	1563.269	.0000	26.7527
Total Inflow	2215.502	.0000	188.3760

Stretch Factor = .000 % (Curvilinear Estimate Only)

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 14:53:39 Date: 03-13-2001

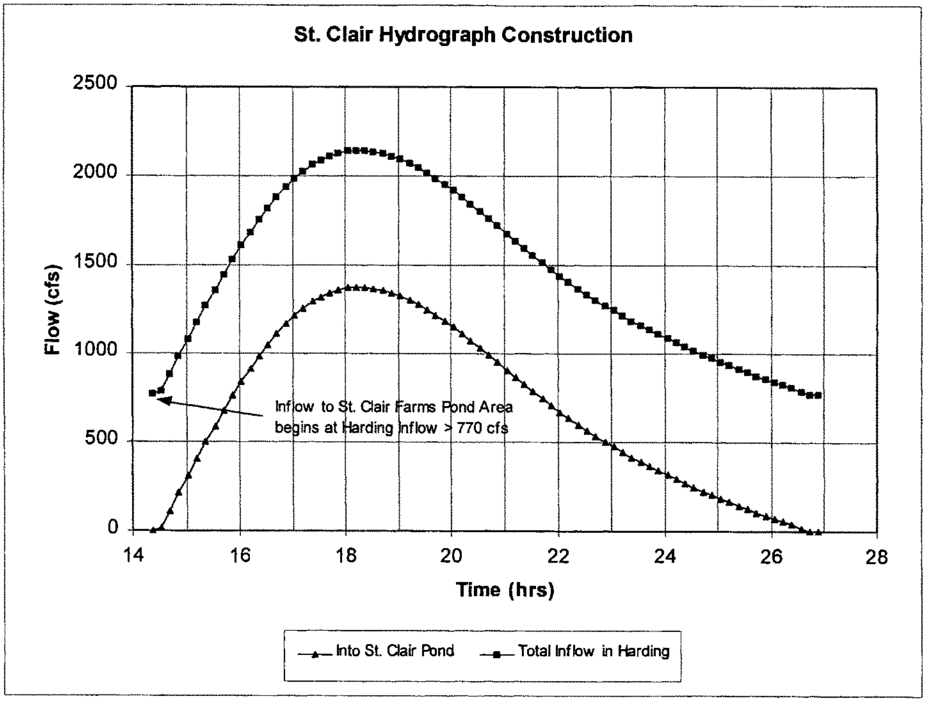
St. Clair Hydrograph Construction Calculations

Time (hrs)	Total Inflow from Harding (cfs)	Estimated Inflow into Detention (cfs)
14.362	770	0
14.529	785.16	15
14.696	883.9	114
14.863	982.48	212
15.03	1079.86	310
15.197	1176.07	406
15.364	1269.34	499
15.531	1359.47	589
15.698	1446.5	677
15.865	1529.35	759
16.032	1608.97	839
16.199	1684.32	914
16.366	1754.66	985
16.533	1820.18	1050
16.7	1880.24	1110
16.867	1934.56	1165
17.034	1983.05	1213
17.201	2025.48	1255
17.368	2061.34	1291
17.535	2090.88	1321
17.702	2113.88	1344
17.869	2130.26	1360
18.036	2140.51	1371
18.203	2145.05	1375
18.37	2144.12	1374
18.537	2137.97	1368
18.704	2127.38	1357
18.871	2112.64	1343
19.038	2093.93	1324
19.205	2071.67	1302
19.372	2046.19	1276
19.539	2017.78	1248
19.706	1986.69	1217
19.873	1953.36	1183
20.04	1918.26	1148
20.207	1881.2	1111
20.374	1842.8	1073
20.541	1802.84	1033
20.708	1761.93	992
20.875	1720.02	950
21.042	1677.57	908
21.209	1635.15	865

Time (hrs)	Total Inflow from Harding (cfs)	Estimated Inflow into Detention (cfs)
21.376	1593.58	824
21.543	1552.67	783
21.71	1513.24	743
21.877	1475.1	705
22.044	1438.22	668
22.211	1402.48	632
22.378	1368.11	598
22.545	1335.03	565
22.712	1302.98	533
22.879	1272.36	502
23.046	1242.56	473
23.213	1213.82	444
23.38	1185.98	416
23.547	1158.88	389
23.714	1133.07	363
23.881	1107.95	338
24.048	1083.56	314
24.215	1060.3	290
24.382	1037.59	268
24.549	1015.44	245
24.716	994.2	224
24.883	973.42	203
25.05	953.03	183
25.217	933.28	163
25.384	913.93	144
25.551	894.85	125
25.718	876.12	106
25.885	858.15	88
26.052	840.45	70
26.219	823.04	53
26.386	806.05	36
26.553	789.46	19
26.72	773.14	3
26.887	770	0

NOTE: 770 cfs to remain in Harding Ditch through the St. Clair Farms site, while the excess flow >700 cfs to enter detention

1973


St. Clair Hydrograph Construction
2500
2000
1500
1000
500
0
Flow (cfs)
14
16
18
20
22
24
26
28
Time (hrs)
Inflow to St. Clair Farms Pond Area
begins at Harding Inflow > 770 cfs
Into St. Clair Pond
Total Inflow in Harding

Storage Volume Calculation

Type.... Vol: Elev-Area Page 1.01
Name.... T04115

File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SC.PPW
Title... Volume with excavation to 411'

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
407.70	-----	.0000	.0000	.000	.000
408.00	-----	.2000	.2000	.020	.020
410.00	-----	1.3000	2.0099	1.340	1.360
410.99	-----	1.4500	4.1230	1.361	2.720
411.00	-----	169.5000	186.6272	.623	3.343
414.00	-----	170.1000	509.3997	509.400	512.743
415.50	-----	171.7000	512.6981	256.349	769.092

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

E-Q-V Table

Type.... Pond E-V-Q Table   Page 10.11
Name.... ST.CLAIR FARM
File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SC.PPW

LEVEL POOL ROUTING DATA

HYG Dir = K:\STLCOE\ESTL-IFC\PONDPACK\
Inflow HYG file = NONE STORED - ST.CLAIR FARMIN ex100
Outflow HYG file = NONE STORED - ST.CLAIR FARMOUT ex100

Pond Node Data = ST.CLAIR FARM
Pond Volume Data = to411
Pond Outlet Data = OUTLET

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 411.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .1670 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
411.00	.00	.000	169.5000	.00	.00	.00
411.25	1.23	42.381	169.5500	.00	1.23	6142.71
411.50	4.58	84.775	169.5999	.00	4.58	12289.34
411.75	9.87	127.181	169.6499	.00	9.87	18439.72
412.00	16.92	169.600	169.6999	.00	16.92	24593.67
412.25	25.46	212.031	169.7499	.00	25.46	30750.94
412.50	35.19	254.475	169.7999	.00	35.19	36911.19
412.75	45.92	296.931	169.8499	.00	45.92	43074.25
413.00	57.36	339.400	169.8999	.00	57.36	49239.85
413.25	69.24	381.881	169.9499	.00	69.24	55407.69
413.50	81.47	424.375	169.9999	.00	81.47	61577.69
413.75	93.70	466.881	170.0500	.00	93.70	67749.51
414.00	106.00	509.400	170.1000	.00	106.00	73923.21
414.25	118.16	551.958	170.3661	.00	118.16	80102.50
414.50	129.99	594.583	170.6325	.00	129.99	86291.09
414.75	140.43	637.274	170.8991	.00	140.43	92487.95
415.00	150.49	680.032	171.1658	.00	150.49	98694.11
415.25	159.65	722.857	171.4328	.00	159.65	104909.00
415.50	168.23	765.749	171.7000	.00	168.23	111133.00

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312)   Compute Time: 16:41:51   Date: 03-15-2001

Pond Analysis Summary

```
Type.... Pond Routing Summary                                  Page 10.14
Name.... ST.CLAIR FARMOUT    Tag: ex100                    Event: ex100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\REVISED_SC.PPW
Storm... ex100    Tag: ex100

                    LEVEL POOL ROUTING SUMMARY

 HYG Dir           = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - ST.CLAIR FARMIN  ex100
 Outflow HYG file = NONE STORED - ST.CLAIR FARMOUT ex100

 Pond Node   Data = ST.CLAIR FARM
 Pond Volume Data = to411
 Pond Outlet Data = OUTLET

 No Infiltration

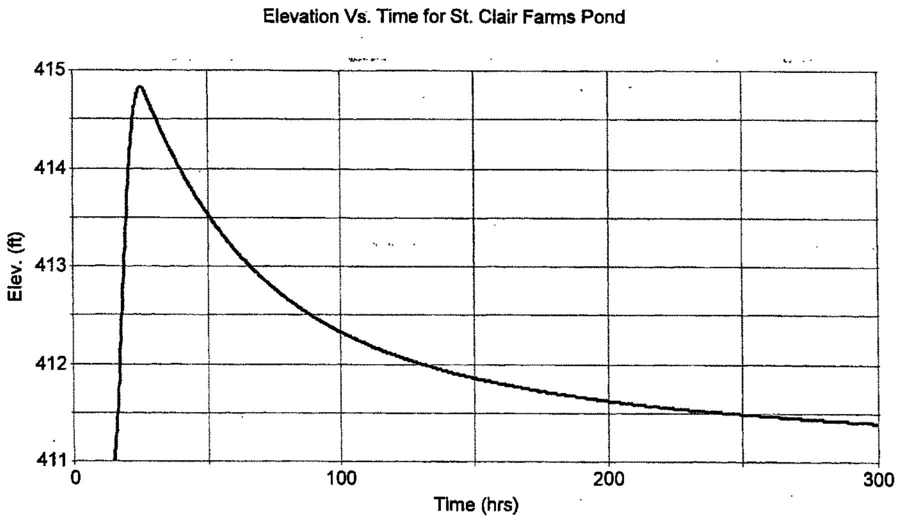
 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =   411.00 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .1670 hrs

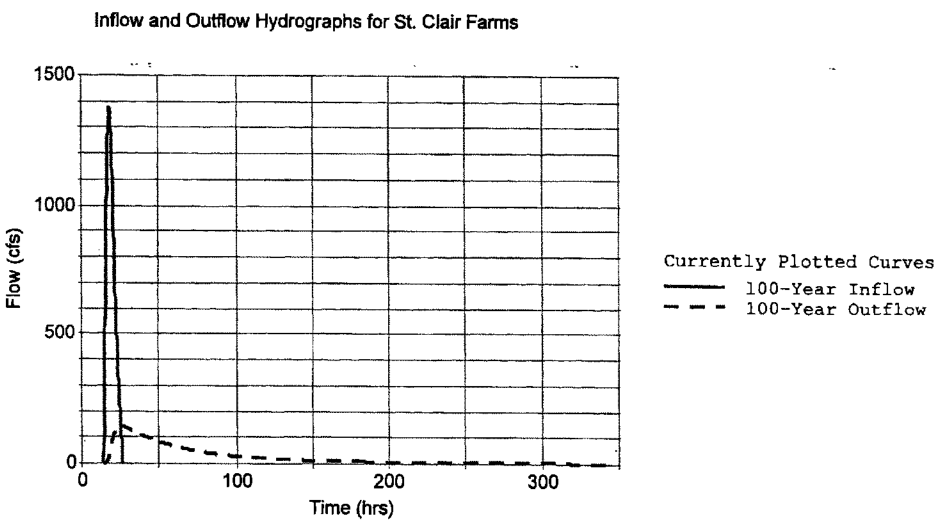
 INFLOW/OUTFLOW HYDROGRAPH SUMMARY
 ====================================================
 Peak Inflow       =  1375.00 cfs    at   18.2030 hrs
 Peak Outflow      =   143.64 cfs    at   25.3840 hrs
 ----------------------------------------------------
 Peak Elevation    =   414.83 ft
 Peak Storage =       650.937 ac-ft
 ====================================================

 MASS BALANCE (ac-ft)
 --------------------------
+ Initial Vol   =        .000
+ HYG Vol IN    =     728.120
- Infiltration =         .000
- HYG Vol OUT   =     672.000
- Retained Vol =       56.120
                   ----------
 Unrouted Vol =         -.001 ac-ft  (.000% of Inflow Volume)

 WARNING: Outflow hydrograph truncated on right side.


 S/N: 021801A06A86    Parsons
 PondPack Ver: 7.0 (312)       Compute Time: 16:41:51    Date: 03-15-2001
```


Elevation Vs. Time for St. Clair Farms Pond
415
414
413
412
411
Elev. (ft)
0
100
200
300
Time (hrs)


Inflow and Outflow Hydrographs for St. Clair Farms
1500
1000
500
0
Flow (cfs)
0
100
200
300
Time (hrs)
Currently Plotted Curves
100-Year Inflow
100-Year Outflow

1978

ADDITIONAL INFORMATION

Bridge Data for Harding Ditch

Location[1]	Data Source	Ditch FL Elevation (ft)	Low Chord Elevation (ft)	Bridge Length (ft)	Bridge Width (ft)	Existing Top of Channel Bank
Hwy. 157	Vicinity East Side Flood Study, Survey 1972	427.6	442.7	30	48	442.7
Long Street	Vicinity East Side Flood Study, Survey 1972	426.8	439.3	41	24	439.3
B&O Railroad	Vicinity East Side Flood Study, Survey 1972	418.1	428.2	76	30	426.1
Black Lane	Construction Plans, 1974	414.3	426.0	96	46	424.9
Black Lane	Scour Survey, FAI Route 255, Forest Blvd. over Harding Ditch, 1994	418.4	426.0	103	*	424.9
I-255 NB	Scour Survey, FAI Route 255, Forest Blvd. over Harding Ditch, 1994	416.8	431.7	343	*	428.9
I-255 SB	Scour Survey, FAI Route 255, Forest Blvd. over Harding Ditch, 1994	416.9	432.1	343	*	429.3
I-255 NB	FAI Route 255 Construction Plans, Revised 1984	413.7	431.7	343	56	426.4
I-255 SB	FAI Route 255 Construction Plans, Revised 1984	413.7	431.7	343	56	426.4
Forest Blvd.	Scour Survey, FAI Route 255, Forest Blvd. over Harding Ditch, 1994	415.6	431.9	175	*	424.2
Forest Blvd.	FAI Route 255 Construction Plans, Revised 1983	414.3	434.5	645	44	424.4
Bunkum Rd.	Vicinity East Site Flood Study, Survey 1972	409.2	419.5	84	24	417.6
I-64 EB	Scour Survey, FAI Route 64 Over Harding Ditch, 1993	411.9	426.9	113	*	425.8
I-64 WB	Scour Survey, FAI Route 64 Over Harding Ditch, 1993	411.8	421.1	112	*	419.9
I-64 EB	FAI Route 64 Construction Plans, 1967	409.0	*	113	90	420.0
I-64 WB	FAI Route 64 Construction Plans, 1967	409.0	*	113	63	420.0
I-255 NB	FAI Route 270 Construction Plans, 1979	407.7	424.3	276	68	423.0
I-255 SB	FAI Route 270 Construction Plans, 1979	407.7	424.3	276	90	423.0

NOTES:

1. Locations listed from upstream to downstream; several bridges have 2 sources of information
2. Data that was not easily discernable from the sources was indicated by a *

New Bridge Culvert Sizing Calculation Summaries

Culvert Designer/Analyzer Report
Penn Central

Peak Discharge Method: User-Specified			
Design Discharge	6,400.00 cfs	Check Discharge	0.00 cfs

Grades Model: Inverts			
Invert Upstream	423.09 ft	Invert Downstream	423.06 ft
Length	46.00 ft	Slope	0.000652 ft/ft
Drop	0.03 ft		

Headwater Model: Maximum Allowable HW	
Headwater Elevation	435.07 ft

Tailwater properties: Irregular Channel			
Slope	0.000500 ft/ft	Mannings Coefficient	0.013

Roughness Segments

Start Station (ft)	End Station (ft)	Mannings Coefficient
0.00	60.00	0.013

Natural Channel Points

Station (ft)	Elevation (ft)
0.00	435.09
0.00	423.09
60.00	423.09
60.00	435.09

Tailwater conditions for Design Storm.			
Discharge	6,400.00 cfs	Depth	10.59 ft
Velocity	10.07 ft/s		

	Name	Desc	Discharge	HW Elev	Velocity
x	Trial-1	5-11 x 11 ft Box	6,400.00 cfs	435.06 ft	15.53 ft/s

New Bridge Culvert Sizing Calculation Summaries

Culvert Designer/Analyzer Report
1-Forest Blvd.

Peak Discharge Method: User-Specified

Design Discharge	2,150.00 cfs	Check Discharge	0.00 cfs

Grades Model: Inverts

Invert Upstream	407.73 ft	Invert Downstream	407.70 ft
Length	58.00 ft	Slope	0.000517 ft/ft
Drop	0.03 ft		

Headwater Model: Maximum Allowable HW

Headwater Elevation	414.80 ft

Tailwater properties: Irregular Channel

Slope	0.000600 ft/ft	Mannings Coefficient	0.013

Roughness Segments

Start Station (ft)	End Station (ft)	Mannings Coefficient
0.00	70.00	0.013

Natural Channel Points

Station (ft)	Elevation (ft)
0.00	415.73
24.00	407.73
46.00	407.73
70.00	415.73

Tailwater conditions for Design Storm.

Discharge	2,150.00 cfs	Depth	6.76 ft
Velocity	7.53 ft/s		

	Name	Desc	Discharge	HW Elev	Velocity
x	Trial-1	10-72 inch Circular	2,150.00 cfs	415.71 ft	7.60 ft/s
	Trial-2	6-8 x 6 ft Box	2,150.00 cfs	415.64 ft	7.47 ft/s

New Bridge Culvert Sizing Calculation Summaries

Culvert Designer/Analyzer Report
2-Maryland Ave.

Peak Discharge Method: User-Specified

Design Discharge	2,150.00 cfs	Check Discharge	0.00 cfs

Grades Model: Inverts

Invert Upstream	404.42 ft	Invert Downstream	404.40 ft
Length	36.00 ft	Slope	0.000528 ft/ft
Drop	0.02 ft		

Headwater Model: Maximum Allowable HW

Headwater Elevation	412.43 ft

Tailwater properties: Rectangular Channel

Slope	0.000600 ft/ft	Mannings Coefficient	0.013
Depth	6.87 ft	Bottom Width	38.00 ft

Tailwater conditions for Design Storm.

Discharge	2,150.00 cfs	Bottom Elevation	404.40 ft
Depth	6.87 ft	Velocity	8.24 ft/s

	Name	Desc	Discharge	HW Elev	Velocity
x	Trial-1	10-72 inch Circular	2,150.00 cfs	412.44 ft	7.60 ft/s
	Trial-2	6-8 x 6 ft Box	2,150.00 cfs	412.38 ft	7.47 ft/s

New Bridge Culvert Sizing Calculation Summaries

Culvert Designer/Analyzer Report
3-Hwy. 111

Peak Discharge Method: User-Specified			
Design Discharge	2,150.00 cfs	Check Discharge	0.00 cfs

Grades Model: Inverts			
Invert Upstream	403.49 ft	Invert Downstream	403.45 ft
Length	60.00 ft	Slope	0.000583 ft/ft
Drop	0.04 ft		

Headwater Model: Maximum Allowable HW	
Headwater Elevation	411.49 ft

Tailwater properties: Rectangular Channel			
Slope	0.000600 ft/ft	Mannings Coefficient	0.013
Depth	6.87 ft	Bottom Width	38.00 ft

Tailwater conditions for Design Storm.			
Discharge	2,150.00 cfs	Bottom Elevation	403.45 ft
Depth	6.87 ft	Velocity	8.24 ft/s

	Name	Desc	Discharge	HW Elev	Velocity
x	Trial-1	10-72 inch Circular	2,150.00 cfs	411.55 ft	7.60 ft/s
	Trial-2	6-8 x 6 ft Box	2,150.00 cfs	411.48 ft	7.47 ft/s

New Bridge Culvert Sizing Calculation Summaries

Culvert Designer/Analyzer Report
4-N. 51st Street

Peak Discharge Method: User-Specified			
Design Discharge	2,150.00 cfs	Check Discharge	0.00 cfs

Grades Model: Inverts			
Invert Upstream	402.61 ft	Invert Downstream	402.59 ft
Length	36.00 ft	Slope	0.000556 ft/ft
Drop	0.02 ft		

Headwater Model: Maximum Allowable HW	
Headwater Elevation	410.61 ft

Tailwater properties: Rectangular Channel			
Slope	0.000600 ft/ft	Mannings Coefficient	0.013
Depth	6.87 ft	Bottom Width	38.00 ft

Tailwater conditions for Design Storm.			
Discharge	2,150.00 cfs	Bottom Elevation	402.59 ft
Depth	6.87 ft	Velocity	8.24 ft/s

	Name	Desc	Discharge	HW Elev	Velocity
x	Trial-1	10-72 inch Circular	2,150.00 cfs	410.63 ft	7.60 ft/s
	Trial-2	6-8 x 6 ft Box	2,150.00 cfs	410.57 ft	7.47 ft/s

New Bridge Culvert Sizing Calculation Summaries

Culvert Designer/Analyzer Report
5-Collinsville Rd.

Peak Discharge Method: User-Specified			
Design Discharge	2,150.00 cfs	Check Discharge	0.00 cfs

Grades Model: Inverts			
Invert Upstream	402.25 ft	Invert Downstream	402.21 ft
Length	70.00 ft	Slope	0.000571 ft/ft
Drop	0.04 ft		

Headwater Model: Maximum Allowable HW	
Headwater Elevation	410.25 ft

Tailwater properties: Rectangular Channel			
Slope	0.000600 ft/ft	Mannings Coefficient	0.013
Depth	6.60 ft	Bottom Width	40.00 ft

Tailwater conditions for Design Storm.			
Discharge	2,150.00 cfs	Bottom Elevation	402.21 ft
Depth	6.60 ft	Velocity	8.15 ft/s

	Name	Desc	Discharge	HW Elev	Velocity
x	Trial-1	10-72 inch Circular	2,150.00 cfs	410.07 ft	7.60 ft/s
	Trial-2	6-8 x 6 ft Box	2,150.00 cfs	409.99 ft	7.47 ft/s

C.4.5 State Park Site

Summary of Engineering Calculations

State Park Site

East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project

Prepared for:
St. Louis District Army Corps of Engineers

Prepared by:
PARSONS
St. Louis, Missouri

May 2001

State Park Site

Description
The State Park site was evaluated as a potential project for the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project for the St. Louis District Army Corps of Engineers (District). The State Park site is located on either side of I-255, bounded by Penn Central Railroad to the south, and Canteen Creek and I-40 to the north. It includes the State Park FEMA buyout area south of Canteen Creek, the abandoned Downtown Air Park west of Black Lane, the existing farmland between the State Park buyout area and I-255, and the existing farmland between I-255 and Canteen Creek. The engineering objectives for this site are to restore a flood pulse to increase the bio-diversity of the site, and provide sediment removal to improve water quality. Combinations of overland flow, detention ponds, channel improvements and new channels were evaluated to achieve these objectives. Hydraulic connections to the Spring Lake 1 and 2 areas, which are described in a separate report entitled Summary of Engineering Calculations, Spring Lake Site, were also considered during the formulation of alternatives for the State Park site.

Hydrology
A HEC-1 base model for the Canteen Creek watershed was provided by the District. It represents the major contributing drainage areas in the Cahokia Canal watershed, from the bluffs to the pump station at the Mississippi River. Several revisions were made to this base model in order to use it for the State Park site analysis. In the base model, the capacity of Canteen Creek downstream of Highway 157 is estimated as 2,100 cfs; the overflow from Canteen Creek is represented in the base model by a diversion that removes all flows in excess of 2,100 cfs from the existing channel. According to the District, the existing capacity in this reach has been improved to approximately 3,300 cfs; therefore, the diversion in the base model was revised to represent this increased capacity by removing all flows exceeding 3,300 cfs from the channel. Precipitation data copied from another HEC-1 model of Cahokia Canal provided by the District was added to the base model in order to compute a full range of storm frequencies. The revised base model HEC-1 input and output for Canteen Creek are included in the Appendix.

Using the HEC-1 revised base model, peak flows and volumes for the 2-, 5-, 10-, 25-, 50-, 100- and 500-year storms were computed for the State Park analysis. Three scenarios of peak flows and volumes were computed, including the total Canteen Creek runoff at Highway 157, the flow remaining in Canteen Creek downstream of Highway 157, and the estimated Canteen Creek overflow downstream of Highway 157. These peak flows and corresponding volumes are listed in Table 1. Values computed with these models are considered preliminary in nature.

Table 1 HEC-1 Peak Flows and Volumes

Storm Frequency	Canteen Creek Total Flow		Canteen Creek Channel Flow		Canteen Creek Overflow	
	Peak Flow (cfs)	Runoff Volume (ac-ft)	Peak Flow (cfs)	Runoff Volume (ac-ft)	Peak Flow (cfs)	Runoff Volume (ac-ft)
2-year	1,627	1,091	1,627	1,091	0	0
5-year	3,152	2,043	3,152	2,043	0	0
10-year	4,261	2,722	3,300	2,547	961	174

Table 1 Continued

Storm Frequency	Canteen Creek Total Flow		Canteen Creek Channel Flow		Canteen Creek Overflow	
	Peak Flow (cfs)	Runoff Volume (ac-ft)	Peak Flow (cfs)	Runoff Volume (ac-ft)	Peak Flow (cfs)	Runoff Volume (ac-ft)
25-year	5,960	3,763	3,300	3,066	2,660	697
50-year	7,734	4,854	3,300	3,475	4,434	1,380
100-year	9,698	6,070	3,300	3,849	6,398	2,221
500-year	15,320	9,589	3,300	4,681	12,020	4,908

Site Description

The most recent topographic information available for the State Park site analysis was in the form of aerial photomaps with 2-foot contours at 1"=200' scale, produced for the District in 1973. These predate the I-255 extension that bisects the site. The age of the data should be acknowledged when considering the accuracy of the results of this analysis as representative of existing conditions. Land use within the State Park site varies, and because constraints on proposed flood control features correspond with the existing land use and location, the State Park site was divided into four main areas for analysis. A map showing the approximate boundaries of these areas is included in the Appendix.

State Park Area 1 was defined as the FEMA buyout area located between Black Lane to the west, Penn Central Railroad to the south, and Highway 40 to the north; it represented an area of approximately 170 acres. Remaining infrastructure within State Park Area 1 was proposed to be demolished in order to enhance the quality of habitat in that area. The topography of State Park Area 1 is very flat, with the existing ground elevation fluctuating between 420 and 422 NGVD. Excavation within State Park Area 1 was not proposed, due to the proximity to Cahokia Mounds and the likelihood of disturbing archeological sites.

State Park Area 2 was defined as the farmland just east of the buyout area and west of I-255, an area of approximately 117 acres. This farmland is used for horseradish production, which inflates the value of the land significantly. For this reason, excavation within State Park Area 2 was to be avoided if possible or minimized if necessary. The topography of State Park Area 2 is relatively flat as well, with the existing ground elevation sloping slightly from northeast to southeast, from elevation 420 to 418 NGVD, respectively.

State Park Area 3 was defined as the farmland east of I-255, bounded by Canteen Creek to the north and east, an area of approximately 440 acres. This area slopes generally from east to west, from a ground elevation of 434 NGVD adjacent to Canteen Creek to approximately elevation 418 NGVD at the southwest corner. This farmland is also used for horseradish cultivation, so proposed excavation within State Park Area 3 was minimized. The proposed desire to use of State Park Area 3 for flood control was constrained by the existing obstruction to overland flow created by I-255.

State Park Area 4 was defined as the area west of Black Lane, south of Highway 40 and north of the Penn Central Railroad, bounded on the west by the edge of the abandoned Downtown Air Park. It has a surface area of approximately 156 acres. Excavation was not proposed within State Park Area 4, due to its proximity to Cahokia Mounds and the likelihood of disturbing archeological sites.

Evaluation of Alternatives
Four potential flood control alternatives were evaluated for the State Park site to the extent practical, given the conceptual nature of the study, and based upon the available data and site constraints described above.

Alternative 1: The first State Park alternative proposed that the Canteen Creek overflow be conveyed by a new channel along the Penn Central Railroad under I-255 and stored temporarily in State Park Areas 1 and 2. Ponded water in State Park Areas 1 and 2 was proposed to drain back into Canteen Creek through flap-gated culverts at the northern boundary of the site. Excavation was not proposed for either State Park Area 1 due to its location adjacent to Cahokia Mounds, or State Park Area 2 due to its current land use for horseradish production. Therefore, a perimeter berm was required to create detention storage within this area. The proposed water surface elevation of ponded water within State Park Areas 1 and 2 was limited by the height of the existing Canteen Creek levee at the northern end of the site. According to the channel improvement plans referenced above, the improved flowline of Canteen Creek decreases from approximately elevation 410 NGVD near I-255 to approximately 407.5 NGVD upstream of Highway 40, and the depth of the typical cross-section is 16.5 feet. The estimated minimum top of levee elevation adjacent to the State Park site is approximately 424 NGVD. Therefore, the target ponding elevation in State Park Areas 1 and 2 was set at 423 NGVD, allowing a one-foot freeboard. Since the existing ground around the boundary of State Park Areas 1 and 2 is between elevation 418 and 420 NGVD, the height of the required perimeter berm was proposed to be between 4 and 6 feet in order to have a crown elevation of 424 NGVD. The storage volume provided by this configuration was computed to be 1,122 acre-ft using the volume calculator in Haestad Methods' PondPack program. This calculation is included in the Appendix.

It was assumed that the detention area needed to have capacity for the entire Canteen Creek overflow volume, because no outflow from detention could occur until the peak flows pass in Canteen Creek. Examination of the volumes for the Canteen Creek overflow shown in Table 1 indicated that the available detention would provide capacity for the 25-year storm but less than the 50-year storm. However, it was determined during field investigation that there was not sufficient available width in the existing opening under I-255 at the Penn Central Railroad to accommodate a proposed channel from Canteen Creek at Highway 157 to State Park Areas 1 and 2. No further analysis was therefore performed for this alternative.

Alternative 2: The second alternative proposed that the Canteen Creek overflow would drain as sheet flow from Canteen Creek westward over the farmland in State Park Area 3, where it would be detained using storage volume provided by existing contours, and drained into State Park Area 2 through existing culverts under I-255. The stormwater was proposed to then flow north across State Park Area 2, which would require some grading, to proposed flap-gated culverts with outfalls into Canteen Creek. The maximum allowable ponding elevation within State Park Area 3 was limited by the low point along I-255, which was estimated from the Plans for Proposed Federal Aid Interstate Highway FAI Route I-255, dated 1983, as elevation 425 NGVD. The existing storage capacity of State Park Area 3 was calculated by measuring the surface area of each existing contour shown on the topographic map, down to the minimum elevation of 418 NGVD. The storage volume in State Park Area 3 was computed up to the maximum ponding elevation of 424 NGVD to allow a one-foot freeboard; using PondPack, the available volume was computed to be approximately 580 acre-ft. This volume calculation is included in the Appendix.

The seven existing culverts under I-255 within the State Park site were used as the outlets for the proposed detention in State Park Area 3. The rating curves for the two 54-inch and five 48-inch concrete culverts were computed using Haestad Methods' CulvertMaster program, using size and invert data from the I-255 construction plans referenced above. The rating curves were added together to obtain a cumulative outlet-rating curve for State Park Area 3; these rating curve calculations are included in the Appendix. The peak outflow computed at the maximum ponding elevation of 424 NGVD is approximately 857 cfs. Using the inflow hydrograph representing the 100-year Canteen Creek overflow and the peak outflow of 857 cfs, a linear approximation was used to estimate the required storage volume for State Park Area 3 using PondPack. The resulting storage volume is 1,930 acre-ft, which is much greater than the available volume of 580 acre-ft. The approximate capacity of the system was determined to be the 25-year storm, because the available volume in State Park Area 3 is greater than the required storage volume of 509 acre-ft computed in PondPack for the 25-year Canteen Creek overflow with a peak outflow of 857 cfs. Volume calculations are included in the Appendix. Because Alternative 2 could not contain the project design storm, which is the 100-year Canteen Creek overflow, no further analysis was performed on this alternative.

Alternative 3: The third alternative was similar to Alternative 2 in that the overflow from Canteen Creek was proposed to sheet flow across the eastern half of State Park Area 3. For Alternative 3, though, it was proposed that the western half of State Park Area 3 would be excavated to a depth that provides storage capacity for the 100-year Canteen Creek overflow volume using the existing culverts under I-255 as outlets to State Park Area 2. The maximum ponding elevation for proposed detention in State Park Area 3 was elevation 424 NGVD, as determined in Alternative 2. The minimum excavated pond bottom elevation was proposed to be 418 NGVD, which is the lowest contour shown at the southwest corner of State Park Area 3 on the topographic map. The eastern limit of excavation was delineated as the location of the north-south roads that divide the farm fields. Assuming a 3:1 horizontal to vertical (3H:1V) side slope of excavation at the limits of the detention area, the storage capacity of the proposed excavated detention area was computed in PondPack to be approximately 1,789 acre-ft.

The required storage for the 100-year inflow from the Canteen Creek overflow with the peak outflow of 857 cfs provided by existing culverts was computed as 1,930 acre-ft for Alternative 2. Therefore, it was evident that additional outlets would be required. One outlet option was to propose new culverts at the northwest corner of the site, which would drain the proposed detention area back into Canteen Creek. These would only operate effectively after the flood flows in Canteen Creek recede, though, and could therefore not be relied upon to reduce ponding elevations in the proposed detention area.

Another option was to propose culverts under Penn Central Railroad to drain the detention area to the south and west toward Spring Lake 2 as sheet flow or through a new channel. The sheet flow alternative was eliminated after examination of the topographic map, which revealed that the ground elevation to south of the railroad is higher than to the north. The proposed channel alternative would convey the flows to Spring Lake 2, where the existing topography would be required to contain outflow volume until flood elevations in Spring Lake 1 had receded. Excavation within Spring Lake 2 was not considered, so berms would be required to contain the stormwater and to protect archeological sites such as Rattlesnake Mound. Further development of this alternative was not performed, because the issues of constructing perimeter berms in Spring Lake 2, increasing existing ponding elevations in Spring Lake 2 and excavation of the farmland in State Park Area 3 were considered to be prohibitive at the time of this study.

Alternative 4: The fourth alternative for the State Park site involved the improvement of Canteen Creek from Highway 157 through I-255 in order to convey the full 100-year flow to just north of State Park Areas 1 and 2. At this location, part of the southern levee of Canteen Creek was to be removed in order to allow the original stormwater overflow volume to be diverted into State Park Area 2. The stormwater ponding in State Park Area 2 was proposed to overflow into State Park Areas 1 and 4, and a perimeter berm around the three areas was proposed to increase the available ponding depth in order to control the 100-year volume. An outlet at the southern edge of State Park Area 4 was proposed to drain this detention area into a proposed new channel, which would ultimately convey the water south to Spring Lake 2.

For Alternative 4, the proposed Canteen Creek channel improvements were required to convey the full 100-year flow of 9,698 cfs from Highway 157 through I-255. Existing channel dimensions were estimated using the existing typical cross-section taken from the Canteen Creek and Cahokia Canal – Reach 2 Rehabilitation channel improvement plans, dated 1997. The typical cross-section of Canteen Creek is a grass-lined trapezoidal channel with 2.5H:1V side slopes, a bottom width of 10 feet and a flow depth of 15.5 feet, allowing a one-foot freeboard below the top of levee. The channel flowline slope varies between Highway 157 and I-255, so proposed improvements were sized for each reach of constant flowline. For each reach, the required bottom width was estimated from normal depth calculations in Haestad Methods' FlowMaster program. It was assumed that the southern levee of Canteen Creek would be moved back to create the proposed increase in bottom width. The existing channel sections and proposed channel improvement dimensions are listed in Table 2 on the following page. Channel capacity calculations are included in the Appendix. The I-255 bridge over Canteen Creek was examined in order to determine whether the existing opening would have room for the channel improvements proposed in Alternative 4. As estimated from the I-255 construction plans, the bridge abutments are approximately 280 feet apart, with 2 sets of piers between the abutments. The existing Canteen Creek channel topwidth through the I-255 bridge is approximately 93 feet, not including the crown of the levees. The piers do not fall within the channel banks under existing conditions, but the exact location of the piers was not determined. The proposed bottom width through this reach was computed to be 32 feet, which would require a topwidth of 115 feet. The proposed channel could therefore pass under the bridge through the existing opening between abutments; however, if the locations of the piers were found to be within the required topwidth of the proposed trapezoidal channel, a rectangular cross-section could be used through the bridge. The required bottom width and topwidth of a concrete rectangular channel through the bridge was computed to be 40 feet.

Table 2 Canteen Creek Dimensions

Slope of Typical Section	Existing Bottom Width (ft)	Proposed Bottom Width (ft)	Increase in Bottom Width (ft)
Slope = 0.0034 ft/ft	10	15	5
Slope = 0.0012 ft/ft	10	41	31
Slope = 0.0013 ft/ft	10	39	29
Slope = 0.0011 ft/ft	10	42	32

The internal drainage within the detention area proposed in Alternative 4 required attention, because State Park Area 1, which lies between State Park Areas 2 and 4, is on a ridge at elevation 420'. The lower-lying areas in State Park Area 2 could not be drained across State Park Area 1 to the lower elevations in State Park Area 4 without some excavation or piping within the buyout area. Excavation of State Park Area 1 was not proposed for the reasons described under Alternative 1, but the District determined that excavation within the existing utility trenches through the buyout area might be allowable, since it was likely that archeological sites along those trenches have already been disturbed. It was assumed that utility trenches are located along the existing roads, so three excavated ditches were proposed along the three main east-west roadways within the buyout area. The approximate dimensions of the proposed excavated ditches were assumed to be 3 feet wide by 4 feet deep. The slope of each proposed ditch was estimated by the existing ground elevation on either side of the buyout area, and varies from 0.02 ft/ft to 0.09 ft/ft. The combined capacity of these trenches was estimated at normal depth to be approximately 112 cfs at elevation 420 NGVD; above this elevation sheet flow would drain the ponded water in State Park Area 2 west to State Park Area 4. Ditch capacity calculations are included in the Appendix.

In order to maximize potential detention by allowing ponding up to the maximum elevation of 423 NGVD, as determined for Alternative 1, a berm of up to 4 feet high was proposed around State Park Areas 1, 2 and 4. The total surface area of State Park Areas 1, 2 and 4 was approximately 443 acres. The available storage volume up to the elevation of 423 NGVD was computed in PondPack to be 2,221 acre-ft, which was equivalent to the approximate stormwater volume for the 100-year Canteen Creek overflow. Proposed outlets at the southern edge of State Park Area 4 would direct flow into a new channel; this new channel was proposed to convey flow south and release it into Spring Lake 2, which would require proposed berms to protect archeological sites and to direct flow towards Forest Boulevard. Alternative 4 could potentially provide 100-year flood control for Canteen Creek; however, the detention area would be required to drain relatively slowly in order to allow the limited storage volume available in Spring Lake 2 to not be exceeded. The issues of berms adjacent to the Cahokia Mounds area and increased ponding depth and duration in State Park Areas 1,2 and 4 were considered to be prohibitive factors at the time of this study. In addition, this Alternative assumed that a detention area had been created in Spring Lake 1, allowing Spring Lake 2 to drain through culverts under Forest Boulevard. Detailed additional analysis would be required to evaluate the operation of this system in combination with the potential inflow/outflow conditions of Spring Lake 1 and Spring Lake 2, which was considered beyond the scope of this conceptual analysis.

Cost Features
No cost features were evaluated for the State Park scenarios.

1993

APPENDIX

SUPPORTING CALCULATIONS FOR STATE PARK SITE

Base Information
- HEC-1 Base Model for Canteen Creek Output
- State Park Area Map

Alternative 1 Calculations
- Storage Volume Calculation

Alternative 2 Calculations
- Storage Volume Calculation
- Existing I-255 Culvert Calculations
- Detention Storage Estimate (100-year)
- Detention Storage Estimate (25-year)

Alternative 3 Calculations
- Storage Volume Calculation
- Required Outflow Estimate

Alternative 4 Calculations
- Storage Volume Calculation
- Proposed Channel Improvement Calculations
- Utility Trench Ditch Calculations

1994

BASE INFORMATION

HEC-1 Base Model for Canteen Creek Output

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1****************************************                              **************************************
 *                                       *                             *                                    *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                             *  U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998               *                             *  HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                             *        609 SECOND STREET           *
 *                                       *                             *     DAVIS, CALIFORNIA 95616        *
 * RUN DATE   10MAY01  TIME  02:00:22    *                             *        (916) 756-1104              *
 *                                       *                             *                                    *
 *****************************************                             **************************************

                          X     X  XXXXXXX   XXXXX           X
                          X     X  X        X     X         XX
                          X     X  X        X                X
                          XXXXXXX  XXXX     X        XXXXX   X
                          X     X  X        X                X
                          X     X  X        X     X          X
                          X     X  XXXXXXX   XXXXX          XXX

   THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

   THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
   THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
   NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
   DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
   KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                          HEC-1 INPUT                                                 PAGE  1

         LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1            ID        FROM BASE FILE: CAHOK.PI1
           2            ID        REVISED TO COMPUTE ALL STORM FREQUENCIES, REVISED CANTEEN CREEK
           3            ID             CAPACITY AT HWY. 157 TO 3300 CFS AND TRUNCATED MODEL
           4            ID             DOWNSTREAM OF HWY. 157
           5            ID        CAHOKIA CANAL HEC-1 MODEL FOR FUTURE CONDITIONS
           6            ID        ASSUMES FULL DEVELOPMENT OF HILLSIDE WATERSHEDS
           7            ID        MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
           8            ID        BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
           9            ID        MADISON COUNTY, IL  (Design FLOOD)
          10            ID        INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC.)
          11            IT      30                    300
          12            IO       5
          13            JR    PREC     .37     .51     .60     .73     .86     1.0     1.39

          14            KK       1
          15            KM        COMPUTE RUNOFF FOR SUBAREA 1 (UPPER COUNTY DITCH)
          16            BA    1.99
          17            BF       0    -.03   1.074
          18            PH       1    91.1    0.99    2.22    3.86    4.84    5.25    6.16    7.14    8.21
          19            LS       0   87.40
          20            UD    1.43

          21            KK       2
          22            KM        ROUTE TO AREA 2
          23            RS       1    STOR      -1
          24            SV       0      20      50     560    1400    1710    2969
          25            SQ       0      50     100     200     300     400     500

          26            KK       3
          27            KM        COMPUTE RUNOFF FOR SUBAREA 3
          28            BA     .22
          29            LS       0   87.90
          30            UD     .88

          31            KK       2
          32            KM        COMPUTE RUNOFF FOR SUBAREA 2
          33            BA    1.39
          34            LS       0   83.70
          35            UD    1.74

          36            KK       2
          37            KM        COMBINE 3 HYDROGRAPHS AT 2
          38            HC       3

          39            KK       5
          40            KM        ROUTE TO AREA 5
          41            RS       1    STOR      -1
          42            SV       0       4       8      15     300     666    1190    1670
          43            SQ       0      50     100     200     300     400     500     600
1                                          HEC-1 INPUT                                                 PAGE  2

         LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          44            KK       4
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 45            KM       COMPUTE RUNOFF FOR SUBAREA 4
 46            BA    1.34
 47            LS       0   90.40
 48            UD    1.16

 49            KK       5
 50            KM       COMPUTE RUNOFF FOR SUBAREA 5
 51            BA     .79
 52            LS       0   78.70
 53            UD    1.24

 54            KK       5
 55            KM       COMBINE 3 HYDORGRAPHS AT 5
 56            HC       3

 57            KK       8
 58            KM       ROUTE TO SUBAREA 8
 59            RS       1    STOR      -1
 60            SV       0      11      70    2100    3200    3800
 61            SQ       0      50     100     200     300     400

 62            KK       8
 63            KM       COMPUTE RUNOFF FOR SUBAREA 8
 64            BA    1.55
 65            LS       0   90.60
 66            UD    1.37

 67            KK       8
 68            KM       COMBINE 2 HYDROGRAPHS AT 8
 69            HC       2

 70            KK      10
 71            KM       ROUTE TO SUBAREA 10 AT I-270
 72            RS       1    STOR      -1
 73            SV       0      18     120    3000    4000    6200    8600
 74            SQ       0      50     100     115     150     200     250

 75            KK      10
 76            KM       COMPUTE RUNOFF FOR SUBAREAS 79,80,81,82,83,84,85,6,7,AND 10
 77            BA    7.28
 78            LS       0   75.00
 79            UD    5.76

 80            KK      10
 81            KM       COMBINE 2 HYDROGRAPHS AT 10
 82            HC       2

 83            KK      11
 84            KM       COMPUTE RUNOFF FOR SUBAREAS 86 AND 11
 85            BA     .97
 86            LS       0   75.00
 87            UD    1.74
10                                        HEC-1 INPUT                                        PAGE  3

LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 88            KK      11
 89            KM       COMBINE 2 HYDROGRAPHS AT SUBAREA 11
 90            HC       2

 91            KK      12
 92            KM       COMPUTE RUNOFF FOR SUBAREAS 87 AND 12
 93            BA    1.50
 94            LS       0   81.00
 95            UD    1.48

 96            KK       9
 97            KM       COMPUTE RUNOFF FOR SUBAREA 9
 98            BA    1.50
 99            LS       0   90.00
100            UD    1.11

101            KK      13
102            KM       COMBINE 3 HYDROGRAPHS AT 13
103            HC       3

104            KK      13
105            KM       ROUTE TO SUBAREA 13 AT ILL. HIGHWAY 162
106            RS       1    STOR      -1
107            SV       0      16      25    1000    1600    2550    3350    3950    4678    5405
108            SQ       0      50     100     200     300     400     500     600     700     800

109            KK      13
110            KM       COMPUTE RUNOFF FOR SUBAREAS 88 AND 13 (JUDY'S BRANCH)
111            BA    9.01
112            LS       0   75.00
113            UD    1.54

114            KK      13
115            KM       DIVERSION OF SPILL OUT OF JUDY'S BRANCH
116            DT    NORTH
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          117            DI       0    1500    1501    5476   10000
          118            DQ       0       0       1    3976    8500

          119            KK      13
          120            KM         COMBINE CAHOKIA CANAL AND JUDY'S BRANCH
          121            HC       2

          122            KK      89
          123            KM         COMPUTE RUNOFF FOR SUBAREAS 89 AND 15 (BURDICK BRANCH)
          124            BA    3.11
          125            LS       0   75.00
          126            UD    1.13

          127            KK      15
          128            KM         DIVERSION OF SPILL OUT OF BURDICK BRANCH
          129            DT   NORTH
          130            DI       0     500     501    2158   10000
          131            DQ       0       0       1    1658    9500
1                                                HEC-1 INPUT                                              PAGE  4

        LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          132            KK      15
          133            KM         COMBINE CAHOKIA CANAL AND BURDICK BRANCH AT SUBAREA 15
          134            HC       2

          135            KK      18
          136            KM         DIVERSION OF SPILL OUT OF CAHOKIA CANAL TO MCDONOUGH LAKE
          137            DT   NORTH
          138            DI       0    2000    2001    2304   15000
          139            DQ       0       0       1     304   13000

          140            KK      21
          141            KM         ROUTE TO SUBAREA 21 AT HORSESHOE LAKE ROAD
          142            RS       4    STOR      -1
          143            SV       0      97     170     196     287
          144            SQ       0     500    1000    1500    2000

          145            KK      21
          146            KM         COMPUTE RUNOFF FOR SUBAREAS 99 AND 21 (SCHOOLHOUSE BRANCH)
          147            BA    7.38
          148            LS       0   75.00
          149            UD    1.49

          150            KK      21
          151            KM         DIVERSION OF SPILL OUT OF SCHOOLHOUSE BRANCH TO THE SOUTH
          152            DT   SOUTH
          153            DI       0    2500    2501    4503   20000
          154            DQ       0       0       1    2003   17500

          155            KK      15
          156            KM         COMBINE 2 HYDROGRAPHS AT SUBAREA 15 (SCHOOLHOUSE BR. AND CAHOKIA CANAL)
          157            HC       2

          158            KK      22
          159            KM   DIVERSION OF SPILL OUT OF CAHOKIA CANAL TO THE SOUTH
          160            DT   SOUTH
          161            DI       0    3000    3001    4468   20000
          162            DQ       0       0       1    1468   17000

          163            KK      22
          164            KM         ROUTE FROM SCHOOLHOUSE BRANCH TO JUNCTION WITH CAHOKIA CANAL
          165            RS       2    STOR      -1
          166            SV       0      55      97     138     176     212     245
          167            SQ       0     500    1000    1500    2000    2500    3000

          168            KK      98
          169            KM         COMPUTE RUNOFF FOR SUBAREA 98 (CANTEEN CREEK)
          170            BA   22.90
          171            LS       0   75.00
          172            UD    3.50
1                                                HEC-1 INPUT                                              PAGE  5

        LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          173            KK      25
          174            KM         DIVERSION OF SPILL FROM CANTEEN CREEK
          175            DT     CAN
          176            DI       0    3300    3301   11752   20000
          177            DQ       0       0       1    8452   16700
          178            ZZ
1****************************************                                      ****************************************
 *                                      *                                      *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                      *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN  1998               *                                      *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                                      *          609 SECOND STREET           *
 *                                      *                                      *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   10MAY01  TIME  02:00:22  *                                      *          (916) 756-1104              *
 *                                      *                                      *                                      *
****************************************                                       ****************************************
```

```
                    FROM BASE FILE: CAHOK.FI1
                    REVISED TO COMPUTE ALL STORM FREQUENCIES, REVISED CANTEEN CREEK
                         CAPACITY AT HWY. 157 TO 3300 CFS AND TRUNCATED MODEL
                         DOWNSTREAM OF HWY. 157
                    CAHOKIA CANAL HEC-1 MODEL FOR FUTURE CONDITIONS
                    ASSUMES FULL DEVELOPMENT OF HILLSIDE WATERSHEDS
                    MIN. CURVE NO OF 75.0 USED FOR RESIDENTIAL DEVELOPMENT
                    BULLETIN 70 RAINFALL VALUES USED FOR PH CARDS, ADJUSTED FOR
                    MADISON COUNTY, IL  (Design FLOOD)
                    INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC.)

 12 IO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT         HYDROGRAPH TIME DATA
                     NMIN          30  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1    0  STARTING DATE
                    ITIME        0000  STARTING TIME
                       NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      7    0  ENDING DATE
                   NDTIME        0530  ENDING TIME
                    ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL     .50 HOURS
                     TOTAL TIME BASE  149.50 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

    JP         MULTI-PLAN OPTION
                    NPLAN           1  NUMBER OF PLANS

    JR         MULTI-RATIO OPTION
                  RATIOS OF PRECIPITATION
                 .37      .51      .60      .73      .86     1.00     1.39
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

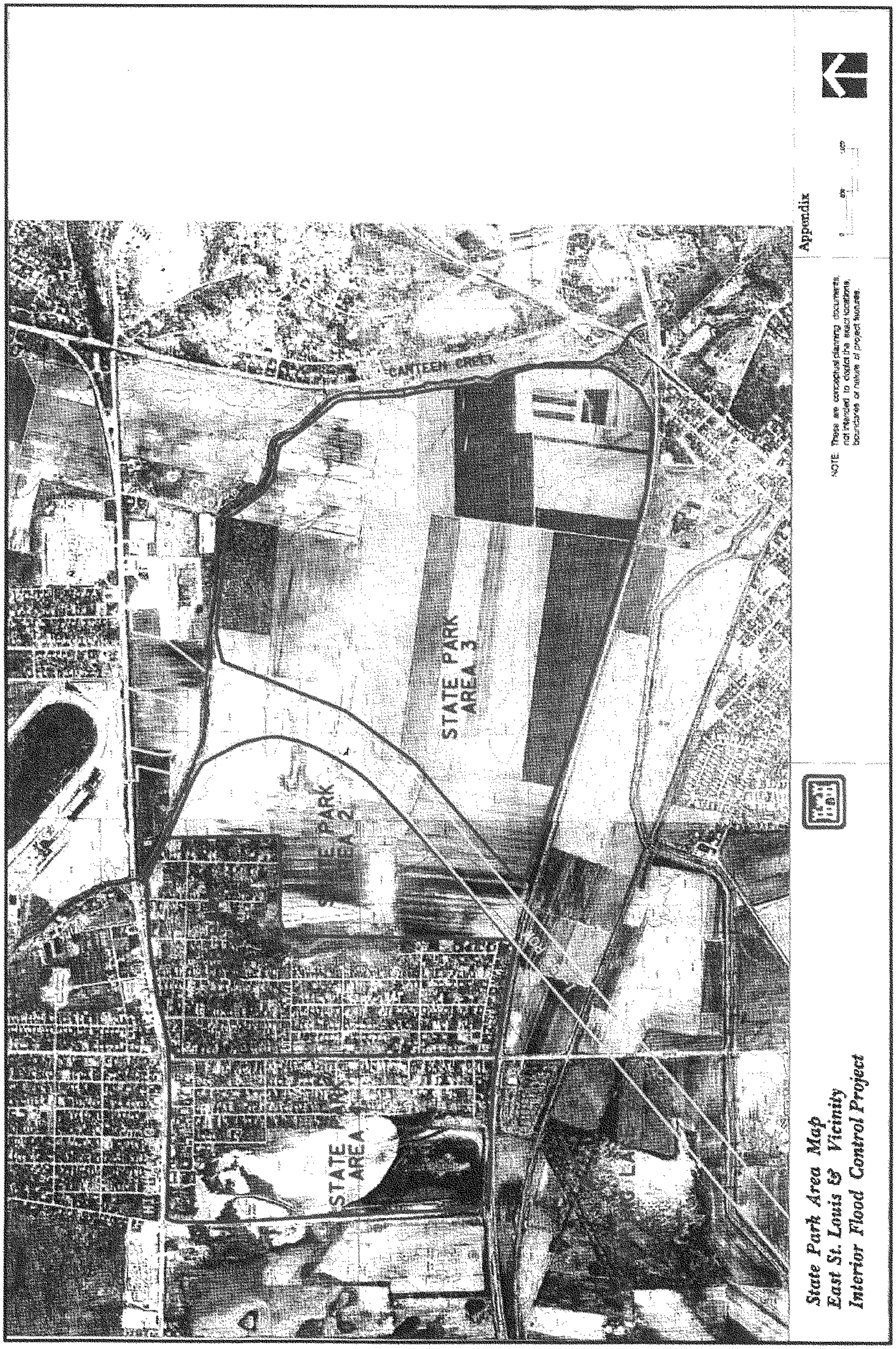
OPERATION	STATION	AREA	PLAN		RATIO 1 .37	RATIO 2 .51	RATIO 3 .60	RATIO 4 .73	RATIO 5 .86	RATIO 6 1.00	RATIO 7 1.39
					RATIOS APPLIED TO PRECIPITATION						
HYDROGRAPH AT											
+	1	1.99	1	FLOW	502.	801.	999.	1287.	1575.	1885.	2743.
				TIME	14.00	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO											
+	2	1.99	1	FLOW	109.	124.	134.	149.	165.	182.	220.
				TIME	17.50	18.50	19.00	19.50	19.50	20.00	21.00
HYDROGRAPH AT											
+	3	.22	1	FLOW	74.	117.	145.	186.	227.	270.	391.
				TIME	13.00	13.00	13.00	13.00	13.00	13.00	13.00
HYDROGRAPH AT											
+	2	1.39	1	FLOW	263.	444.	566.	744.	925.	1120.	1663.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
3 COMBINED AT											
+	2	3.60	1	FLOW	412.	626.	770.	981.	1193.	1423.	2065.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
ROUTED TO											
+	5	3.60	1	FLOW	212.	232.	246.	268.	291.	313.	371.
				TIME	17.00	18.50	19.00	19.50	20.50	21.00	22.50
HYDROGRAPH AT											
+	4	1.34	1	FLOW	446.	678.	827.	1043.	1257.	1487.	2122.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
HYDROGRAPH AT											
+	5	.79	1	FLOW	137.	251.	330.	449.	570.	702.	1074.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50

3 COMBINED AT

+	5	5.73	1	FLOW	783.	1135.	1368.	1708.	2050.	2421.	3453.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO											
+	8	5.73	1	FLOW	111.	121.	128.	138.	148.	159.	189.
				TIME	29.00	37.50	42.50	50.00	57.00	64.00	82.00
HYDROGRAPH AT											
+	8	1.55	1	FLOW	470.	717.	877.	1107.	1336.	1582.	2262.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
2 COMBINED AT											
+	8	7.28	1	FLOW	559.	819.	980.	1212.	1444.	1693.	2381.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO											
+	10	7.28	1	FLOW	100.	101.	102.	103.	104.	105.	108.
				TIME	60.50	88.00	105.00	129.00	148.50	149.50	149.50
HYDROGRAPH AT											
+	10	7.28	1	FLOW	366.	704.	945.	1320.	1712.	2147.	3397.
				TIME	19.00	19.00	18.50	18.50	18.50	18.50	18.50
2 COMBINED AT											
+	10	14.56	1	FLOW	466.	805.	1046.	1421.	1813.	2249.	3500.
				TIME	19.00	19.00	18.50	18.50	18.50	18.50	18.50
HYDROGRAPH AT											
+	11	.97	1	FLOW	107.	211.	285.	400.	519.	650.	1025.
				TIME	14.50	14.00	14.00	14.00	14.00	14.00	14.00
2 COMBINED AT											
+	11	15.53	1	FLOW	494.	854.	1113.	1508.	1922.	2380.	3703.
				TIME	19.00	18.50	18.50	18.50	18.50	18.50	18.00
HYDROGRAPH AT											
+	12	1.50	1	FLOW	270.	471.	607.	808.	1012.	1234.	1862.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	13.50
HYDROGRAPH AT											
+	9	1.50	1	FLOW	501.	764.	934.	1179.	1423.	1684.	2406.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
3 COMBINED AT											
+	13	18.53	1	FLOW	940.	1562.	1988.	2623.	3269.	3980.	6014.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO											
+	13	18.53	1	FLOW	153.	197.	242.	308.	356.	411.	616.
				TIME	33.00	32.50	32.00	31.50	31.50	31.50	31.00
HYDROGRAPH AT											
+	13	9.01	1	FLOW	1089.	2139.	2882.	4012.	5183.	6473.	10138.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
DIVERSION TO											
+	NORTH	9.01	1	FLOW	0.	639.	1382.	2512.	3683.	4973.	8638.
				TIME	.00	14.00	14.00	14.00	14.00	14.00	14.00
HYDROGRAPH AT											
+	13	9.01	1	FLOW	1089.	1500.	1500.	1500.	1500.	1500.	1500.
				TIME	14.00	13.50	13.00	13.00	12.50	12.50	12.00
2 COMBINED AT											
+	13	27.54	1	FLOW	1197.	1627.	1642.	1666.	1694.	1746.	1895.
				TIME	14.00	15.00	15.50	16.00	16.50	17.00	18.50
HYDROGRAPH AT											
+	89	3.11	1	FLOW	448.	883.	1189.	1655.	2137.	2668.	4175.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
DIVERSION TO											
+	NORTH	3.11	1	FLOW	0.	383.	689.	1155.	1637.	2168.	3675.
				TIME	.00	13.50	13.50	13.50	13.50	13.50	13.50
HYDROGRAPH AT											
+	15	3.11	1	FLOW	448.	500.	500.	500.	500.	500.	500.
				TIME	13.50	13.00	12.50	12.50	12.50	12.00	11.50
2 COMBINED AT											
+	15	30.65	1	FLOW	1606.	2123.	2137.	2159.	2185.	2228.	2378.
				TIME	14.00	14.50	15.00	15.50	16.00	16.50	18.00
DIVERSION TO											
+	NORTH	30.65	1	FLOW	0.	123.	137.	159.	185.	228.	378.
				TIME	.00	14.50	15.00	15.50	16.00	16.50	18.00
HYDROGRAPH AT											
+	18	30.65	1	FLOW	1606.	2000.	2000.	2000.	2000.	2000.	2000.
				TIME	14.00	13.50	13.00	13.00	12.50	12.50	12.00
ROUTED TO											

+	21	30.65	1	FLOW	1439.	1868.	1942.	1977.	1992.	1997.	2000.
				TIME	15.00	16.00	16.50	17.00	17.50	18.00	19.50
HYDROGRAPH AT											
+	21	7.38	1	FLOW	909.	1779.	2393.	3325.	4292.	5355.	8375.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
DIVERSION TO											
+	SOUTH	7.38	1	FLOW	0.	0.	0.	825.	1792.	2855.	5875.
				TIME	.00	.00	.00	14.00	14.00	14.00	14.00
HYDROGRAPH AT											
+	21	7.38	1	FLOW	909.	1779.	2393.	2500.	2500.	2500.	2500.
				TIME	14.00	14.00	14.00	13.50	13.00	13.00	12.50
2 COMBINED AT											
+	15	38.03	1	FLOW	2112.	3235.	3784.	4245.	4360.	4433.	4492.
				TIME	15.00	14.50	14.50	14.50	15.00	15.50	16.50
DIVERSION TO											
+	SOUTH	38.03	1	FLOW	0.	235.	784.	1245.	1360.	1433.	1492.
				TIME	.00	14.50	14.50	14.50	15.00	15.50	16.50
HYDROGRAPH AT											
+	22	38.03	1	FLOW	2112.	3000.	3000.	3000.	3000.	3000.	3000.
				TIME	15.00	14.50	14.00	13.50	13.00	13.00	12.00
ROUTED TO											
+	22	38.03	1	FLOW	1785.	2835.	2982.	2999.	3000.	3000.	3000.
				TIME	16.00	15.50	16.00	16.50	17.00	18.00	18.00
HYDROGRAPH AT											
+	98	22.90	1	FLOW	1627.	3152.	4261.	5960.	7734.	9698.	15320.
				TIME	16.50	16.00	16.00	16.00	16.00	16.00	16.00
DIVERSION TO											
+	CAN	22.90	1	FLOW	0.	0.	961.	2660.	4434.	6398.	12020.
				TIME	.00	.00	16.00	16.00	16.00	16.00	16.00
HYDROGRAPH AT											
+	25	22.90	1	FLOW	1627.	3152.	3300.	3300.	3300.	3300.	3300.
				TIME	16.50	16.00	15.00	14.50	14.00	13.50	13.00

*** NORMAL END OF HEC-1 ***


State Park Area Map
East St. Louis & Vicinity
Interior Flood Control Project
Appendix
NOTE: These are conceptual planning documents, not intended to depict the exact locations, boundaries or nature of project features.
CANTEEN CREEK
STATE PARK AREA 3

2002

ALTERNATIVE 1 CALCULATIONS

Storage Volume Calculation

```
Type.... Vol: Elev-Area                                       Page 1.01
Name.... AREAS 1 AND 2

File.... K:\STLCOE\ESTL-IFC\PONDPACK\STATEPARK.PPW
Title... Alternative 1: Areas 1 and 2, No excavation, berms to
         424
```

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
416.00	-----	5.0000	.0000	.000	.000
418.00	-----	50.9000	71.8531	47.902	47.902
419.99	-----	179.3000	325.7321	216.068	263.970
420.00	-----	283.8000	688.6779	2.298	266.268
423.00	-----	286.8000	855.8962	855.896	1122.164
424.00	-----	287.8000	861.8997	287.300	1409.464

POND VOLUME EQUATIONS

```
* Incremental volume computed by the Conic Method for Reservoir Volumes.

  Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

  where: EL1, EL2     = Lower and upper elevations of the increment
         Area1,Area2  = Areas computed for EL1, EL2, respectively
         Volume       = Incremental volume between EL1 and EL2
```

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 08:34:47 Date: 03-21-2001

2004

ALTERNATIVE 2 CALCULATIONS

Storage Volume Calculation

Type.... Vol: Elev-Area   Page 1.01
Name.... FARMLAND

File.... K:\STLCOE\ESTL-IFC\PONDPACK\STATEPARK2.PPW
Title... Alternative 2: Existing contours in Area 3

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
416.50	-----	.0000	.0000	.000	.000
418.00	-----	6.0500	6.0500	3.025	3.025
420.00	-----	46.1500	68.9095	45.940	48.965
422.00	-----	140.8600	267.6369	178.425	227.389
424.00	-----	215.2000	530.1665	353.444	580.834

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 08:46:32   Date: 03-21-2001

Existing I-255 Culvert Calculations

Culvert Calculator Report
State Park Place, 2 - 54" Culverts @ 255

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	424.00 ft	Headwater Depth/ Height	1.26
Computed Headwater Elevation	424.00 ft	Discharge	234.92 cfs
Inlet Control HW Elev	423.54 ft	Tailwater Elevation	418.06 ft
Outlet Control HW Elev	424.00 ft	Control Type	Outlet Control

Grades			
Upstream Invert	418.34 ft	Downstream Invert	418.06 ft
Length	252.00 ft	Constructed Slope	0.001111 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	3.19 ft
Slope Type	Mild	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	3.19 ft
Velocity Downstream	9.74 ft/s	Critical Slope	0.004925 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.50 ft
Section Size	54 inch	Rise	4.50 ft
Number Sections	2		

Outlet Control Properties			
Outlet Control HW Elev	424.00 ft	Upstream Velocity Head	0.86 ft
Ke	0.50	Entrance Loss	0.43 ft

Inlet Control Properties			
Inlet Control HW Elev	423.54 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	31.8 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Existing I-255 Culvert Calculations

Rating Table Report
State Park Place, 2 - 54" Culverts @ 255

Range Data:

	Minimum	Maximum	Increment
Allowable HW Eleva	418.25	424.00	0.25 ft

HW Elev (ft)	Discharge (cfs)
418.25	0.00
418.50	0.25
418.75	1.73
419.00	4.55
419.25	8.69
419.50	14.14
419.75	20.80
420.00	28.59
420.25	37.44
420.50	47.26
420.75	58.01
421.00	69.62
421.25	81.95
421.50	94.90
421.75	108.35
422.00	122.26
422.25	136.52
422.50	150.55
422.75	165.50
423.00	180.19
423.25	194.57
423.50	208.73
423.75	222.21
424.00	234.92

Existing I-255 Culvert Calculations

Culvert Calculator Report
State Park Place, 5 - 48" Culverts @ 255

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	424.00 ft	Headwater Depth/ Height	1.82
Computed Headwater Elevation	424.00 ft	Discharge	622.40 cfs
Inlet Control HW Elev	423.30 ft	Tailwater Elevation	416.28 ft
Outlet Control HW Elev	424.00 ft	Control Type	Outlet Control

Grades			
Upstream Invert	416.72 ft	Downstream Invert	416.28 ft
Length	232.00 ft	Constructed Slope	0.001897 ft/ft

Hydraulic Profile			
Profile	CompositeM2Pressure	Depth, Downstream	3.35 ft
Slope Type	Mild	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	3.35 ft
Velocity Downstream	11.07 ft/s	Critical Slope	0.007236 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	5		

Outlet Control Properties			
Outlet Control HW Elev	424.00 ft	Upstream Velocity Head	1.52 ft
Ke	0.50	Entrance Loss	0.76 ft

Inlet Control Properties			
Inlet Control HW Elev	423.30 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	62.8 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Existing I-255 Culvert Calculations

Rating Table Report
State Park Place, 5 - 48" Culverts @ 255

Range Data:	Minimum	Maximum	Increment
Allowable HW Eleva	416.50	424.00	0.25 ft

HW Elev (ft)	Discharge (cfs)
416.50	0.00
416.75	1.0e-5
417.00	2.09
417.25	7.55
417.50	16.24
417.75	27.99
418.00	42.61
418.25	59.91
418.50	79.67
418.75	101.77
419.00	125.95
419.25	151.97
419.50	179.57
419.75	208.47
420.00	238.36
420.25	269.07
420.50	300.17
420.75	331.07
421.00	361.82
421.25	391.94
421.50	421.07
421.75	448.17
422.00	472.51
422.25	492.19
422.50	511.94
422.75	531.27
423.00	550.21
423.25	568.78
423.50	586.99
423.75	604.86
424.00	622.40

Cumulative Rating Curve for Outlet under I-255

Computed from individual rating curves of 7 culverts under I-255

Elevation	Q1	Q2	Total Q
416.50	0	0	0
416.75	0	0	0
417.00	2	0	2
417.25	8	0	8
417.50	16	0	16
417.75	28	0	28
418.00	43	0	43
418.25	60	0	60
418.50	80	0	80
418.75	102	2	104
419.00	126	5	131
419.25	152	9	161
419.50	180	14	194
419.75	208	21	229
420.00	238	29	267
420.25	269	37	307
420.50	300	47	347
420.75	331	58	389
421.00	362	70	431
421.25	392	82	474
421.50	421	95	516
421.75	448	108	557
422.00	473	122	595
422.25	492	137	629
422.50	512	151	662
422.75	531	166	697
423.00	550	180	730
423.25	569	195	763
423.50	587	209	796
423.75	605	222	827
424.00	622	235	857

Detention Storage Estimate (100-year)

```
Type.... Vol.Est: Peak Estimate                              Page 2.01
Name.... EST.VOL  10

File.... K:\STLCOE\ESTL-IFC\PONDPACK\STATEPARK2.PPW
Title... Alternative 2: Required Storage Estimate, 100-Year
         Canteen Creek Overflow

                    DETENTION STORAGE ESTIMATE
                 Estimated from Max Allowable Outflow
                  (Outflow Hydrograph Approximation)

                    Peak Inflow =      6398.00 cfs
                    Max Outflow =       857.00 cfs
```

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	1701.629	13.5914	20.1905
Linear	1930.693	13.0000	20.1905
Curvilinear	2161.151	13.0000	20.1905
Upper Boundary	2185.333	13.0000	20.1905
Total Inflow	2220.909	13.0000	21.5000

Stretch Factor = .000 % (Curvilinear Estimate Only)

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:09:47 Date: 03-21-2001

Detention Storage Estimate (25-year)

```
Type.... Vol.Est: Peak Estimate                                    Page 2.01
Name.... EST.VOL  10

File.... K:\STLCOE\ESTL-IFC\PONDPACK\STATEPARK2.PPW
Title... Alternative 2: Required Storage Estimate, 25-Year
         Canteen Creek Overflow
```

DETENTION STORAGE ESTIMATE
Estimated from Max Allowable Outflow
(Outflow Hydrograph Approximation)

Peak Inflow = 2660.00 cfs
Max Outflow = 857.00 cfs

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	370.846	14.4089	18.3303
Linear	509.716	14.0000	18.3303
Curvilinear	616.400	14.0000	18.3303
Upper Boundary	663.066	14.0000	18.3303
Total Inflow	696.570	14.0000	19.5000

Stretch Factor = .000 % (Curvilinear Estimate Only)

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:10:09 Date: 03-21-2001

2013

ALTERNATIVE 3 CALCULATIONS

Storage Volume Calculation

```
Type.... Vol: Elev-Area                                        Page 1.01
Name.... FARMLAND_EX

File.... K:\STLCOE\ESTL-IFC\PONDPACK\STATEPARK3.PPW
Title... Alternative 3:  Excavation to elevation 418'
```

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
416.50	-----	.0000	.0000	.000	.000
418.00	-----	272.3999	272.3999	136.200	136.200
420.00	-----	274.6001	820.4978	546.999	683.199
422.00	-----	276.7000	826.9481	551.299	1234.497
423.00	-----	277.8000	831.7495	277.250	1511.747
424.00	-----	278.5000	834.4499	278.150	1789.897

POND VOLUME EQUATIONS

```
* Incremental volume computed by the Conic Method for Reservoir Volumes.

  Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

  where: EL1, EL2      = Lower and upper elevations of the increment
         Area1,Area2   = Areas computed for EL1, EL2, respectively
         Volume        = Incremental volume between EL1 and EL2
```

Required Outflow Estimate

```
Type.... Vol.Est: Peak Estimate                                Page 2.01
Name.... EST.VOL  10

File.... K:\STLCOE\ESTL-IFC\PONDPACK\STATEPARK3.PPW
Title... Alternative 3: Required Outflow for excavated
         detention area with 100-year Canteen Creek Overflow

                    DETENTION STORAGE ESTIMATE
                 Estimated from Max Allowable Outflow
                  (Outflow Hydrograph Approximation)

                  Peak Inflow =      6398.00 cfs
                  Max Outflow =      1500.00 cfs
```

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	1372.884	13.7740	19.5608
Linear	1717.692	13.0000	19.5608
Curvilinear	2059.398	13.0000	19.5608
Upper Boundary	2124.355	13.0000	19.5608
Total Inflow	2220.909	13.0000	21.5000

Stretch Factor = .000 % (Curvilinear Estimate Only)

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:57:15 Date: 03-21-2001

2016

ALTERNATIVE 4 CALCULATIONS

Storage Volume Calculations

Type.... Vol: Elev-Area Page 1.01
Name.... AREA5

File.... K:\STLCOE\ESTL-IFC\PONDPACK\STATEPARK5.PPW
Title... Alternative 4: State Park Areas 1,2 and 4, berms to elevation 424'

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
414.00	-----	51.0000	.0000	.000	.000
416.00	-----	82.9000	198.9223	132.615	132.615
418.00	-----	137.3000	326.8873	217.925	350.540
420.00	-----	439.2000	822.0649	548.043	898.583
422.00	-----	441.5000	1321.0480	880.699	1779.282
423.00	-----	442.7000	1326.3000	442.100	2221.382
424.00	-----	443.8000	1329.7500	443.250	2664.632

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 13:41:43 Date: 03-21-2001

Proposed Channel Improvement Calculations

Proposed Channel , s=0.00334
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\state park\canteen .fm2
Worksheet	Sta 185+80 to Hwy. 157 new
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.003440	ft/ft
Depth	15.50	ft
Left Side Slope	2.500000	H : V
Right Side Slope	2.500000	H : V
Discharge	9,698.00	cfs

Results		
Bottom Width	13.55	ft
Flow Area	810.72	ft²
Wetted Perimeter	97.02	ft
Top Width	91.05	ft
Critical Depth	13.21	ft
Critical Slope	0.007205	ft/ft
Velocity	11.96	ft/s
Velocity Head	2.22	ft
Specific Energy	17.72	ft
Froude Number	0.71	
Flow is subcritical.		

Proposed Channel Improvement Calculations

Proposed Channel, s=0.0012 ft/ft
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\state park\canteen .fm2
Worksheet	Sta 166+00 to 185+80 new
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.001200	ft/ft
Depth	15.50	ft
Left Side Slope	2.500000	H : V
Right Side Slope	2.500000	H : V
Discharge	9,698.00	cfs

Results		
Bottom Width	40.34	ft
Flow Area	1,225.82	ft²
Wetted Perimeter	123.81	ft
Top Width	117.84	ft
Critical Depth	9.85	ft
Critical Slope	0.007197	ft/ft
Velocity	7.91	ft/s
Velocity Head	0.97	ft
Specific Energy	16.47	ft
Froude Number	0.43	
Flow is subcritical.		

Proposed Channel Improvement Calculations

Proposed Channel, s=0.00132
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\sticoe\estl-ifc\state park\canteen .fm2
Worksheet	Sta 122+00 to 166+00 new
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.001320	ft/ft
Depth	15.50	ft
Left Side Slope	2.500000	H : V
Right Side Slope	2.500000	H : V
Discharge	9,698.00	cfs

Results		
Bottom Width	37.36	ft
Flow Area	1,179.74	ft²
Wetted Perimeter	120.83	ft
Top Width	114.86	ft
Critical Depth	10.14	ft
Critical Slope	0.007189	ft/ft
Velocity	8.22	ft/s
Velocity Head	1.05	ft
Specific Energy	16.55	ft
Froude Number	0.45	
Flow is subcritical.		

Proposed Channel Improvement Calculations

Proposed Channel, s=0.001140
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\state park\canteen .fm2
Worksheet	Sta 111+00 to 122+00 new
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.001140	ft/ft
Depth	15.50	ft
Left Side Slope	2.500000	H : V
Right Side Slope	2.500000	H : V
Discharge	9,698.00	cfs

Results		
Bottom Width	41.99	ft
Flow Area	1,251.45	ft²
Wetted Perimeter	125.46	ft
Top Width	119.49	ft
Critical Depth	9.69	ft
Critical Slope	0.007203	ft/ft
Velocity	7.75	ft/s
Velocity Head	0.93	ft
Specific Energy	16.43	ft
Froude Number	0.42	
Flow is subcritical.		

Proposed Channel Improvement Calculations

Proposed Channel through I-255 bridge
Worksheet for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\state park\canteen .fm2
Worksheet	Sta 111+00 to Sta 122+00 rectangular
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.001140	ft/ft
Depth	15.50	ft
Discharge	9,698.00	cfs

Results		
Bottom Width	38.63	ft
Flow Area	598.71	ft²
Wetted Perimeter	69.63	ft
Top Width	38.63	ft
Critical Depth	12.51	ft
Critical Slope	0.002065	ft/ft
Velocity	16.20	ft/s
Velocity Head	4.08	ft
Specific Energy	19.58	ft
Froude Number	0.73	
Flow is subcritical.		

Utility Trench Ditch Calculations

Utility Trench Ditch 1
Worksheet for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\state park\trenches.fm2
Worksheet	TRENCH1
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.000800	ft/ft
Depth	4.00	ft
Bottom Width	3.00	ft

Results		
Discharge	41.11	cfs
Flow Area	12.00	ft²
Wetted Perimeter	11.00	ft
Top Width	3.00	ft
Critical Depth	1.80	ft
Critical Slope	0.005793	ft/ft
Velocity	3.43	ft/s
Velocity Head	0.18	ft
Specific Energy	4.18	ft
Froude Number	0.30	
Flow is subcritical.		

Utility Trench Ditch Calculations

Utility Ditch Trench 2
Worksheet for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\state park\trenches.fm2
Worksheet	TRENCH2
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.000900	ft/ft
Depth	4.00	ft
Bottom Width	3.00	ft

Results		
Discharge	43.61	cfs
Flow Area	12.00	ft²
Wetted Perimeter	11.00	ft
Top Width	3.00	ft
Critical Depth	1.87	ft
Critical Slope	0.005885	ft/ft
Velocity	3.63	ft/s
Velocity Head	0.21	ft
Specific Energy	4.21	ft
Froude Number	0.32	
Flow is subcritical.		

Utility Trench Ditch Calculations

Utility Trench Ditch 3
Worksheet for Rectangular Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\state park\trenches.fm2
Worksheet	TRENCH3
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.002000	ft/ft
Depth	2.00	ft
Bottom Width	3.00	ft

Results		
Discharge	27.67	cfs
Flow Area	6.00	ft²
Wetted Perimeter	7.00	ft
Top Width	3.00	ft
Critical Depth	1.38	ft
Critical Slope	0.005282	ft/ft
Velocity	4.61	ft/s
Velocity Head	0.33	ft
Specific Energy	2.33	ft
Froude Number	0.58	
Flow is subcritical.		

C.4.6 Wedgewood Site

Summary of Engineering Calculations

Wedgewood Site

East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project

Prepared for:
St. Louis District Army Corps of Engineers

Prepared by:
PARSONS
St. Louis, Missouri

May 2001

Wedgewood Site

Description
One of the potential project sites for the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project for the St. Louis District Army Corps of Engineers (District) is the Wedgewood site. The Wedgewood site is located in the City of East St. Louis, and consists of a buyout area bisected by both I-255 and Summit/Marybell Avenue, forming four quadrants. The engineering objectives for this site are to restore a flood pulse across the Wedgewood site using flow from Schoenberger Creek via Harding Ditch to increase the bio-diversity of the site, and provide sediment removal to improve water quality. The site is bounded to the north by the MetroLink line, to the east by Harding Ditch, and to the west by Kingshighway. The site stretches south to the limits of the Wedgewood buyout area. The quadrants were identified as follows, clockwise from northwest: Area 1, Area 3, Area 4 and Area 2.

The available mapping of the project area was provided in the form of 1998 NAPP aerial maps of the vicinity, scaled at 1"=1000', and topographic aerial photomaps at 1"=200' scale, produced for the District in 1971. The topographic map predates the I-255 extension that bisects the site. It should be noted that the inaccuracy and age of the available topographic data contributed a factor of uncertainty to the analysis. Results of the analysis are considered conceptual in nature. Using the 1998 aerial maps, the surface areas of the four quadrants within the project site were measured, and the resulting total surface area for the site was 112.9 acres, as shown in Table 1.

Table 1 Wedgewood Surface Area

Area #	Surface Area (acres)
1	52.4
2	35.0
3	18.3
4	7.2
TOTAL	**112.9**

Hydrology
Under existing conditions, the flow in Schoenberger Creek overtops the levees downstream of Highway 157 and causes flooding in the adjacent areas. The base HEC-1 model represents these conditions by including a diversion of flow from Schoenberger Creek downstream of Highway 157. The diversion effectively removes all flows greater than the existing capacity of the creek, which had been estimated as 3950 cfs in the model. The goal for the Wedgewood site was to receive full flow of Schoenberger Creek, assuming new channel improvements to Schoenberger that would convey the flow from Highway 157 to Harding Ditch. Therefore, the hydrologic point at Highway 157, just upstream of the diversion in the HEC-1 model, was used to provide approximate data for full flows in Schoenberger Creek. The peak inflows and runoff volumes for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year and 500-year storms at Highway 157 are listed in Table 2.

Table 2 Schoenberger Creek HEC-1 Flows and Volumes at Hwy. 157

Storm Frequency	Peak Flow (cfs)	Runoff Volume (ac-ft)
2-year	2,612	756
5-year	4,112	1,161
10-year	5,295	1,475
25-year	7,756	2,141
50-year	9,834	2,731
100-year	12,191	3,394
500-year	17,788	5,020

The HEC-1 base model input and output, and a graph of the design flood pulse hydrograph for Schoenberger Creek at Highway 157 are included in the Appendix.

Hydraulics
The existing capacity of Harding Ditch at the location adjacent to the Wedgewood site was computed using the Harding Ditch cross-section at station 150+50 from the East St. Louis Flood Protection Rehabilitation Project Channel Improvements, Harding Ditch and Schoenberger Creek, dated 1995. The approximate dimensions of the existing ditch consisted of a 30-foot bottom width, 3:1 horizontal to vertical (3H:1V) side slopes, target flow depth of 14 feet and flowline slope of 0.00044 ft/ft. The resulting normal depth channel capacity of this cross-section was computed to be 4360 cfs using Manning's equation in Haestad Methods' FlowMaster program. For site analysis, the approximate Harding Ditch flowline was determined to be at elevation 406.5 NGVD; this provided the minimum elevation constraint for any proposed excavation in the Wedgewood areas, since the ponds would have to drain into Harding Ditch. The crown of the Harding Ditch levee adjacent to the site was determined to be at elevation 422.5 NGVD. This formed the minimum elevation constraint for proposed berms around the Wedgewood areas.

Site Analysis
It was assumed that the Wedgewood area would operate in conjunction with upstream sediment detention along Harding Ditch at one or more of the other project sites, since Harding Ditch already experiences flooding problems without the additional flow from Schoenberger Creek. Therefore, the storage volume that would be required to provide capacity for the full flow from Schoenberger Creek was estimated assuming no concurrent inflow from the upstream Harding Ditch watershed. Using the storage volume calculator in Haestad Methods' PondPack program, the cumulative volume requirements for the Wedgewood site were estimated for the range of volumes from 1,475 acre feet to 3,394 acre-feet. The HEC-1 model hydrograph for Schoenberger Creek at Highway 157 was used to represent the inflow for each storm, while the existing Harding Ditch capacity of 4,360 cfs was the allowable outflow. Since the peak 2-year flow of 2,612 cfs and the peak 5-year flow of 4,112 cfs for Schoenberger Creek were less than the Harding Ditch capacity of 4,360 cfs, no storage volumes were necessary for those storm frequencies. Storage volume estimates for the 10-, 25-, 50- and 100-year storms are listed in Table 3, and corresponding calculations are included in the Appendix.

Table 3 Storage Volume Estimates

Storm Frequency	Estimated Storage Requirement (ac-ft)
10-year	59.1
25-year	354.3
50-year	676.5
100-year	1071.9

Several issues concerning the efficient utilization of the Wedgewood site were discovered upon preliminary evaluation. The first issue involved an existing 60-inch storm sewer that extended across the north side of Areas 1 and 3. This sewer was identified on a layout of existing storm sewers from the Harding Ditch Combined Area Harding Ditch Storm Sewer Study, provided by the District. It appeared from the layout that the outfall of the sewer was located at Harding Ditch. In order to maximize the available surface area of Areas 1 and 3, it was initially assumed that the outfall of the existing storm sewer system could be rerouted directly into a proposed habitat Area 1. No storm sewer profiles were available for the existing storm sewer system, and the manhole shown on the plans between Summit Avenue and the MetroLink rail could not be located during a field visit. A conservative assumption was made that a minimum of 3 feet of cover was maintained over the existing pipe. From the topographic map, the ground over the downstream reach of pipe had an average elevation of 414 NGVD, which along with the assumption of cover would set the pipe invert at elevation 406 NGVD. The channel bottom flowline of Harding Ditch adjacent to the site was estimated as 406.5 NGVD, which constrained the pond outlet to an elevation at or greater than 406.5 NGVD'. Under these assumptions, the existing storm sewer system could not be redirected into a proposed habitat Area 1 without potentially exacerbating upstream flooding in the area served by the existing storm sewer system. It was therefore assumed for the purposes of this conceptual plan that the storm sewer could be relocated to outfall into Harding Ditch while maximizing available surface area in Areas 1 and 3.

The second issue to be considered during evaluation of alternatives for the Wedgewood site involved the required berm height for the proposed habitat areas. The target flood pulse elevation in the proposed habitat areas was determined by the water surface elevation of Harding Ditch flowing at capacity, which was at approximately elevation 420.5 NGVD. Setting target ponding levels and corresponding berms at a lower elevation than 420.5 NGVD could cause potential flooding due to backwater from Harding Ditch. With the existing ground in Areas 1 and 2 at an average elevation 414 NGVD, according to the topographic map, it would be necessary to construct berms with an average height of 8.5 feet around these areas. Existing housing and roadways would be directly adjacent to the berms in Areas 1 and 2, and consideration was given to the thought that this height of berm might have a negative aesthetic (or psychological) impact on the neighborhood.

The third issue arising from the evaluation of the Wedgewood areas was the desire of the local community to keep Summit/Marybell Avenue operational. Protecting this roadway with at least 8.5' berms on both sides would require a significant amount of the surface area available in the site.

Assuming 3H:1V side slopes for the berms and a 10-foot crown at the top, the average berm width would be 61 feet on either side of the road. This amounts to a total width of 122 feet plus the roadway right-of-way, which would result in a significant loss of surface area across the length of the road. In addition, the existing Summit/Marybell underpass might provide the most suitable location for the necessary hydraulic interconnection of Areas 1 and 2 with Areas 3 and 4 across I-255. It would be difficult to make efficient use of the areas if Summit/Marybell Avenue was not taken out of operation.

After considering the limiting factors described above, the District defined two alternatives to be evaluated. Alternative 1 assumes that Summit/Marybell Avenue would remain operational, but that habitat areas would only be located in Areas 3 and 4 in order to avoid the problem of punching culverts through the I-255 embankments. Alternative 2 assumes that Summit/Marybell Avenue would be removed, and the existing Summit/Marybell Avenue opening would be utilized to interconnect Areas 1 and 2 with Areas 3 and 4. Both alternatives assume that the existing storm sewer would be rerouted to maximize available area.

Alternative 1

Alternative 1 for Wedgewood was formulated with the objective of determining the maximum capacity of Areas 3 and 4, assuming berm heights at the maximum allowable elevation of 422.5 NGVD and excavation to the minimum allowable pond bottom elevation of 407 NGVD. The maximum berm elevation was constrained by the average top of levee elevation of Harding Ditch, while the minimum pond bottom elevation was set slightly higher than the Harding Ditch flowline of 406.5 NGVD in order to facilitate drainage of the pond back into Harding Ditch. Using the available surface area boundary and a side slope of 3H:1V for the proposed berms the surface area was measured for both areas and the combined elevation-area relationship was input into the PondPack volume calculator. The resulting available storage volume for Alternative 1 was calculated as approximately 296.8 acre-ft. From Table 3, it is evident that this capacity falls between the 10-year required storage volume of 59.1 acre-ft and the 25-year required storage volume of 354.3 acre-ft

Alternative 2

Alternative 2 for Wedgewood was formulated with the objective of determining the minimum excavation required for the entire site, assuming that Summit/Marybell Avenue would be taken out of service. Areas 1 and 2 were combined as one detention area, and Areas 3 and 4 were combined as a second detention area, with the Summit/Marybell Avenue opening under I-255 providing the hydraulic interconnection. The elevation of the top of proposed berms around the areas was set to the Harding Ditch levee elevation of 422.5 NGVD. Using the available surface area boundaries and side slopes of 3H:1V for the proposed berms and the detention pond excavation, the surface area was measured for both detention areas, and the combined elevation-area relationship was input into the PondPack volume calculator. The available storage volume without excavation of the areas was computed in PondPack as 775 acre-ft.

This volume would provide capacity for the 50-year storm, which requires approximately 676.5 acre-ft of storage, as shown in Table 3. The side slopes of the detention areas were then extended down at one-foot increments until the design flood pulse capacity was reached, using the PondPack volume calculator. The results if this analysis indicated that an average of 4 feet of excavation, which would locate the pond bottoms at elevation 410 NGVD, would provide approximately 1,167.7 acre-ft ensuring flows from the Harding ditch through the site.

Cost Features
Parsons estimated no cost features for the Wedgewood alternatives.

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

APPENDIX

SUPPORTING CALCULATIONS FOR WEDGEWOOD

HEC-1 Base Model for Schoenberger Creek
  HEC-1 Model Output
  100-Year Hydrograph for Schoenberger Creek, Full Flow

Detention Storage Estimates, Assuming 4,360 cfs Outflow

Harding Ditch Existing Capacity Calculation

Alternative 1 Storage Volume Calculation

Alternative 2 Storage Volume Calculation

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

HEC-1 Model Output

```
1***************************************                    ***************************************
 *                                     *                    *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1) *                    *   U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN    1998            *                    *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1               *                    *         609 SECOND STREET           *
 *                                     *                    *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   08MAY01  TIME  12:52:03 *                    *         (916) 756-1104              *
 *                                     *                    *                                     *
 ***************************************                    ***************************************


                    X     X  XXXXXXX   XXXXX          X
                    X     X  X        X     X        XX
                    X     X  X        X               X
                    XXXXXXX  XXXX     X        XXXXX  X
                    X     X  X        X               X
                    X     X  X        X     X         X
                    X     X  XXXXXXX   XXXXX         XXX


     THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

     THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
     THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
     NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
     DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
     KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                           HEC-1 INPUT                                                  PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         1          ID        HARDING DITCH WATERSHED
         2          ID        HEC-1 ROUTING
         3          ID        MULTI-RATIO:10-YR BASE FLOOD (1.0) /2-YR/5-YR/25-YR/50-YR/100-YR/500-YR
         4          IT      10                    290
         5          IO       5
         6          JR    PREC     .69     .87    1.00    1.26    1.48    1.72    2.29

         7          KK     145  LITTLE CANTEEN CREEK TRIB 145
         8          BA    2.98
         9          BF     5.0    -.03    1.43
                    *  BASED ON ISWS BULLETIN 70 -PROB=10.0% -- INTERVAL= 10MIN -- DURATION=24HR
        10          PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
        11          PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
        12          PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
        13          PI    .008    .008    .008    .008    .008    .008    .018    .018    .018    .018
        14          PI    .018    .018    .018    .018    .018    .018    .018    .018    .018    .018
        15          PI    .018    .018    .018    .018    .029    .029    .029    .029    .029    .029
        16          PI    .029    .029    .029    .055    .056    .056    .080    .081    .081    .178
        17          PI    .183    .397    .894    .310    .181    .082    .081    .080    .056    .056
        18          PI    .056    .029    .029    .029    .029    .029    .029    .029    .029    .029
        19          PI    .018    .018    .018    .018    .018    .018    .018    .018    .018    .018
        20          PI    .018    .018    .018    .018    .018    .018    .018    .018    .008    .008
        21          PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
        22          PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
        23          PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
        24          PI    .008    .008    .008    .008
        25          LS       0    75.0
        26          UD    1.22

        27          KK     146  LITTLE CANTEEN CREEK TRIB 146
        28          BA    2.91
        29          LS       0    75.0
        30          UD     .99

        31          KK       1  COMBINE 145 AND 146
        32          HC       2

        33          KK     146  ROUTE COMBINED FLOWS TO ILLINOIS HIGHWAY 157
        34          RS       4    FLOW      -1       0
        35          SV       0      20      39      67     121     173     230     283     339     433
        36          SQ       0     200     500    1000    2000    3000    4000    5000    6000    8000

        37          KK     144  LITTLE CANTEEN CREEK TRIB 144
        38          BA    2.06
        39          LS       0    75.0
        40          UD     .74

        41          KK       2  COMBINE FLOWS AT ILLINOIS HIGHWAY 157 IN CASEYVILLE
        42          HC       2
1                                           HEC-1 INPUT                                                  PAGE  2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 43           KK      35 DIVERSION OF SPILL ABOVE 2300 CFS
 44           DT    HARD
 45           DI       0    2300   20000
 46           DQ       0       0   17700

 47           KK      15 ROUTE TO JUNCTION OF SCHOENBERGER CREEK
 48           RT       0       2      14

 49           KK     155  SCHOENBERGER CREEK TRIB 155
 50           BA    4.40
 51           BF     5.0    -.03    1.43
 52           LS       0    75.7
 53           UD    1.24

 54           KK     152  SCHOENBERGER CREEK SUBAREA 152
 55           BA    1.16
 56           LS       0    75.0
 57           UD    0.73

 58           KK       1  COMBINE 155 AND 152
 59           HC       2

 60           KK     156  SCHOENBERGER CREEK SUBAREA 156
 61           BA    4.36
 62           LS       0    75.0
 63           UD    1.09

 64           KK       2  COMBINE 155,152,156
 65           HC       2

 66           KK       3  ROUTE COMBINED FLOWS
 67           RS       0    FLOW      -1       0
 68           SV       0       9      18      31      51      97     140     244     300
 69           SQ       0     200     500    1000    2000    4000    6000   10000   12000

 70           KK     150,151,153 SCHOENBERGER CREEK TRIBS 150,151,153
 71           BA    2.12
 72           LS       0    75.0
 73           UD     .66

 74           KK       2  COMBINE FLOWS AT ILLINOIS HIGHWAY 157 IN CASEYVILLE
 75           HC       2

 76           KK      14  DIVERSION OF SPILL ABOVE 3950 CFS
 77           DT     SCH
 78           DI       0    3950   20000
 79           DQ       0       0   16050

 80           KK       2  COMBINE FLOWS AT JUNCTION OF SCHOENBERGER WITH HARDING DITCH
 81           HC       2
 82           ZZ
```

```
1*****************************************                                          ***************************************
 *                                       *                                          *                                     *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)  *                                          *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN    1998               *                                          *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                                          *        609 SECOND STREET            *
 *                                       *                                          *     DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   08MAY01  TIME  12:52:03   *                                          *        (916) 756-1104               *
 *                                       *                                          *                                     *
 *****************************************                                          ***************************************
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```
                              HARDING DITCH WATERSHED
                              HEC-1 ROUTING
                              MULTI-RATIO:10-YR BASE FLOOD (1.0) /2-YR/5-YR/25-YR/50-YR/100-YR/500-YR

   5 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                        NMIN         10  MINUTES IN COMPUTATION INTERVAL
                       IDATE     1    0  STARTING DATE
                       ITIME       0000  STARTING TIME
                          NQ        290  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE     3    0  ENDING DATE
                      NDTIME       0010  ENDING TIME
                       ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL     .17 HOURS
                      TOTAL TIME BASE   48.17 HOURS

        ENGLISH UNITS
            DRAINAGE AREA         SQUARE MILES
```

```
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT

  JP         MULTI-PLAN OPTION
                 NPLAN           1  NUMBER OF PLANS

  JR         MULTI-RATIO OPTION
                RATIOS OF PRECIPITATION
                 .69      .87     1.00     1.26     1.48     1.72     2.29

WARNING --- ROUTED OUTFLOW (   8527.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   9461.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   9819.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   9674.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (   9081.) IS GREATER THAN MAXIMUM OUTFLOW (   8000.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (  12030.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (  13691.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (  14775.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (  15227.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (  15108.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (  14510.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (  13547.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (  12358.) IS GREATER THAN MAXIMUM OUTFLOW (  12000.) IN STORAGE-OUTFLOW TABLE
1

       PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                         FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                         TIME TO PEAK IN HOURS

                                                            RATIOS APPLIED TO PRECIPITATION
OPERATION        STATION      AREA     PLAN            RATIO 1  RATIO 2  RATIO 3  RATIO 4  RATIO 5  RATIO 6  RATIO 7
                                                           .69      .87     1.00     1.26     1.48     1.72     2.29

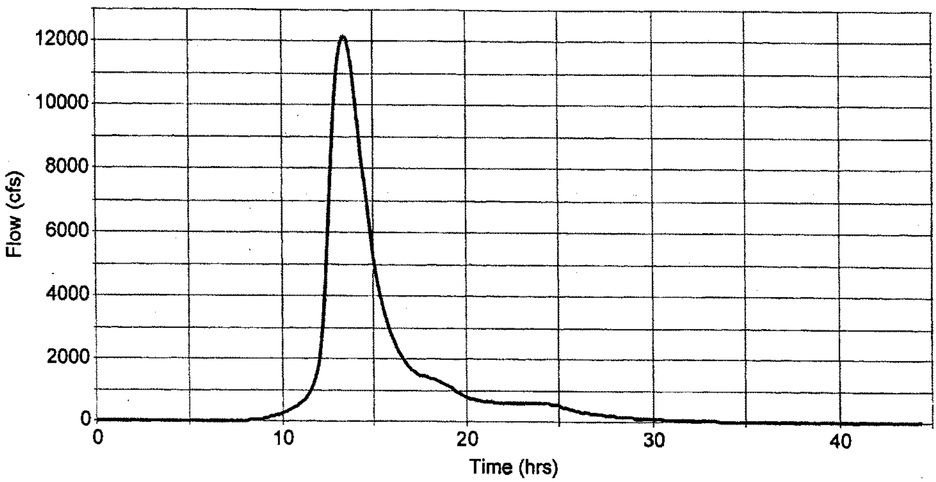
HYDROGRAPH AT
+                  145        2.98       1     FLOW       674.    1069.    1375.    2024.    2599.    3238.    4785.
                                               TIME      13.50    13.50    13.50    13.33    13.33    13.33    13.33

HYDROGRAPH AT
+                  146        2.91       1     FLOW       757.    1206.    1553.    2283.    2923.    3634.    5351.
                                               TIME      13.17    13.17    13.17    13.17    13.17    13.17    13.17
```

2 COMBINED AT											
+	1	5.89	1	FLOW	1408.	2238.	2878.	4228.	5431.	6771.	10011.
				TIME	13.33	13.33	13.33	13.17	13.17	13.17	13.17
ROUTED TO											
+	146	5.89	1	FLOW	1281.	2048.	2643.	3857.	4956.	6183.	9302.
				TIME	14.00	14.00	14.00	14.00	14.00	13.83	13.83
HYDROGRAPH AT											
+	144	2.06	1	FLOW	641.	1018.	1314.	1935.	2479.	3086.	4548.
				TIME	13.00	12.83	12.83	12.83	12.83	12.83	12.83
2 COMBINED AT											
+	2	7.95	1	FLOW	1550.	2481.	3210.	4646.	5987.	7465.	11307.
				TIME	13.83	13.83	13.83	13.83	13.83	13.83	13.67
DIVERSION TO											
+	HARD	7.95	1	FLOW	0.	181.	910.	2346.	3687.	5165.	9007.
				TIME	.00	13.83	13.83	13.83	13.83	13.83	13.67
HYDROGRAPH AT											
+	35	7.95	1	FLOW	1550.	2300.	2300.	2300.	2300.	2300.	2300.
				TIME	13.83	13.50	13.17	12.67	12.50	12.50	12.17
ROUTED TO											
+	15	7.95	1	FLOW	1550.	2300.	2300.	2300.	2300.	2300.	2300.
				TIME	16.33	16.00	15.67	15.17	15.00	15.00	14.67
HYDROGRAPH AT											
+	155	4.40	1	FLOW	1027.	1616.	2069.	3019.	3859.	4798.	7063.
				TIME	13.50	13.50	13.50	13.50	13.33	13.33	13.33
HYDROGRAPH AT											
+	152	1.16	1	FLOW	363.	579.	747.	1099.	1408.	1752.	2581.
				TIME	13.00	12.83	12.83	12.83	12.83	12.83	12.83
2 COMBINED AT											
+	1	5.56	1	FLOW	1289.	2036.	2610.	3839.	4918.	6120.	9021.
				TIME	13.33	13.33	13.33	13.17	13.17	13.17	13.17
HYDROGRAPH AT											
+	156	4.36	1	FLOW	1064.	1691.	2174.	3189.	4086.	5094.	7530.
				TIME	13.33	13.33	13.33	13.33	13.17	13.17	13.17
2 COMBINED AT											
+	2	9.92	1	FLOW	2354.	3726.	4784.	7020.	9004.	11213.	16551.
				TIME	13.33	13.33	13.33	13.17	13.17	13.17	13.17
ROUTED TO											
+	3	9.92	1	FLOW	2225.	3502.	4520.	6601.	8397.	10403.	15227.
				TIME	13.67	13.67	13.50	13.50	13.50	13.50	13.50
HYDROGRAPH AT											
+	150	2.12	1	FLOW	716.	1137.	1460.	2138.	2731.	3390.	4975.
				TIME	12.83	12.83	12.83	12.83	12.83	12.83	12.83
2 COMBINED AT											
+	2	12.04	1	FLOW	2612.	4112.	5295.	7756.	9834.	12191.	17788.
				TIME	13.50	13.50	13.50	13.33	13.33	13.33	13.33
DIVERSION TO											
+	SCH	12.04	1	FLOW	0.	162.	1345.	3806.	5884.	8241.	13838.
				TIME	.00	13.50	13.50	13.33	13.33	13.33	13.33
HYDROGRAPH AT											
+	14	12.04	1	FLOW	2612.	3950.	3950.	3950.	3950.	3950.	3950.
				TIME	13.50	13.33	12.83	12.67	12.50	12.33	12.17
2 COMBINED AT											
+	2	19.99	1	FLOW	2613.	3969.	4074.	5263.	6250.	6250.	6250.
				TIME	13.50	13.67	14.17	15.00	15.00	15.00	14.67

*** NORMAL END OF HEC-1 ***

100-Year Hydrograph for Schoenberger Creek, Full Flow



Detention Storage Estimates, Assuming 4,360 cfs Outflow

Type.... Vol.Est: Peak Estimate Page 3.01
Name.... 10-YR

File.... K:\STLCOE\ESTL-IFC\PONDPACK\WEDGEWOOD.PPW
Title... Storage Calculation for full 10-year Inflow from
Schoenberger Creek

DETENTION STORAGE ESTIMATE
Estimated from Max Allowable Outflow
(Outflow Hydrograph Approximation)

Peak Inflow = 5295.00 cfs
Max Outflow = 4360.00 cfs

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	59.122	12.9228	14.0797
Linear	229.748	12.0240	14.0797
Curvilinear	473.722	9.6860	14.0797
Upper Boundary	638.967	.0000	14.0797
Total Inflow	1477.577	.0000	42.2510

Stretch Factor = .000 % (Curvilinear Estimate Only)

WARNING: Hydrographs did not cross on
rising limb of inflow hydrograph.

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:16:34 Date: 02-12-2001

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Detention Storage Estimates, Assuming 4,360 cfs Outflow

```
Type.... Vol.Est: Peak Estimate                                    Page 3.01
Name.... 25-YR

File.... K:\STLCOE\ESTL-IFC\PONDPACK\WEDGEWOOD.PPW
Title... Storage Calculation for full 25-year Inflow from
         Schoenberger Creek

                   DETENTION STORAGE ESTIMATE
                 Estimated from Max Allowable Outflow
                  (Outflow Hydrograph Approximation)

                    Peak Inflow =      7756.00 cfs
                    Max Outflow =      4360.00 cfs
```

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	354.350	12.5957	14.5951
Linear	627.326	11.8570	14.5951
Curvilinear	1073.915	-.1716	14.5951
Upper Boundary	1216.300	.0000	14.5951
Total Inflow	2144.776	.0000	43.2530

Stretch Factor = .000 % (Curvilinear Estimate Only)

WARNING: Hydrographs did not cross on
rising limb of inflow hydrograph.

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:17:45 Date: 02-12-2001

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Detention Storage Estimates, Assuming 4,360 cfs Outflow

```
Type.... Vol.Est: Peak Estimate                              Page 3.01
Name.... 50-YR

File.... K:\STLCOE\ESTL-IFC\PONDPACK\WEDGEWOOD.PPW
Title... Storage Calculation for full 50-year Inflow from
         Schoenberger Creek

                 DETENTION STORAGE ESTIMATE
              Estimated from Max Allowable Outflow
               (Outflow Hydrograph Approximation)

                Peak Inflow =      9834.00 cfs
                Max Outflow =      4360.00 cfs
```

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	676.496	12.4538	14.9081
Linear	996.044	11.6900	14.9081
Curvilinear	1554.470	-.2177	14.9081
Upper Boundary	1723.074	.0000	14.9081
Total Inflow	2736.108	.0000	43.9210

```
Stretch Factor =     .000 %  (Curvilinear Estimate Only)

WARNING: Hydrographs did not cross on
rising limb of inflow hydrograph.
```

```
S/N: 021801A06A86    Parsons
PondPack Ver: 7.0 (312)       Compute Time: 09:18:55     Date: 02-12-2001
```

Detention Storage Estimates, Assuming 4,360 cfs Outflow

```
Type.... Vol.Est: Peak Estimate                               Page 3.01
Name.... EST.VOL  20

File.... K:\STLCOE\ESTL-IFC\PONDPACK\WEDGEWOOD.PPW
Title... Storage Calculation for full 100-year Inflow from
         Schoenberger Creek

                    DETENTION STORAGE ESTIMATE
                 Estimated from Max Allowable Outflow
                  (Outflow Hydrograph Approximation)

                    Peak Inflow =     12191.00 cfs
                    Max Outflow =      4360.00 cfs
```

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	1071.858	12.3475	15.1934
Linear	1428.150	11.3560	15.1934
Curvilinear	2082.132	-.1602	15.1934
Upper Boundary	2298.896	.0000	15.1934
Total Inflow	3400.605	.0000	44.4220

```
Stretch Factor =     .000 %  (Curvilinear Estimate Only)

WARNING: Hydrographs did not cross on
rising limb of inflow hydrograph.
```

```
S/N: 021801A06A86    Parsons
PondPack Ver: 7.0 (312)        Compute Time: 09:19:34     Date: 02-12-2001
```

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Harding Ditch Existing Capacity Calculation

Capacity of Harding Ditch at Wedgewood
Worksheet for Trapezoidal Channel

Project Description	
Project File	k:\stlcoe\estl-ifc\wedgewood\harding.fm2
Worksheet	Existing Cross-Section of Harding Ditch
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.000440	ft/ft
Depth	14.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	30.00	ft

Results		
Discharge	4,362.97	cfs
Flow Area	1,008.00	ft²
Wetted Perimeter	118.54	ft
Top Width	114.00	ft
Critical Depth	6.87	ft
Critical Slope	0.008054	ft/ft
Velocity	4.33	ft/s
Velocity Head	0.29	ft
Specific Energy	14.29	ft
Froude Number	0.26	
Flow is subcritical.		

Alternative 1 Storage Volume Calculation

```
Type.... Vol: Elev-Area                                          Page 1.01
Name.... WITH BERM, 3-4

File.... K:\STLCOE\ESTL-IFC\PONDPACK\WEDGEWOOD.PPW
Title... Aternative 1: Storage Volume Calculation
```

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
407.00	-----	17.7000	.0000	.000	.000
408.50	-----	18.4000	54.1466	27.073	27.073
410.50	-----	19.1000	56.2467	37.498	64.571
412.50	-----	19.8000	58.3469	38.898	103.469
414.50	-----	20.5000	60.4470	40.298	143.767
416.50	-----	21.3000	62.6962	41.797	185.564
418.50	-----	22.0000	64.9472	43.298	228.863
420.50	-----	22.9000	67.3455	44.897	273.760
421.50	-----	23.2000	69.1495	23.050	296.809

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

```
Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2      = Lower and upper elevations of the increment
       Area1,Area2   = Areas computed for EL1, EL2, respectively
       Volume        = Incremental volume between EL1 and EL2
```

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 13:57:58   Date: 02-13-2001

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Alternative 2 Storage Volume Calculation

```
Type.... Vol: Elev-Area                                          Page 1.01
Name.... BERMS, NO SUMMIT

File.... K:\STLCOE\ESTL-IFC\PONDPACK\WEDGEWOOD.PPW
Title... Alternative 2:  Storage Volume Calculation
```

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
410.00	-----	96.0000	.0000	.000	.000
411.00	-----	97.0000	289.4987	96.500	96.500
412.00	-----	98.0000	292.4987	97.500	193.999
414.00	-----	100.0000	296.9950	197.997	391.996
416.50	-----	102.2000	303.2940	252.745	644.741
418.50	-----	104.1000	309.4456	206.297	851.038
420.50	-----	106.0000	315.1457	210.097	1061.135
421.50	-----	107.2000	319.7983	106.599	1167.734

POND VOLUME EQUATIONS

```
* Incremental volume computed by the Conic Method for Reservoir Volumes.

  Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

  where: EL1, EL2      = Lower and upper elevations of the increment
         Area1,Area2   = Areas computed for EL1, EL2, respectively
         Volume        = Incremental volume between EL1 and EL2
```

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 13:57:21   Date: 02-13-2001

C.4.7 Mullen's Slough

Summary of Engineering Calculations

Mullens Slough Site

East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project

Prepared for:
St. Louis District Army Corps of Engineers

Prepared by:
PARSONS
St. Louis, Missouri

May 2001

Mullens Slough Site

Description
One of the potential project sites for the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project for the St. Louis District Army Corps of Engineers is the Mullens Slough area. The Mullens Slough area consists of four storage cells that could potentially provide stormwater detention or sediment control functions for the Powdermill Creek watershed if interconnected. These storage cells are identified as follows, from north to south: Cell 1 is an existing sediment pond just north of Highway 163, Cell 2 is an existing fishing lake just south of Highway 163, Cell 3 is known as Mullens Slough, and Cell 4 is identified as WRP land. Formulation and analysis of alternatives for the Mullens Slough site were limited by the lack of topographic mapping for the site area. . The engineering objectives for this site are to restore a flood pulse to Mullens Slough to increase the bio-diversity of the site, and provide sediment removal to improve water quality to Canal No. 1.

Hydrology
The existing HEC-1 base model for Powdermill Creek was provided by the District. It was utilized to compute the existing peak inflow to the site for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year and 500-year storms. These peak flows and the corresponding runoff volumes are listed in Table 1 below. The HEC-1 model output and hydrograph for Powdermill Creek are included in the Appendix.

Table 1 Powdermill Creek Flows

Storm Frequency	Peak Flow (cfs)	Runoff Volume (ac-ft)
2-year	723	213
5-year	1387	391
10-year	1871	520
25-year	2654	728
50-year	3431	938
100-year	4262	1163
500-year	6658	1825

Using 1998 NAPP aerial maps of the vicinity, scaled at 1"=1000', approximate pond surface areas were measured for the four cells. No elevation-depth information was available for the analysis of existing capacities of the cells, so these areas were assumed to remain wet up to the existing bank elevations. After field investigation, project team members agreed that it would be prudent to assume that the water surface elevation in the cells should not exceed existing bank elevations by more than five feet. This was due to the proximity of houses to the site as well as drainage considerations for the low-lying area to the east of the site. Potential cell capacities were computed using the storage volume calculator in Haestad Methods' PondPack program, assuming 3:1 horizontal to vertical sloped banks to create five feet of additional storage depth in each cell. The computed additional storage volumes available for stormwater in each cell are shown in Table 2 and calculations are included in the Appendix.

Table 2 Storage Volumes

Location	Potential Storage Volume
Cell 1	86 ac-ft
Cell 2	117 ac-ft
Cell 3	1034 ac-ft
Cell 4	628 ac-ft

The fishing lake is privately owned, and its inclusion into a flood control/sediment control system would necessitate regular cleanout maintenance. In addition, the fishing lake might not provide high quality habitat because its banks are mowed right up to the edge of the water. For these reasons, it was decided by the District project team that two conceptual layouts would be considered for future analysis; the first alternative would utilize all four cells while the second alternative would exclude Cell 2, the fishing lake.

Alternative 1
Alternative 1 for Mullens Slough was formulated on the assumption that all four cells could be interconnected by channelization, and that the combined storage of the four bermed cells would be used for flow from Powdermill Creek. The sum of the additional storage volumes created by berming all four cells was computed to be 1865 ac-ft. This available capacity is more than enough for the design event which was computed in the HEC-1 model as 1163 acre-ft. This preliminary evaluation indicates that Alternative 1 could be further developed. No hydrologic or hydraulic analysis was performed on an interconnection system for the cells, or an outlet for the system, due to the lack of topographic and other data for the site.

Alternative 2
The layout of Alternative 2 was identical to Alternative 1 with the exception that the fishing lake was excluded from the system. Without the fishing lake included in storage volume calculations, the available storage volume was reduced to 1748 acre-ft. . This preliminary evaluation indicates that Alternative 2 also contains more storage than needed for the design event and could be further developed to achieve the goal of flood pulse restoration. No hydrologic or hydraulic analysis was performed on an interconnection system for the cells, or an outlet for the system, due to the lack of topographic and other data for the site.

Cost Features:
Parsons estimated no cost features for either of these alternatives.

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

APPENDIX

SUPPORTING CALCULATIONS FOR MULLENS SLOUGH

HEC-1 Base Model for Powdermill Creek
- HEC-1 Model Output
- 100-Year Hydrograph

Mullens Slough Storage Volume Calculations
- Cell 1 (Sediment Pond)
- Cell 2 (Fishing Lake)
- Cell 3 (Mullens Slough)
- Cell 4 (WRP Land)

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

HEC-1 Model Output

```
1****************************************                ***************************************
*                                       *                *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                *   U.S. ARMY CORPS OF ENGINEERS      *
*             JUN   1998                *                *   HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1                *                *         609 SECOND STREET           *
*                                       *                *      DAVIS, CALIFORNIA 95616        *
*  RUN DATE   08MAY01  TIME  07:53:20   *                *         (916) 756-1104              *
*                                       *                *                                     *
*****************************************                ***************************************


                    X     X  XXXXXXX   XXXXX          X
                    X     X  X         X    X        XX
                    X     X  X         X              X
                    XXXXXXX  XXXX      X       XXXXX  X
                    X     X  X         X              X
                    X     X  X         X    X         X
                    X     X  XXXXXXX   XXXXX         XXX


      THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

      THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
      THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
      NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
      DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
      KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                        HEC-1 INPUT                                                PAGE  1

      LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1        ID        POWDERMILL CREEK - CANAL NO. 1 WATERSHED
        2        ID        HEC-1 FLOOD HYDROGRAPH CALCULATED AT BASE OF BLUFF
        3        ID        FUTURE CONDITIONS
        4        ID        1989 BULLETIN 70 RAINFALL
        5        ID        MULTI-RATIO:10-YR BASE FLOOD (1.0) /2-YR/5-YR/25-YR/50-YR/100-YR/500-YR
        6        ID        RAINFALL   :10-YR BASE FLOOD (4.88)/3.02/4.16/ 5.99/ 7.03/ 8.17 /11.34
        7        IT      10                 290
        8        IO       3
        9        JR    PREC     .62     .85    1.00    1.23    1.45    1.68    2.33

       10        KK  159163  POWDERMILL CREEK
       11        BA    4.32
       12        BF    1.00    -.03    1.43
                 *  BASED ON ISWS BULLETIN 70 -PROB=10.0% -- INTERVAL= 10MIN -- DURATION= 24HR
       13        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       14        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       15        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       16        PI    .008    .008    .008    .008    .008    .008    .018    .018    .018    .018
       17        PI    .018    .018    .018    .018    .018    .018    .018    .018    .018    .018
       18        PI    .018    .018    .018    .018    .029    .029    .029    .029    .029    .029
       19        PI    .029    .029    .029    .055    .056    .056    .080    .081    .081    .178
       20        PI    .183    .397    .894    .310    .181    .082    .081    .080    .056    .056
       21        PI    .056    .029    .029    .029    .029    .029    .029    .029    .029    .029
       22        PI    .018    .018    .018    .018    .018    .018    .018    .018    .018    .018
       23        PI    .018    .018    .018    .018    .018    .018    .018    .018    .008    .008
       24        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       25        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       26        PI    .008    .008    .008    .008    .008    .008    .008    .008    .008    .008
       27        PI    .008    .008    .008    .008
       28        LS       0    75.0
       29        UD    1.34
       30        ZZ
```


```
1****************************************                ***************************************
*                                       *                *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                *   U.S. ARMY CORPS OF ENGINEERS      *
*             JUN   1998                *                *   HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1                *                *         609 SECOND STREET           *
*                                       *                *      DAVIS, CALIFORNIA 95616        *
*  RUN DATE   08MAY01  TIME  07:53:20   *                *         (916) 756-1104              *
*                                       *                *                                     *
*****************************************                ***************************************
```


```
                    POWDERMILL CREEK - CANAL NO. 1 WATERSHED
                    HEC-1 FLOOD HYDROGRAPH CALCULATED AT BASE OF BLUFF
                    FUTURE CONDITIONS
                    1989 BULLETIN 70 RAINFALL
```

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

```
                    MULTI-RATIO:10-YR BASE FLOOD (1.0) /2-YR/5-YR/25-YR/50-YR/100-YR/500-YR
                    RAINFALL   :10-YR BASE FLOOD (4.88)/3.02/4.16/ 5.99/ 7.03/ 8.17 /11.34

 8 IO         OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

   IT         HYDROGRAPH TIME DATA
                     NMIN         10  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1   0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ        290  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      3   0  ENDING DATE
                   NDTIME       0010  ENDING TIME
                    ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL     .17 HOURS
                     TOTAL TIME BASE   48.17 HOURS

      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

   JP          MULTI-PLAN OPTION
                    NPLAN          1  NUMBER OF PLANS

   JR          MULTI-RATIO OPTION
                  RATIOS OF PRECIPITATION
                   .62        .85       1.00       1.23       1.45       1.68       2.33


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
 10 KK    *   159163   *       POWDERMILL CREEK
          *            *
          **************

              SUBBASIN RUNOFF DATA

 11 BA          SUBBASIN CHARACTERISTICS
                      TAREA        4.32  SUBBASIN AREA

 12 BF          BASE FLOW CHARACTERISTICS
                      STRTQ        1.00  INITIAL FLOW
                      QRCSN        -.03  BEGIN BASE FLOW RECESSION
                      RTIOR     1.43000  RECESSION CONSTANT

                PRECIPITATION DATA

 11 PB                STORM        4.71  BASIN TOTAL PRECIPITATION

 11 PI            INCREMENTAL PRECIPITATION PATTERN
                       .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                       .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                       .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                       .01        .01        .01        .01        .01        .01        .02        .02        .02        .02
                       .02        .02        .02        .02        .02        .02        .02        .02        .02        .02
                       .02        .02        .02        .02        .03        .03        .03        .03        .03        .03
                       .03        .03        .03        .06        .06        .06        .08        .08        .08        .18
                       .18        .40        .89        .31        .18        .08        .08        .08        .06        .06
                       .06        .03        .03        .03        .03        .03        .03        .03        .03        .03
                       .02        .02        .02        .02        .02        .02        .02        .02        .02        .02
                       .02        .02        .02        .02        .02        .02        .02        .02        .01        .01
                       .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                       .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                       .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                       .01        .01        .01        .01

 28 LS          SCS LOSS RATE
                      STRTL         .67  INITIAL ABSTRACTION
                     CRVNBR       75.00  CURVE NUMBER
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

 29 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        1.34  LAG

                                                     ***

                                                UNIT HYDROGRAPH
                                            42 END-OF-PERIOD ORDINATES
            61.       192.       369.       615.       927.      1206.      1380.      1456.      1457.      1388.
          1272.      1135.       957.       763.       616.       507.       417.       353.       292.       241.
```

```
            198.      164.      136.      111.       92.       76.       63.       52.       43.       36.
             29.       24.       20.       17.       14.       12.       10.        8.        6.        5.
              3.        1.

     TOTAL RAINFALL =    4.71, TOTAL LOSS =    2.49, TOTAL EXCESS =    2.22

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      48.17-HR
+    (CFS)       (HR)
                             (CFS)
+    1871.      13.50                   843.         262.         131.          131.
                           (INCHES)    1.814        2.251        2.255         2.255
                            (AC-FT)     418.         519.         520.          520.

                          CUMULATIVE AREA =    4.32 SQ MI


       ***            ***            ***            ***            ***

                           HYDROGRAPH AT STATION    159163
                             FOR PLAN 1, RATIO =  .62

     TOTAL RAINFALL =    2.92, TOTAL LOSS =    2.01, TOTAL EXCESS =     .91

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      48.17-HR
+    (CFS)       (HR)
                             (CFS)
+     723.      13.67                   339.         107.          54.           54.
                           (INCHES)     .729         .923         .925          .925
                            (AC-FT)     168.         213.         213.          213.

                          CUMULATIVE AREA =    4.32 SQ MI


       ***            ***            ***            ***            ***

                           HYDROGRAPH AT STATION    159163
                             FOR PLAN 1, RATIO =  .85

     TOTAL RAINFALL =    4.00, TOTAL LOSS =    2.33, TOTAL EXCESS =    1.67

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      48.17-HR
+    (CFS)       (HR)
                             (CFS)
+    1387.      13.67                   632.         197.          98.           98.
                           (INCHES)    1.361        1.696        1.698         1.698
                            (AC-FT)     314.         391.         391.          391.

                          CUMULATIVE AREA =    4.32 SQ MI


       ***            ***            ***            ***            ***

                           HYDROGRAPH AT STATION    159163
                             FOR PLAN 1, RATIO = 1.00

     TOTAL RAINFALL =    4.71, TOTAL LOSS =    2.49, TOTAL EXCESS =    2.22

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      48.17-HR
+    (CFS)       (HR)
                             (CFS)
+    1871.      13.50                   843.         262.         131.          131.
                           (INCHES)    1.814        2.251        2.255         2.255
                            (AC-FT)     418.         519.         520.          520.

                          CUMULATIVE AREA =    4.32 SQ MI


       ***            ***            ***            ***            ***

                           HYDROGRAPH AT STATION    159163
                             FOR PLAN 1, RATIO = 1.23

     TOTAL RAINFALL =    5.79, TOTAL LOSS =    2.69, TOTAL EXCESS =    3.11

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      48.17-HR
+    (CFS)       (HR)
                             (CFS)
+    2654.      13.50                  1182.         367.         183.          183.
                           (INCHES)    2.544        3.155        3.161         3.161
                            (AC-FT)     586.         727.         728.          728.

                          CUMULATIVE AREA =    4.32 SQ MI


       ***            ***            ***            ***            ***

                           HYDROGRAPH AT STATION    159163
```

```
                    FOR PLAN 1, RATIO = 1.45

   TOTAL RAINFALL =    6.83, TOTAL LOSS =    2.83, TOTAL EXCESS =    4.00

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR         24-HR       72-HR      48.17-HR
+   (CFS)        (HR)
                            (CFS)
+    3431.      13.50                1520.         472.        236.         236.
                          (INCHES)   3.271        4.060       4.069        4.069
                           (AC-FT)    754.         936.        938.         938.

                          CUMULATIVE AREA =    4.32 SQ MI


      ***            ***           ***            ***            ***

                         HYDROGRAPH AT STATION   159163
                           FOR PLAN 1, RATIO = 1.68

   TOTAL RAINFALL =    7.91, TOTAL LOSS =    2.95, TOTAL EXCESS =    4.96

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR         24-HR       72-HR      48.17-HR
+   (CFS)        (HR)
                            (CFS)
+    4262.      13.50                1881.         585.        292.         292.
                          (INCHES)   4.048        5.036       5.049        5.049
                           (AC-FT)    933.        1160.       1163.        1163.

                          CUMULATIVE AREA =    4.32 SQ MI


      ***            ***           ***            ***            ***

                         HYDROGRAPH AT STATION   159163
                           FOR PLAN 1, RATIO = 2.33

   TOTAL RAINFALL =   10.97, TOTAL LOSS =    3.19, TOTAL EXCESS =    7.79

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR         24-HR       72-HR      48.17-HR
+   (CFS)        (HR)
                            (CFS)
+    6658.      13.50                2926.         917.        458.         458.
                          (INCHES)   6.297        7.895       7.920        7.920
                           (AC-FT)   1451.        1819.       1825.        1825.

                          CUMULATIVE AREA =    4.32 SQ MI

1

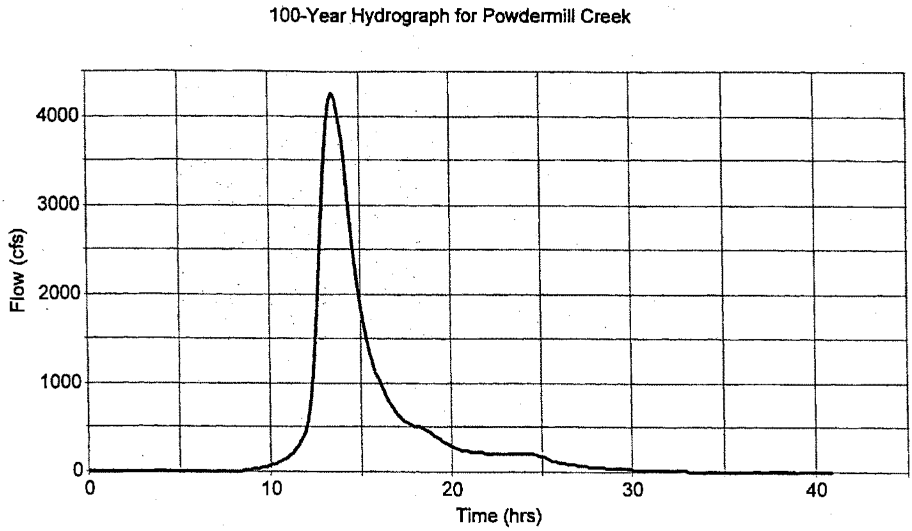
             PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                               FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                              TIME TO PEAK IN HOURS


                                                              RATIOS APPLIED TO PRECIPITATION
 OPERATION        STATION     AREA    PLAN              RATIO 1  RATIO 2  RATIO 3  RATIO 4  RATIO 5  RATIO 6  RATIO 7
                                                            .62      .85     1.00     1.23     1.45     1.68     2.33

 HYDROGRAPH AT
+                  159163      4.32     1    FLOW        723.    1387.    1871.    2654.    3431.    4262.    6658.
                                             TIME       13.67    13.67    13.50    13.50    13.50    13.50    13.50


*** NORMAL END OF HEC-1 ***
```

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project



East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Mullens Slough Storage Volume Calculations: Cell 1 (Sediment Pond)

Type.... Vol: Elev-Area   Page 1.01
Name.... SEDIMENT POND

File.... M:\USERS\PROJECTS\ENGR\STLCOE\ESTL-IFC\PONDPACK\POWDERMILL.PPW
Title... Sediment Pond with 5' Berms

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
100.00	-----	16.6200	.0000	.000	.000
101.00	-----	16.8700	50.2345	16.745	16.745
102.00	-----	17.1200	50.9846	16.995	33.740
103.00	-----	17.3800	51.7495	17.250	50.990
104.00	-----	17.6300	52.5146	17.505	68.494
105.00	-----	17.8900	53.2795	17.760	86.254

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 15:50:21   Date: 01-31-2001

Mullens Slough Storage Volume Calculations: Cell 2 (Fishing Lake)

Type.... Vol: Elev-Area   Page 1.01
Name.... FISHING LAKE

File.... M:\USERS\PROJECTS\ENGR\STLCOE\ESTL-IFC\PONDPACK\POWDERMILL.PPW
Title... Fishing Lake Storage with 5' Berms

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
100.00	-----	22.7400	.0000	.000	.000
101.00	-----	23.0200	68.6396	22.880	22.880
102.00	-----	23.3000	69.4796	23.160	46.040
103.00	-----	23.5800	70.3196	23.440	69.480
104.00	-----	23.8600	71.1596	23.720	93.199
105.00	-----	24.1500	72.0146	24.005	117.204

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 15:49:17   Date: 01-31-2001

Mullens Slough Storage Volume Calculations: Cell 3 (Mullens Slough)

Type.... Vol: Elev-Area
Name.... MULLENS SLOUGH

Page 1.01

File.... M:\USERS\PROJECTS\ENGR\STLCOE\ESTL-IFC\PONDPACK\POWDERMILL.PPW
Title... Mullens Slough Storage with 5' Berms

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
100.00	-----	204.0600	.0000	.000	.000
101.00	-----	205.1800	613.8592	204.620	204.620
102.00	-----	206.2900	617.2042	205.735	410.355
103.00	-----	207.4000	620.5342	206.845	617.199
104.00	-----	208.5200	623.8793	207.960	825.159
105.00	-----	209.6300	627.2242	209.075	1034.234

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 15:49:46 Date: 01-31-2001

Mullens Slough Storage Volume Calculations: Cell 4 (WRP Land)

Type.... Vol: Elev-Area Page 1.01
Name.... WRP LAND

File.... M:\USERS\PROJECTS\ENGR\STLCOE\ESTL-IFC\PONDPACK\POWDERMILL.PPW
Title... WRP Land Storage with 5' Berms

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
100.00	-----	124.0200	.0000	.000	.000
101.00	-----	124.7000	373.0795	124.360	124.360
102.00	-----	125.3900	375.1346	125.045	249.405
103.00	-----	126.0800	377.2046	125.735	375.140
104.00	-----	126.7700	379.2745	126.425	501.564
105.00	-----	127.4600	381.3445	127.115	628.679

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 15:50:52 Date: 01-31-2001

C.4.8 Dobrey Slough Site

Summary of Engineering Calculations

Dobrey Slough Site

East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project

Prepared for:
St. Louis District Army Corps of Engineers

Prepared by:
PARSONS
St. Louis, Missouri

May 2001

Dobrey Slough Site

Description

Dobrey Slough is one of the potential project sites of the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project for the St. Louis District Army Corps of Engineers (District). The Dobrey Slough site is located in Granite City, Illinois, and includes the southern portion of Dobrey Slough, which extends southeast from Maryville Road to the Alton and Southern Railroad, as well as the undeveloped area just east of the railroad and north of Pontoon Avenue. The engineering objectives for this site were to restore a flood pulse using available stormwater to increase the bio-diversity while preserving existing wetlands in the slough.

Hydrology

The District provided preliminary rainfall and runoff data for the existing drainage area of Dobrey Slough. A curve number of 82 had been assigned to the existing 205-acre drainage area, which represents a high intensity of development. The undeveloped area east of the railroad contributed an additional 31.2 acres to the total drainage area for the proposed site; this area was assigned a curve number of 100 to represent pond-full conditions in the proposed habitat area. Using the composite curve number of 84 along with the Bulletin 70 point rainfall data table provided by the District, the revised runoff volumes for the Dobrey Slough site were computed for the 2-, 5-, 10-, 25-, 50-, 100- and 500-year storms, as shown in Table 1. The base information is included in the Appendix along with the revised runoff calculations.

Table 1 Runoff Volumes for Dobrey Slough

Storm Frequency	Runoff Volume (ac-ft)
2-year	**30.5**
5-year	50.0
10-year	62.5
25-year	83.0
50-year	102
100-year	124
500-year	185

Site Analysis

The most recent topographic information available for the site was in the form of aerial photomaps with 2-foot contours at 1"=200' scale, produced for the District in 1973. A surveyed cross-section of Dobrey Slough at the Angela Drive culverts midway between Maryville Road and the railroad was available from Flood Control Studies, Cahokia Canal & Tributaries, dated 1978. From this cross-section, the flowline elevation of Dobrey Slough was estimated as 412 NGVD at the Angela Drive culverts, and from the topographic map it was estimated that the elevation of the slough flowline near the railroad was approximately 410 NGVD. The target ponding elevation was estimated to be 415 NGVD, in order to prevent roadway overtopping at the Angela Drive culverts, and to allow freeboard between the water surface elevation in the slough and the adjacent houses. Information concerning storm sewers serving the surrounding neighborhood was not available for this study. During the future design process, the elevations of any storm sewer outfalls into the slough should be examined in order to identify opportunities to further reduce local flooding problems by such means as using flap-gated outfall structures, rerouting sewers or lowering the target ponding elevation.

A pump station located just west of the railroad provides the outlet for Dobrey Slough under existing conditions. Stormwater is pumped from Dobrey Slough to Nameoki Ditch. No outflow data for the pump was available for this study. The surface areas of existing contours within Dobrey Slough were determined, and this elevation-area relationship was used to calculate the available storage in the slough. The computed storage volume provided by the existing contours was 29.9 acre-ft, which is approximately equivalent to the 2-year storm runoff volume. In order to meet biological enhancement goals in the Dobrey Slough site, either additional area would be required to utilize the stormwater or channel improvements would be required to increase outflow from the slough. These two scenarios were identified as Alternative 1 and Alternative 2, as described below.

Alternative 1

Alternative 1 was formulated under the assumption that no improvements would be made to the existing pump station in Dobrey Slough and no additional outflow mechanisms, such as channel improvements, would be proposed. This would prevent negative impacts to Nameoki Ditch that might occur as a result of increased peak inflows from Dobrey Slough.

The undeveloped area just east of the railroad was identified as a potential habitat area, and the depth of excavation required to meet the target storage volume was computed. It was assumed that 3:1 horizontal to vertical (3H:1V) side slopes would be maintained on the excavated pond walls. Equalizer pipes would be used to allow flow to pass from the slough into the wetland habitat area and return back to the slough in order to enter the pump intake. The minimum bottom elevation of the habitat area was limited by the flowline of Dobrey Slough near the pump intake, which was estimated as elevation 410 NGVD, in order to allow flow to pass back and forth between the pond and slough. The storage volume available at this depth of five feet was computed to be approximately 158 acre-ft. The total surface area at the maximum ponding elevation of 415 NGVD was 52.8 acres, including the existing slough area and the proposed habitat area. The storage volume and excavation calculations are included in the Appendix.

As part of Alternative 1, new culverts would be proposed in two locations: at Angela Drive in the northwestern reach of the slough, and under the railroad at the southeastern end of the slough. Under existing conditions, two culverts carry flow from Dobrey Slough under the roadway at Angela Drive; according to the surveyed cross-section at this location, these culverts consist of a 30-inch CMP and a 3'x 4' elliptical CMP. Since flooding is a known problem in the area adjacent to Dobrey Slough, it was assumed that these two structures do not have the capacity to convey the design flood pulse without creating backwater. Therefore, a new 42-inch RCP culvert was proposed to provide additional capacity through Angela Drive. The required length of this proposed culvert was estimated from the topographic map as 28 feet. The proposed equalizer pipes that would provide the hydraulic connection through the railroad berm between the slough and the proposed habitat area need to be large enough to allow water to easily move between the two areas. It was estimated that either two 10'x 4' concrete box culverts or seven 48-inch concrete pipes would be sufficient for this purpose. The approximate length required for these structures was estimated from the topographic map as 50 feet.

Alternative 1 would not require berms around Dobrey Slough or surrounding the habitat area. According to the topographic map, the existing ground elevation in the area east of the railroad varies from elevation 415' near Pontoon Avenue to 420 NGVD along the northern boundary. The maximum water surface elevation in the proposed habitat area was set at elevation 415 NGVD. As a safety precaution, however, a two-foot berm was proposed along the south edge of the pond for a length of 1,250 feet, in order to insure that Pontoon Avenue would be protected from overflow. This berm was assumed to have 3H:1V side slopes and a 10-foot crown.

Greenway Corridors
It was decided by the District project team that a greenway corridor, or forested buffer zone, should be proposed as part of Alternative 1. This greenway corridor would extend along both sides of Dobrey Slough in order to enhance the quality of habitat in the slough area. Three different widths of greenway were proposed: 50 meters (164 feet), 75 meters (246 feet) and 100 meters (328 feet). From the aerial map, the average width of the slough was estimated as 50 feet; this would represent the "clear" corridor, outside of which the greenway could be planted. The length of the slough within the project site was measured from the aerial map as 4,705 feet, and the approximate acreage corresponding to the "clear" corridor was computed as the product of the length times the 50-foot width, which was 5.4 acres. Greenway boundaries were then drawn by paralleling a line at distances of 50, 75 and 100 meters from the edges of the "clear" corridor, excluding areas with existing development. The areas corresponding to the three greenway widths were measured from the aerial map; the difference of these total areas and the clear corridor area of 5.4 acres was equivalent to the area of greenway planting, as shown in Table 2.

Table 2 Greenway Acreages

Greenway Width (m)	Clear Corridor Area (ac)	Total Area (ac)	Greenway Area (ac)
50	5.4	34.7	29.3
75	5.4	43.9	38.5
100	5.4	52.0	46.6

<u>Alternative 2</u>
This alternative was proposed by the District in the Reevaluation Report and Environmental Assessment Cahokia Canal - Harding Ditch Areas, East St. Louis and Vicinity, Illinois Interior Flood Control Project of August, 1985. It consisted of proposed channelization from Dobrey Slough south to the confluence with Bishop Slough and continuing on to Horseshoe Lake. The proposed channel was sized as a grass-lined channel with a 35-foot bottom width from Dobrey Slough to Bishop Slough and a 45-foot bottom width from Bishop Slough to Horseshoe Lake. Double 13' x 7' RCB culverts were proposed at the Illinois Central-Norfolk and Western Railroad, Illinois Highway 162, and Collinsville Road – Illinois Terminal Railroad.

To supplement the information provided in the referenced report, the District requested topwidths be computed for the proposed channels, assuming 3H:1V side slopes and an average depth of 8 feet for the channels. The resulting topwidth of the proposed channel from Dobrey Slough to Bishop Slough was 83 feet, and the proposed channel from Bishop Slough to Horseshoe Lake was 93 feet.

Cost Features
A summary of major engineering cost features for Alternative 1 is included in Table 3 on the following page. It should be noted that this was not intended to be an all-inclusive list, but only includes major features requested by the District; the District has computed additional cost features that would be combined with those listed in Table 3. Also, since no detailed hydrologic or hydraulic models were created for this analysis, it is possible that other major cost features might be required when a design analysis is performed. Cost features for Alternative 2 were to be updated by the District based on the cost estimate presented in the referenced report.

Table 3 Engineering Cost Features

Alternative 1:	
Features:	**Quantity**
Real Estate for Dobrey Slough Area, not including greenways	52.8 acres
Excavation East of RR	205,054 CY
Berm (overflow protection for Pontoon Ave.)	1250 ft x 2' high
Concrete Culvert at Angela Drive	1-42" RCP, L=28'
Choose Equalizer Pipes across RR from choices below	L = 50'

Equalizing Structure Types:	**Quantity**
Concrete Box Culverts, Equalizing across RR	2-10'x4' RCB's
Concrete Pipe Culverts, Equalizing across RR	7-48" RCP's

Note: Quantities for greenway areas, plantings, and tributary stream sediment detention basins not included.

Alternative 2:
Cost features listed in the Reevaluation Report of 1985 were assumed to be unchanged for this report.

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

APPENDIX
SUPPORTING CALCULATIONS FOR DOBREY SLOUGH

Runoff Calculations for Dobrey Slough

Volume Calculations for Existing Dobrey Slough

Volume Calculations with Proposed Detention Pond

Excavation Volume Calculations for Proposed Detention Pond

Runoff Calculations for Dobrey Slough

Base Data Given by District:

Stream: Dobrey Slough (Granite City Area)
NRCS curve number: 82
Area: 205 acres = 0.32 sq. mi.

Return Period	Bullentin 70 Pt. Rainfall	Partial Duration to Annual Series	Areal Reduction	Adjusted Rainfall	Runoff Depth (in)	Volume (ac-ft)
2	3.45	0.88	1.00	3.04	1.42	24
5	4.35	0.96	1.00	4.18	2.36	40
10	4.95	0.99	1.00	4.90	2.99	51
25	6.02	1.00	1.00	6.02	4.01	68
50	7.07	1.00	1.00	7.07	4.98	85
100	8.21	1.00	1.00	8.21	6.06	104
500	11.4	1.00	1.00	11.40	9.13	156

Parsons Calculations for Inclusion of Additional 31 acres:

Stream: Dobrey Slough (Granite City Area)
NRCS curve number: 84 (composite, using 100 for additional 31 acres)
Area: 236 acres = 0.37 sq. mi.

Return Period	Bullentin 70 Pt. Rainfall	Partial Duration to Annual Series	Areal Reduction	Adjusted Rainfall	Runoff Depth (in)*	Volume (ac-ft)
2	3.45	0.88	1.00	3.04	1.55	30.5
5	4.35	0.96	1.00	4.18	2.54	50.0
10	4.95	0.99	1.00	4.90	3.18	62.5
25	6.02	1.00	1.00	6.02	4.22	83.0
50	7.07	1.00	1.00	7.07	5.21	102
100	8.21	1.00	1.00	8.21	6.29	124
500	11.4	1.00	1.00	11.40	9.39	185

*Runoff depths interpolated from Table 2-1, TR-55

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Volume Calculations for Existing Dobrey Slough

Type.... Vol: Elev-Area
Name.... DOBREY SLOUGH EX

Page 1.01

File.... K:\STLCOE\ESTL-IFC\PONDPACK\DOBREY.PPW
Title... Volume Calculation for Existing Dobrey Slough

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
412.00	-----	.0000	.0000	.000	.000
413.00	-----	3.9400	3.9400	1.313	1.313
414.00	-----	16.6200	28.6522	9.551	10.864
415.00	-----	21.5900	57.1527	19.051	29.915

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 12:36:08 Date: 02-19-2001

Volume Calculations with Proposed Detention Pond

Type.... Vol: Elev-Area Page 1.01
Name.... DOBREY SLOUGH

File.... K:\STLCOE\ESTL-IFC\PONDPACK\DOBREY.PPW
Title... Volume Calculation for Dobrey Slough with Proposed Pond

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
410.00	-----	22.1600	.0000	.000	.000
411.00	-----	23.0900	67.8702	22.623	22.623
412.00	-----	24.0400	70.6902	23.563	46.187
413.00	-----	28.9500	79.3710	26.457	72.644
414.00	-----	44.9100	109.9175	36.639	109.283
415.00	-----	52.7500	146.3324	48.777	158.060

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 12:33:59 Date: 02-19-2001

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Excavation Volume Calculations for Proposed Detention Pond

Type.... Vol: Elev-Area Page 1.01
Name.... DET POND

File.... K:\STLCOE\ESTL-IFC\PONDPACK\DOBREY.PPW
Title... Excavation Volume for Proposed Detention Pond

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
410.00	-----	22.1600	.0000	.000	.000
411.00	-----	23.0900	67.8702	22.623	22.623
412.00	-----	24.0400	70.6902	23.563	46.187
413.00	-----	25.0100	73.5702	24.523	70.710
414.00	-----	28.2900	79.8995	26.633	97.343
415.00	-----	31.2000	89.1994	29.733	127.077

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 15:09:04 Date: 02-19-2001

C.4.9 Elm Slough

Summary of Engineering Calculations

Elm Slough Site

East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project

Prepared for:
St. Louis District Army Corps of Engineers

Prepared by:
PARSONS
St. Louis, Missouri

May 2001

Elm Slough Site

Description
Elm Slough is one of the potential project sites of the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project for the St. Louis District Army Corps of Engineers (District). The Elm Slough site is located between I-255 to the east, Highway 162 to the north and Highway 111 to the west. The site extends south to the edge of the existing wooded slough area. The engineering objectives for this site was to restore a flood pulse in the existing slough to increase the bio-diversity of the site, and provide sediment removal to improve water quality to Horseshoe Lake. Construction of berms and excavation within Elm Slough are to be used to direct inflow from Long Lake and Mitchell Ditch as sheet flow across the site in order to mimic a flood pulse.

Hydrology
A preliminary hydrologic analysis was performed using the District's HEC-1 base model for the Cahokia Canal watershed, which includes Long Lake, Mitchell Ditch and Elm Slough. There are existing connections between Mitchell Ditch and Elm Slough through a series of culverts under gravel roads, the Illinois Central Railroad, the Norfolk & Western Railroad and Highway 162, and from Long Lake through culverts under a dirt road, the two railroads and Highway 162. Existing culverts under Highway 111 provide outflow from Elm Slough toward Horseshoe Lake. The HEC-1 base model provides an approximation of the runoff produced by the major contributing drainage basins to Elm Slough. Peak flows and volumes computed with this model are considered preliminary in nature, and the conclusions reached will require verification during the design process.

Peak flows computed for the 2-, 5-, 10-, 25-, 50-, 100- and 500-year storms were identified for the hydrologic points of interest for this analysis, and are listed in Table 1 below. The HEC-1 base model input and output and the hydrograph for Elm Slough are included in the Appendix.

Table 1 Peak Flows at Hydrologic Points

Hydrologic Point	**Computed Peak Flows (cfs)**						
	2-year	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**500-year**
Mitchell Ditch @ Hwy. 162	499	670	687	717	750	789	880
Long Lake @ Hwy. 162	248	353	399	470	542	609	745
Elm Slough @ Hwy. 111	1,074	1,818	2,323	3,076	3,768	4,497	6,608

Runoff volumes for each storm frequency were also computed by the HEC-1 base model. The runoff volumes at the Elm Slough hydrologic point are listed in Table 2.

Table 2 Runoff Volumes for Elm Slough

Hydrologic Point	Computed Volume (ac-ft)						
	2-year	5-year	10-year	25-year	50-year	100-year	500-year
Elm Slough @ Hwy. 111	2,072	3,223	3,832	4,754	5,705	6,756	9,754

The most recent topographic information available for the site was in the form of aerial photomaps with 2-foot contours at 1"=200' scale, produced for the District in 1973. These predate the I-255 extension, which intersects the northeastern corner of the Elm Slough site. The inaccuracy and age of the data should be acknowledged when considering the results of this analysis. Aerial photographs dated 1998 were also available for the site, but without topographic information. These maps were used in conjunction with the contour maps to identify more recent land use throughout the site.

The 410 NGVD contour was chosen to represent the ponding limits within Elm Slough, because it provides the maximum surface area of the pond without flooding adjacent structures. A planimeter was used to measure surface areas for the existing 406, 408 and 410 NGVD contours on the topographic map. The minimum pond elevation from the topographic map was estimated as elevation 405 NGVD in the depression near the outlet. According to data provided by the District, the existing outlet culverts were set at an invert of approximately 402 NGVD but a surface area of zero was assigned to this elevation since it could not be estimated from the topographic information available. The available storage volume provided by these existing contours was computed to be 1,015 acre-ft, using the volume calculator in Haestad Methods' PondPack program. This volume calculation is included in the Appendix.

Hydraulics

Existing inflow to Elm Slough is controlled by the series of existing culverts on Mitchell Ditch and the Long Lake outlet ditch on the north side of the site. A 1983 survey of the Cahokia Canal area provided by the District revealed the existing locations, lengths and sizes of these structures. Outflow for drainage through Elm Slough is conveyed through the existing culverts under Highway 111 at the southwestern edge of the site. Table 3 lists the inflow and outflow structures for Elm Slough along with their sizes.

Table 3 Existing Culvert Sizes

Structure Location	Existing Size of Structure(s)	Proposed Size of Structure(s)
Mitchell Ditch, Gravel Road	6.5' x 3.6' RCB, 7' x 3.6'RCB, 36" pipe	Existing
Mitchell Ditch, Gravel Road	8' x 8' RCB	Existing
Mitchell Ditch, Field Crossing	8' x 6.5' RCB	Existing
Mitchell Ditch, IL Central RR	48" RCP, 21" VCP	3-10'x 4' RCB's or 9-48" RCP's
Mitchell Ditch, N&W RR	48" RCP, 21" VCP	"
Mitchell Ditch, Hwy. 162	4' x 4' RCB	"

Table 3 Continued

Structure Location	Existing Size of Structure(s)	Proposed Size of Structure(s)
Long Lake, Dirt Road	5' x 3.5' concrete arch	3-10'x 4' RCB's or 8–48" RCP's
Long Lake, IL Central RR	5' x 3.5' concrete arch	"
Long Lake, N&W RR	36" steel pipe	"
Long Lake, Hwy. 162	3.5' x 3.5' RCB	"
Elm Slough, Hwy. 111	3 - 9'x 7' RCB with flapgates	Existing

For this conceptual analysis, it was assumed that flow in Mitchell Ditch would reach the railroads without additional structures or channel improvements, as directed by the District. The structures at the railroads and Highway 162 for Mitchell Ditch and Long Lake did not have sufficient capacity to carry the design flood pulse flows, so replacement structures were sized using Haestad Methods' CulvertMaster program assuming inlet control conditions. The proposed culvert sizes are shown in Table 3 above. The slope for the Long Lake ditch was estimated from the survey to be 0.0028 ft/ft, assuming approximately 100 feet of ditch cleanout between culverts to restore the flow direction from north to south. The slope for Mitchell Ditch was estimated from the survey as 0.005 ft/ft, assuming approximately 85 feet of ditch cleanout between culverts. Culverts to be resized along Mitchell Ditch had a constant height of 4 feet; this height was used for the replacement structures in order to maintain the existing ditch flow depth. Output calculations from the CulvertMaster computer program for all proposed culvert sizes are included in the Appendix.

The outlet structure at Highway 111 consists of triple 9' x 7' reinforced concrete box culverts that were assumed to remain. The District provided the rating curve for these culverts. The rating curve indicated that the outflow would be approximately 1,500 cfs when the pond elevation reached 410', which was the target inflow to Horseshoe Lake recommended by the District.

Placement of Berms

Using the topographic map, several berms were proposed in the Elm Slough site for the purpose of directing the flow and protecting surrounding development. Two berms were laid out at the center of the northern boundary of the site to direct inflow from the Long Lake culverts down to the proposed habitat area. The crown of these berms was set at elevation 416 NGVD, which is the approximate top of banks of Long Lake north of Highway 111. The average height of the directional berms was 4 feet and the total length was approximately 4,150; using the assumptions of 3H:1V side slopes and a 10-foot crown, the total footprint of these berms was computed to be 3.2 acres. This redirection of inflow might require some action at the crossing with the road along the eastern branch of Long Lake, but that was not evaluated for this study, as directed by the District. A perimeter berm was proposed from the southern end of Long Lake westward to protect existing property to the north. The crown of this berm was also set at elevation 416 NGVD, which is the approximate top of banks of the existing eastern branch of Long Lake. The average height of this berm was 6 feet and the length was approximately 2,880 feet; using the assumptions of 3H:1V side slopes and a 10-foot crown, the footprint of this berm was computed to be 3.0 acres. Another perimeter berm at elevation 416 NGVD was proposed along the southeast corner of the site in order to protect the area to the south from stormwater from Elm Slough. The average height of this berm was 2 feet and the approximate length was 4,770 feet; using the assumptions of 3H:1V side slopes and a 10-foot crown, the footprint of this berm was computed to be 2.4 acres.

Volume Analysis

PondPack was used to determine the existing storage capacity of the Elm Slough, according to the storm frequency it could contain at or below the target ponding elevation of 410 NGVD. Using the HEC-1 hydrographs for Elm Slough as input, a linear approximation was used to compute the volume amount for each storm frequency assuming a maximum of 1,500 cfs outflow. The 2-year storm was not included in analysis because its peak inflow of 1,074 cfs was less than the maximum outflow of 1,500 cfs, so no storage would be required. The volume estimates were compared with the available storage volume in Elm Slough, which was computed as 1,015 acre-ft. The results of this analysis are shown in Table 4, and output data from PondPack are included in the Appendix.

Table 4 Volume Estimates

Storm Frequency	Estimated Storage Requirement (ac-ft)	Conclusion
5-Year	85	1,015 > 85: Existing contours provide required capacity
10-Year	291	1,015 > 291: Existing contours provide required capacity
25-Year	898	1,015 > 898: Existing contours provide required capacity
50-Year	1,310	1,015 > 1,310: Existing contours provide required capacity
100-Year	1,924	1,015 < 1,924: Existing contours DO NOT provide required capacity
500-Year	3,819	1,015 < 3,819: Existing contours DO NOT provide required capacity

Using PondPack, a preliminary pond inflow/outflow analysis was made using the design flood hydrograph for Elm Slough, while the outflow was modeled by the rating curve for the Highway 111 culverts provided by the District. The excavation of approximately 70 acres at an average depth of 1 foot to enlarge the 410 NGVD contour, and of approximately 103 acres at an average depth of 2 feet to enlarge the 408 NGVD contour achieved the target volume. The approximate excavation volume was computed as 277 acre-ft, or 446,893 CY. PondPack output from the inflow/outflow analysis are included in the Appendix. Also included is a graph comparing inflow and outflow hydrographs and a graph of elevation versus time. The duration of ponding to an elevation of 408 NGVD or greater was estimated as 35.5 hours and the duration of ponding to an elevation at 406 NGVD and greater was estimated as 47.5 hours. Elevations less that 406 NGVD would be contained within the existing depression near the outlet culverts.

Cost Features

A summary of major engineering cost features is included in Table 5. It should be noted that this is not intended to be an all-inclusive list, but only includes major features requested by the District. The District has computed additional cost features that would be combined with those listed in Table 5. Also, since no detailed hydrologic or hydraulic models were created for this analysis, it is possible that other major cost features might be required when a design analysis is performed.

Table 5 Engineering Cost Features

Feature	**Quantity**
Real Estate for Sheet Flow Area	543.6 acres
Real Estate for Excavated Pond Area	173.4 acres
Excavation	446,893 CY
Directional Berms	4,150 ft x 4' high
Perimeter Berms	2,880 ft x 6' high
Perimeter Berms	4,770 ft x 2' high
Ditch Cleanout between culverts	L=185'
Choose Alternative A or B for Culvert Replacements	*(See Culvert Alternative Chart Below)*

Culvert Alternative Chart		
Feature	**Alternative A**	**Alternative B**
Concrete Culverts	3-10'x4' RCB's, L=45'	9-48" RCP's, L=45'
Concrete Culverts	6-10'x4' RCB's, L=50'	18-48" RCP's, L=50'
Concrete Culverts	3-10'x4' RCB's, L=178'	9-48" RCP's, L=178'
Concrete Culverts	3-10'x4' RCB's, L=55'	9-48" RCP's, L=55'
Concrete Culverts	3-10'x4' RCB's, L=53'	9-48" RCP's, L=53'

NOTE: Quantities for greenway areas, plantings, and tributary stream sediment detention basins data not included.

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

APPENDIX

SUPPORTING CALCULATIONS FOR ELM SLOUGH

HEC-1 Base Model for Cahokia Canal (includes Elm Slough)
- HEC-1 Model Output
- Graph of 100-Year Hydrograph for Elm Slough

Elm Slough Storage Volume Calculation, Existing Contours

Calculations for Culvert Replacements
- Long Lake Culverts
- Mitchell Ditch Culverts

Pond Inflow/Outflow Analysis Output
- Detention Storage Estimates, Assuming 1,500 cfs Outflow
- Storage Volume Calculation with Excavation
- E-Q-V Table
- Pond Analysis Summary
- Graph of Elevation Vs. Time for Pond
- Graph of Inflow and Outflow Hydrographs for Pond

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

HEC-1 Model Output

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1****************************************                          ***************************************
 *                                       *                          *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                          *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998                *                          *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                          *         609 SECOND STREET           *
 *                                       *                          *      DAVIS, CALIFORNIA 95616        *
 * RUN DATE   08MAY01  TIME  13:47:54    *                          *          (916) 756-1104             *
 *                                       *                          *                                     *
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                    X     X  XXXXXXX   XXXXX          X
                    X     X  X        X     X        XX
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                    XXXXXXX  XXXX     X        XXXXX  X
                    X     X  X        X               X
                    X     X  X        X     X         X
                    X     X  XXXXXXX   XXXXX         XXX


        THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

        THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
        THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
        NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
        DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
        KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                            HEC-1 INPUT                                                  PAGE  1

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1          ID        METRO EAST WATERSHED PLANNING TEAM STUDY - AUGUST,1996
        2          ID        CAHOKIA CANAL HEC-1 MODEL FOR EXISTING CONDITIONS
        3          ID        ASSUMES EXISTING DEVELOPMENT OF HILLSIDE RUNOFF CREEKS
        4          ID        RUNOFF & LOSS RATE VALUES TAKEN FROM HEC-1 OUTPUT FROM COE
        5          ID        BULLETIN 70 RAINFALL VALUES USED FOR PH (ADJ FOR MADISON CO.)
        6          ID        INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC)
        7          ID        USED TO UPDATE RAINFALL USING BULLETIN 70
        8          IT      30                      300
        9          IO       5
       10          JR    PREC     .37     .51     .60     .73     .86     1.0    1.39

       11          KK       1
       12          KM        COMPUTE RUNOFF FOR SUBAREA 1 (UPPER COUNTY DITCH)
       13          BA    1.99
       14          PH       1    91.1    0.99    2.22    3.86    4.84    5.25    6.16    7.14    8.21
       15          LS       0   87.40
       16          UD    1.43

       17          KK      99
       18          KM        ROUTE TO SUBAREA 2
       19          RS       1    STOR      -1
       20          SV       0      20      50     560    1400    1710    2969
       21          SQ       0      50     100     200     300     400     500

       22          KK       3
       23          KM        COMPUTE RUNOFF FOR SUBAREA 3
       24          BA     .22
       25          LS       0   87.90
       26          UD     .88

       27          KK       2
       28          KM        COMPUTE RUNOFF FOR SUBAREA 2
       29          BA    1.39
       30          LS       0   83.70
       31          UD    1.74

       32          KK       2
       33          KM        COMBINE 2 HYDROGRAPHS AT 2
       34          HC       3

       35          KK       5
       36          KM        ROUTE TO AREA 5
       37          RS       1    STOR      -1
       38          SV       0       4       8      15     300     666    1190    1670
       39          SQ       0      50     100     200     300     400     500     600

       40          KK       4
       41          KM        COMPUTE RUNOFF FOR SUBAREA 4
       42          BA    1.34
       43          LS       0   90.40
```

```
  44          UD    1.16
1                                          HEC-1 INPUT                                           PAGE  2

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  45          KK       5
  46          KM         COMPUTE RUNOFF FOR SUBAREA 5
  47          BA     .79
  48          LS       0    78.70
  49          UD    1.24

  50          KK       5
  51          KM         COMBINE 3 HYDRGRAPHS AT 5
  52          HC       3

  53          KK       8
  54          KM         ROUTE TO SUBAREA 8
  55          RS       1     STOR      -1
  56          SV       0       11       70     2100     3200     3800
  57          SQ       0       50      100      200      300      400

  58          KK       8
  59          KM         COMPUTE RUNOFF FOR SUBAREA 8
  60          BA    1.55
  61          LS       0    90.60
  62          UD    1.37

  63          KK       8
  64          KM         COMBINE 2 HYDROGRAPHS AT 8
  65          HC       2

  66          KK      10
  67          KM         ROUTE TO SUBAREA 10 AT I-270
  68          RS       1     STOR      -1
  69          SV       0       18      120     3000     4000     6200     8600
  70          SQ       0       50      100      115      150      200      250

  71          KK      10
  72          KM         COMPUTE RUNOFF FOR SUBAREAS 79,80,81,2,83,84,85,6,7,AND 10
  73          BA    7.28
  74          LS       0    72.70
  75          UD    6.40

  76          KK      10
  77          KM         COMBINE 2 HYDROGRAPHS AT 10
  78          HC       2

  79          KK      11
  80          KM         COMPUTE RUNOFF FOR SUBAREAS 86 AND 11
  81          BA     .97
  82          LS       0    72.00
  83          UD    1.93

  84          KK      11
  85          KM         COMBINE 2 HYDROGRAPHS AT SUBAREA 11
  86          HC       2
1                                          HEC-1 INPUT                                           PAGE  3

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  87          KK      12
  88          KM         COMPUTE RUNOFF FOR SUBAREAS 87 AND 12
  89          BA    1.50
  90          LS       0    81.00
  91          UD    1.64

  92          KK       9
  93          KM         COMPUTE RUNOFF FOR SUBAREA 9
  94          BA    1.50
  95          LS       0    90.00
  96          UD    1.11

  97          KK      13
  98          KM         COMBINE 3 HYDROGRAPHS AT 13   IL HWY 162
  99          HC       3

 100          KK      17
 101          KM         ROUTE TO SUBAREA 17 ELM SLOUGH
 102          RS       1     STOR      -1
 103          SV       0       16       25     1000     1600     2550     3350     3950     4678     5405
 104          SQ       0       50      100      200      300      400      500      600      700      800

 105          KK      58
 106          KM         COMPUTE RUNOFF FROM SUBAREAS 61,60,52,59,57, AND 58 (MITCHELL DITCH)
 107          BA    4.50
 108          LS       0    87.70
 109          UD    4.61

 110          KK      17
 111          KM         ROUTE TO ELM SLOUGH
```

```
         112            RS        1     STOR       -1
         113            SV        0        2       47      935     5000
         114            SE    413.3    417.3    420.0    422.0    424.0
         115            SQ        0      450      665      875     1045

         116            KK       17
         117            KM         COMBINE COUNTY DITCH WITH MITCHEL DITCH
         118            HC        2

         119            KK       56
         120            KM         COMPUTE RUNOFF FOR SUBAREAS 53,54 AND 56 (LONG LAKE)
         121            BA     2.92
         122            LS        0    88.20
         123            UD     2.90

         124            KK       17
         125            KM         ROUTE TO ELM SLOUGH
         126            RS        1     STOR       -1
         127            SV        0       20      141      454     1119     2520
         128            SE    408.9      410      412      414      416      418
         129            SQ        0       75      325      590      900     1125
1                                                        HEC-1 INPUT                                          PAGE  4

        LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         130            KK       17
         131            KM         COMBINE 2 HYDROGRAPHS AT SUBAREA 17
         132            HC        2

         133            KK       17
         134            KM         COMPUTE RUNOFF FOR SUBAREA 17(ELM SLOUGH)
         135            BA     3.72
         136            LS        0    79.80
         137            UD      .95

         138            KK       17
         139            KM         COMBINE 2 HYDROGRAPHS IN ELM SLOUGH
         140            HC        2
         141            ZZ
1***************************************                                  ***************************************
 *                                     *                                  *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1) *                                  *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998              *                                  *   HYDROLOGIC ENGINEERING CENTER     *
 *             VERSION 4.1             *                                  *        609 SECOND STREET            *
 *                                     *                                  *     DAVIS, CALIFORNIA 95616         *
 *  RUN DATE  08MAY01  TIME  13:47:54  *                                  *        (916) 756-1104               *
 *                                     *                                  *                                     *
***************************************                                  ***************************************



                          METRO EAST WATERSHED PLANNING TEAM STUDY - AUGUST,1996
                          CAHOKIA CANAL HEC-1 MODEL FOR EXISTING CONDITIONS
                          ASSUMES EXISTING DEVELOPMENT OF HILLSIDE RUNOFF CREEKS
                          RUNOFF & LOSS RATE VALUES TAKEN FROM HEC-1 OUTPUT FROM COE
                          BULLETIN 70 RAINFALL VALUES USED FOR PH (ADJ FOR MADISON CO.)
                          INCLUDES HILLSIDE CREEKS (JUDY'S, BURDICK, SCHOOLHOUSE, CANTEEN, ETC)
                          USED TO UPDATE RAINFALL USING BULLETIN 70

    9 IO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN          30  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1    0  STARTING DATE
                        ITIME        0000  STARTING TIME
                           NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      7    0  ENDING DATE
                       NDTIME        0530  ENDING TIME
                        ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     .50 HOURS
                       TOTAL TIME BASE  149.50 HOURS

         ENGLISH UNITS
               DRAINAGE AREA           SQUARE MILES
               PRECIPITATION DEPTH     INCHES
               LENGTH, ELEVATION       FEET
               FLOW                    CUBIC FEET PER SECOND
               STORAGE VOLUME          ACRE-FEET
               SURFACE AREA            ACRES
               TEMPERATURE             DEGREES FAHRENHEIT

      JP          MULTI-PLAN OPTION
                        NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
```

RATIOS OF PRECIPITATION
.37 .51 .60 .73 .86 1.00 1.39

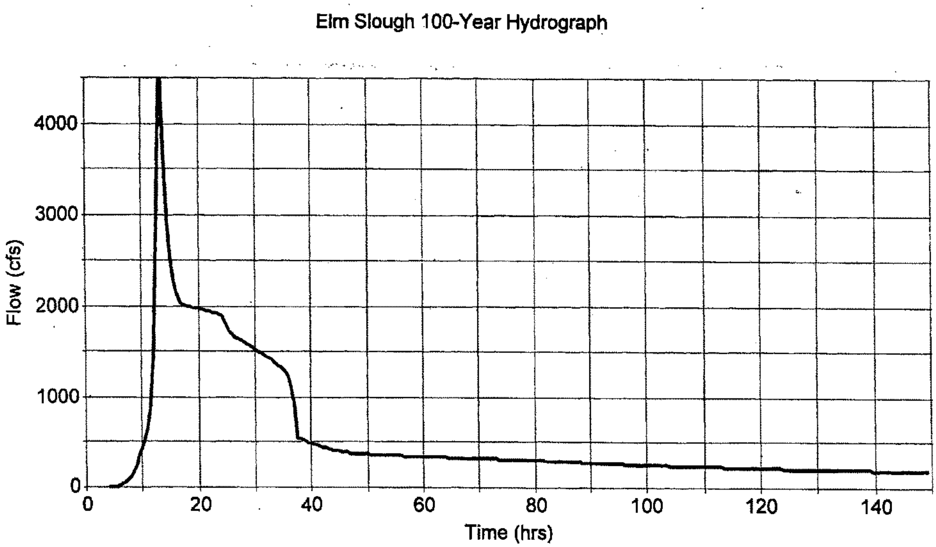
1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .37	RATIO 2 .51	RATIO 3 .60	RATIO 4 .73	RATIO 5 .86	RATIO 6 1.00	RATIO 7 1.39
HYDROGRAPH AT +	1	1.99	1	FLOW	502.	801.	999.	1287.	1575.	1885.	2743.
				TIME	14.00	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO +	99	1.99	1	FLOW	109.	124.	134.	149.	165.	182.	220.
				TIME	17.50	18.50	19.00	19.50	19.50	20.00	21.00
HYDROGRAPH AT +	3	.22	1	FLOW	74.	117.	145.	186.	227.	270.	391.
				TIME	13.00	13.00	13.00	13.00	13.00	13.00	13.00
HYDROGRAPH AT +	2	1.39	1	FLOW	263.	444.	566.	744.	925.	1120.	1663.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
3 COMBINED AT +	2	3.60	1	FLOW	412.	626.	770.	981.	1193.	1423.	2065.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
ROUTED TO +	5	3.60	1	FLOW	212.	232.	246.	268.	291.	313.	371.
				TIME	17.00	18.50	19.00	19.50	20.50	21.00	22.50
HYDROGRAPH AT +	4	1.34	1	FLOW	446.	678.	827.	1043.	1257.	1487.	2122.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
HYDROGRAPH AT +	5	.79	1	FLOW	137.	251.	330.	449.	570.	702.	1074.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
3 COMBINED AT +	5	5.73	1	FLOW	783.	1135.	1368.	1708.	2050.	2421.	3453.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO +	8	5.73	1	FLOW	110.	120.	126.	135.	144.	154.	182.
				TIME	27.50	35.00	40.00	47.00	53.50	60.00	77.00
HYDROGRAPH AT +	8	1.55	1	FLOW	470.	717.	877.	1107.	1336.	1582.	2262.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
2 COMBINED AT +	8	7.28	1	FLOW	559.	819.	980.	1212.	1444.	1693.	2381.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
ROUTED TO +	10	7.28	1	FLOW	100.	101.	101.	102.	103.	104.	107.
				TIME	55.00	81.00	98.50	120.50	141.00	149.50	149.50
HYDROGRAPH AT +	10	7.28	1	FLOW	292.	583.	797.	1128.	1477.	1867.	3003.
				TIME	20.00	19.50	19.50	19.50	19.50	19.50	19.00
2 COMBINED AT +	10	14.56	1	FLOW	392.	684.	897.	1229.	1579.	1969.	3106.
				TIME	20.00	19.50	19.50	19.50	19.50	19.50	19.00
HYDROGRAPH AT +	11	.97	1	FLOW	82.	171.	236.	337.	443.	560.	898.
				TIME	14.50	14.50	14.50	14.50	14.50	14.50	14.50
2 COMBINED AT +	11	15.53	1	FLOW	414.	724.	950.	1299.	1671.	2086.	3289.
				TIME	19.50	19.50	19.50	19.50	19.00	19.00	19.00
HYDROGRAPH AT +	12	1.50	1	FLOW	255.	448.	580.	774.	973.	1188.	1790.
				TIME	14.00	14.00	14.00	14.00	14.00	14.00	14.00
HYDROGRAPH AT +	9	1.50	1	FLOW	501.	764.	934.	1179.	1423.	1684.	2406.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50
3 COMBINED AT +	13	18.53	1	FLOW	866.	1429.	1815.	2391.	2975.	3620.	5470.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.50

ROUTED TO											
+	17	18.53	1	FLOW	148.	188.	226.	293.	341.	393.	587.
				TIME	33.00	32.50	32.50	31.50	32.00	32.00	31.50
HYDROGRAPH AT											
+	58	4.50	1	FLOW	542.	863.	1075.	1385.	1697.	2034.	2970.
				TIME	17.50	17.00	17.00	17.00	17.00	17.00	17.00
ROUTED TO											
+	17	4.50	1	FLOW	499.	670.	687.	717.	750.	789.	880.
				TIME	18.50	19.50	20.50	21.50	22.00	22.50	24.00
			** PEAK STAGES IN FEET **								
			1	STAGE	417.92	420.05	420.21	420.49	420.81	421.18	422.06
				TIME	18.50	19.50	20.50	21.50	22.00	22.50	24.00
2 COMBINED AT											
+	17	23.03	1	FLOW	625.	831.	875.	975.	1065.	1155.	1456.
				TIME	18.50	21.50	24.50	25.50	25.00	25.50	29.00
HYDROGRAPH AT											
+	56	2.92	1	FLOW	500.	788.	976.	1249.	1526.	1825.	2653.
				TIME	15.50	15.50	15.50	15.00	15.00	15.00	15.00
ROUTED TO											
+	17	2.92	1	FLOW	248.	353.	399.	470.	542.	609.	745.
				TIME	18.50	18.50	19.00	19.00	19.50	19.50	20.00
			** PEAK STAGES IN FEET **								
			1	STAGE	411.38	412.21	412.56	413.09	413.64	414.12	415.00
				TIME	18.50	18.50	19.00	19.00	19.50	19.50	20.00
2 COMBINED AT											
+	17	25.95	1	FLOW	872.	1175.	1258.	1401.	1564.	1722.	2113.
				TIME	18.50	19.50	20.00	21.50	22.00	22.50	25.50
HYDROGRAPH AT											
+	17	3.72	1	FLOW	784.	1382.	1787.	2400.	3042.	3743.	5711.
				TIME	13.50	13.50	13.50	13.00	13.00	13.00	13.00
2 COMBINED AT											
+	17	29.67	1	FLOW	1074.	1818.	2323.	3076.	3768.	4497.	6608.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50	13.00

*** NORMAL END OF HEC-1 ***


Elm Slough 100-Year Hydrograph
Flow (cfs)
4000
3000
2000
1000
0
0
20
40
60
80
100
120
140
Time (hrs)

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Elm Slough Storage Volume Calculation, Existing Contours

Type.... Vol: Elev-Area   Page 1.01
Name.... NO EXCAVATION

File.... K:\STLCOE\ESTL-IFC\PONDPACK\ELMSLOUGH.PPW
Title... Volume with Existing Contours of Elm Slough

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
402.00	-----	.0000	.0000	.000	.000
405.00	-----	1.0000	1.0000	1.000	1.000
406.00	-----	33.2800	40.0489	13.350	14.350
408.00	-----	268.2300	395.9912	263.994	278.344
410.00	-----	478.1299	1104.4780	736.319	1014.663

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: 021801A06A86   Parsons
PondPack Ver: 7.0 (312)   Compute Time: 10:53:57   Date: 02-01-2001

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

CALCULATIONS FOR CULVERT REPLACEMENTS

Culvert Designer/Analyzer Report
Long Lake under Dirt Road

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	412.88 ft	Discharge	609.00 cfs
Headwater Depth/ Height	1.02	Tailwater Elevation	N/A ft
Inlet Control HW Elev	412.81 ft	Control Type	Outlet Control
Outlet Control HW Elev	412.88 ft		

Grades			
Upstream Invert	408.82 ft	Downstream Invert	408.69 ft
Length	45.00 ft	Constructed Slope	0.002800 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	2.34 ft
Slope Type	Mild	Normal Depth	2.42 ft
Flow Regime	Subcritical	Critical Depth	2.34 ft
Velocity Downstream	8.68 ft/s	Critical Slope	0.003095 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	3		

Outlet Control Properties			
Outlet Control HW Elev	412.88 ft	Upstream Velocity Head	1.10 ft
Ke	0.50	Entrance Loss	0.55 ft

Inlet Control Properties			
Inlet Control HW Elev	412.81 ft	Flow Control	N/A
Inlet Type	90 and 15 ° wingwall flares	Area Full	120.0 ft²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

Culvert Designer/Analyzer Report
Long Lake under Dirt Road

Design:Trial-2

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	413.14 ft	Discharge	609.00 cfs
Headwater Depth/ Height	1.08	Tailwater Elevation	N/A ft
Inlet Control HW Elev	412.98 ft	Control Type	Outlet Control
Outlet Control HW Elev	413.14 ft		

Grades			
Upstream Invert	408.82 ft	Downstream Invert	408.69 ft
Length	45.00 ft	Constructed Slope	0.002800 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	2.64 ft
Slope Type	Mild	Normal Depth	3.28 ft
Flow Regime	Subcritical	Critical Depth	2.64 ft
Velocity Downstream	8.65 ft/s	Critical Slope	0.004694 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	8		

Outlet Control Properties			
Outlet Control HW Elev	413.14 ft	Upstream Velocity Head	0.93 ft
Ke	0.50	Entrance Loss	0.46 ft

Inlet Control Properties			
Inlet Control HW Elev	412.98 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	100.5 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Designer/Analyzer Report
Long Lake under Ill. Central

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	412.58 ft	Discharge	609.00 cfs
Headwater Depth/ Height	1.02	Tailwater Elevation	N/A ft
Inlet Control HW Elev	412.51 ft	Control Type	Outlet Control
Outlet Control HW Elev	412.58 ft		

Grades			
Upstream Invert	408.52 ft	Downstream Invert	408.38 ft
Length	50.00 ft	Constructed Slope	0.002800 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	2.34 ft
Slope Type	Mild	Normal Depth	2.42 ft
Flow Regime	Subcritical	Critical Depth	2.34 ft
Velocity Downstream	8.68 ft/s	Critical Slope	0.003095 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	3		

Outlet Control Properties			
Outlet Control HW Elev	412.58 ft	Upstream Velocity Head	1.10 ft
Ke	0.50	Entrance Loss	0.55 ft

Inlet Control Properties			
Inlet Control HW Elev	412.51 ft	Flow Control	N/A
Inlet Type	90 and 15 ° wingwall flares	Area Full	120.0 ft²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

Culvert Designer/Analyzer Report
Long Lake under Ill. Central

Design:Trial-2

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	412.84 ft	Discharge	609.00 cfs
Headwater Depth/ Height	1.08	Tailwater Elevation	N/A ft
Inlet Control HW Elev	412.68 ft	Control Type	Outlet Control
Outlet Control HW Elev	412.84 ft		

Grades			
Upstream Invert	408.52 ft	Downstream Invert	408.38 ft
Length	50.00 ft	Constructed Slope	0.002800 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	2.84 ft
Slope Type	Mild	Normal Depth	3.28 ft
Flow Regime	Subcritical	Critical Depth	2.64 ft
Velocity Downstream	8.65 ft/s	Critical Slope	0.004694 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	8		

Outlet Control Properties			
Outlet Control HW Elev	412.84 ft	Upstream Velocity Head	0.92 ft
Ke	0.50	Entrance Loss	0.46 ft

Inlet Control Properties			
Inlet Control HW Elev	412.68 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	100.5 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Designer/Analyzer Report
Long Lake under N&W RR and Hwy. 162

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	412.35 ft	Discharge	609.00 cfs
Headwater Depth/ Height	1.01	Tailwater Elevation	N/A ft
Inlet Control HW Elev	412.28 ft	Control Type	Outlet Control
Outlet Control HW Elev	412.35 ft		

Grades			
Upstream Invert	408.29 ft	Downstream Invert	407.79 ft
Length	178.00 ft	Constructed Slope	0.002800 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	2.34 ft
Slope Type	Mild	Normal Depth	2.42 ft
Flow Regime	Subcritical	Critical Depth	2.34 ft
Velocity Downstream	8.68 ft/s	Critical Slope	0.003095 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	3		

Outlet Control Properties			
Outlet Control HW Elev	412.35 ft	Upstream Velocity Head	1.09 ft
Ke	0.50	Entranca Loss	0.55 ft

Inlet Control Properties			
Inlet Control HW Elev	412.28 ft	Flow Control	N/A
Inlet Type	90 and 15 ° wingwall flares	Area Full	120.0 ft²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

Culvert Designer/Analyzer Report
Long Lake under N&W RR and Hwy. 162

Design:Trial-2

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	412.63 ft	Discharge	609.00 cfs
Headwater Depth/ Height	1.08	Tailwater Elevation	N/A ft
Inlet Control HW Elev	412.45 ft	Control Type	Outlet Control
Outlet Control HW Elev	412.63 ft		

Grades

Upstream Invert	408.29 ft	Downstream Invert	407.79 ft
Length	178.00 ft	Constructed Slope	0.002800 ft/ft

Hydraulic Profile

Profile	M2	Depth, Downstream	2.64 ft
Slope Type	Mild	Normal Depth	3.28 ft
Flow Regime	Subcritical	Critical Depth	2.64 ft
Velocity Downstream	8.65 ft/s	Critical Slope	0.004694 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	8		

Outlet Control Properties

Outlet Control HW Elev	412.63 ft	Upstream Velocity Head	0.83 ft
Ke	0.50	Entrance Loss	0.41 ft

Inlet Control Properties

Inlet Control HW Elev	412.45 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	100.5 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Designer/Analyzer Report
Mitchell Ditch under Ill. Central RR

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	418.19 ft	Discharge	789.00 cfs
Headwater Depth/ Height	1.22	Tailwater Elevation	N/A ft
Inlet Control HW Elev	418.08 ft	Control Type	Entrance Control
Outlet Control HW Elev	418.19 ft		

Grades

Upstream Invert	413.32 ft	Downstream Invert	413.05 ft
Length	55.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile

Profile	S2	Depth, Downstream	2.48 ft
Slope Type	Steep	Normal Depth	2.37 ft
Flow Regime	Supercritical	Critical Depth	2.78 ft
Velocity Downstream	10.59 ft/s	Critical Slope	0.003158 ft/ft

Section

Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	3		

Outlet Control Properties

Outlet Control HW Elev	418.19 ft	Upstream Velocity Head	1.39 ft
Ke	0.50	Entrance Loss	0.70 ft

Inlet Control Properties

Inlet Control HW Elev	418.08 ft	Flow Control	N/A
Inlet Type	90 and 15 ° wingwall flares	Area Full	120.0 ft²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

Culvert Designer/Analyzer Report
Mitchell Ditch under Ill. Central RR

Design:Trial-2

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	418.12 ft	Discharge	789.00 cfs
Headwater Depth/ Height	1.20	Tailwater Elevation	N/A ft
Inlet Control HW Elev	417.94 ft	Control Type	Outlet Control
Outlet Control HW Elev	418.12 ft		

Grades			
Upstream Invert	413.32 ft	Downstream Invert	413.05 ft
Length	55.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	2.84 ft
Slope Type	Mild	Normal Depth	2.87 ft
Flow Regime	Subcritical	Critical Depth	2.84 ft
Velocity Downstream	9.19 ft/s	Critical Slope	0.005129 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	9		

Outlet Control Properties			
Outlet Control HW Elev	418.12 ft	Upstream Velocity Head	1.29 ft
Ke	0.50	Entrance Loss	0.64 ft

Inlet Control Properties			
Inlet Control HW Elev	417.94 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	113.1 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Designer/Analyzer Report
Mitchell Ditch under N&W RR

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	417.64 ft	Discharge	789.00 cfs
Headwater Depth/ Height	1.22	Tailwater Elevation	N/A ft
Inlet Control HW Elev	417.53 ft	Control Type	Entrance Control
Outlet Control HW Elev	417.64 ft		

Grades			
Upstream Invert	412.77 ft	Downstream Invert	412.52 ft
Length	50.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	2.49 ft
Slope Type	Steep	Normal Depth	2.37 ft
Flow Regime	Supercritical	Critical Depth	2.78 ft
Velocity Downstream	10.55 ft/s	Critical Slope	0.003158 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	3		

Outlet Control Properties			
Outlet Control HW Elev	417.64 ft	Upstream Velocity Head	1.39 ft
Ke	0.50	Entrance Loss	0.70 ft

Inlet Control Properties			
Inlet Control HW Elev	417.53 ft	Flow Control	N/A
Inlet Type	90 and 15 ° wingwall flares	Area Full	120.0 ft²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

Culvert Designer/Analyzer Report
Mitchell Ditch under N&W RR

Design:Trial-2

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	417.57 ft	Discharge	789.00 cfs
Headwater Depth/ Height	1.20	Tailwater Elevation	N/A ft
Inlet Control HW Elev	417.39 ft	Control Type	Outlet Control
Outlet Control HW Elev	417.57 ft		

Grades			
Upstream Invert	412.77 ft	Downstream Invert	412.52 ft
Length	50.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	2.84 ft
Slope Type	Mild	Normal Depth	2.87 ft
Flow Regime	Subcritical	Critical Depth	2.84 ft
Velocity Downstream	9.19 ft/s	Critical Slope	0.005129 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	9		

Outlet Control Properties			
Outlet Control HW Elev	417.57 ft	Upstream Velocity Head	1.29 ft
Ke	0.50	Entrance Loss	0.64 ft

Inlet Control Properties			
Inlet Control HW Elev	417.39 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	113.1 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Designer/Analyzer Report
Mitchell Ditch under Hwy. 162

Design: Trial-1

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	417.27 ft	Discharge	789.00 cfs
Headwater Depth/ Height	1.22	Tailwater Elevation	N/A ft
Inlet Control HW Elev	417.16 ft	Control Type	Entrance Control
Outlet Control HW Elev	417.27 ft		

Grades			
Upstream Invert	412.40 ft	Downstream Invert	412.14 ft
Length	53.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	2.49 ft
Slope Type	Steep	Normal Depth	2.37 ft
Flow Regime	Supercritical	Critical Depth	2.78 ft
Velocity Downstream	10.57 ft/s	Critical Slope	0.003158 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	3		

Outlet Control Properties			
Outlet Control HW Elev	417.27 ft	Upstream Velocity Head	1.39 ft
Ke	0.50	Entrance Loss	0.70 ft

Inlet Control Properties			
Inlet Control HW Elev	417.16 ft	Flow Control	N/A
Inlet Type	90 and 15 ° wingwall flares	Area Full	120.0 ft²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

Culvert Designer/Analyzer Report
Mitchell Ditch under Hwy. 162

Design: Trial-2

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	N/A ft	Storm Event	Design
Computed Headwater Elevation	417.20 ft	Discharge	789.00 cfs
Headwater Depth/ Height	1.20	Tailwater Elevation	N/A ft
Inlet Control HW Elev	417.02 ft	Control Type	Outlet Control
Outlet Control HW Elev	417.20 ft		

Grades			
Upstream Invert	412.40 ft	Downstream Invert	412.14 ft
Length	53.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	2.84 ft
Slope Type	Mild	Normal Depth	2.87 ft
Flow Regime	Subcritical	Critical Depth	2.84 ft
Velocity Downstream	9.19 ft/s	Critical Slope	0.005129 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	9		

Outlet Control Properties			
Outlet Control HW Elev	417.20 ft	Upstream Velocity Head	1.29 ft
Ke	0.50	Entrance Loss	0.64 ft

Inlet Control Properties			
Inlet Control HW Elev	417.02 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	113.1 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

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East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

POND INFLOW/OUTFLOW ANALYSIS OUTPUT

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Detention Storage Estimates

Type.... Vol.Est: Peak Estimate   Page 3.01
Name.... VOLUME

File.... K:\STLCOE\ESTL-IFC\PONDPACK\ELMSLOUGH.PPW
Title... Storage Volume Required During 5-Year Storm, Assuming 1500 cfs outflow

DETENTION STORAGE ESTIMATE
Estimated from Max Allowable Outflow
(Outflow Hydrograph Approximation)

Peak Inflow = 1818.00 cfs
Max Outflow = 1500.00 cfs

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	21.367	12.8732	14.3679
Linear	84.951	11.5000	14.3679
Curvilinear	188.074	6.5000	14.3679
Upper Boundary	305.329	6.5000	14.3679
Total Inflow	3223.185	6.5000	149.5000

Stretch Factor = .000 % (Curvilinear Estimate Only)

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312)   Compute Time: 09:46:23   Date: 02-02-2001

Detention Storage Estimates

```
Type.... Vol.Est: Peak Estimate                                   Page 3.01
Name.... VOLUME

File.... K:\STLCOE\ESTL-IFC\PONDPACK\ELMSLOUGH.PPW
Title... Storage Volume Required During 10-Year Storm,
         Assuming 1500 cfs outflow

                  DETENTION STORAGE ESTIMATE
              Estimated from Max Allowable Outflow
               (Outflow Hydrograph Approximation)

                 Peak Inflow =     2323.00 cfs
                 Max Outflow =     1500.00 cfs
```

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	95.060	12.6114	16.6731
Linear	281.446	11.0000	16.6731
Curvilinear	593.726	5.5000	16.6731
Upper Boundary	702.863	5.5000	16.6731
Total Inflow	3831.758	5.5000	149.5000

Stretch Factor = .000 % (Curvilinear Estimate Only)

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:46:49 Date: 02-02-2001

Detention Storage Estimates

```
Type.... Vol.Est: Peak Estimate                                  Page 3.01
Name.... VOLUME

File.... K:\STLCOE\ESTL-IFC\PONDPACK\ELMSLOUGH.PPW
Title... Storage Volume Required During 25-Year Storm,
         Assuming 1500 cfs outflow

                 DETENTION STORAGE ESTIMATE
              Estimated from Max Allowable Outflow
               (Outflow Hydrograph Approximation)

                  Peak Inflow =      3076.00 cfs
                  Max Outflow =      1500.00 cfs
```

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	299.131	12.3379	24.3333
Linear	897.411	9.5000	24.3333
Curvilinear	1764.739	5.0000	24.3333
Upper Boundary	1907.369	5.0000	24.3333
Total Inflow	4753.492	5.0000	149.5000

Stretch Factor = .000 % (Curvilinear Estimate Only)

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Detention Storage Estimates

```
Type.... Vol.Est: Peak Estimate                                Page 3.01
Name.... VOLUME

File.... K:\STLCOE\ESTL-IFC\PONDPACK\ELMSLOUGH.PPW
Title... Storage Volume Required During 50-Year Storm,
         Assuming 1500 cfs outflow

                    DETENTION STORAGE ESTIMATE
                 Estimated from Max Allowable Outflow
                  (Outflow Hydrograph Approximation)

                     Peak Inflow =      3768.00 cfs
                     Max Outflow =      1500.00 cfs
```

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	588.859	12.1498	26.5250
Linear	1309.931	8.5000	26.5250
Curvilinear	2361.702	4.5000	26.5250
Upper Boundary	2516.468	4.5000	26.5250
Total Inflow	5704.751	4.5000	149.5000

Stretch Factor = .000 % (Curvilinear Estimate Only)

Detention Storage Estimates

Type.... Vol.Est: Peak Estimate Page 3.01
Name.... VOLUME

File.... K:\STLCOE\ESTL-IFC\PONDPACK\ELMSLOUGH.PPW
Title... Storage Volume Required During 100-Year Storm,
Assuming 1500 cfs outflow

DETENTION STORAGE ESTIMATE
Estimated from Max Allowable Outflow
(Outflow Hydrograph Approximation)

Peak Inflow = 4497.00 cfs
Max Outflow = 1500.00 cfs

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	942.292	12.0129	30.8333
Linear	1924.174	7.0000	30.8333
Curvilinear	3274.645	4.0000	30.8333
Upper Boundary	3454.959	4.0000	30.8333
Total Inflow	6755.642	4.0000	149.5000

Stretch Factor = .000 % (Curvilinear Estimate Only)

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:48:04 Date: 02-02-2001

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Detention Storage Estimates

Type.... Vol.Est: Peak Estimate
Name.... VOLUME

Page 3.01

File.... K:\STLCOE\ESTL-IFC\PONDPACK\ELMSLOUGH.PPW
Title... Storage Volume Required During 500-Year Storm,
Assuming 1500 cfs outflow

DETENTION STORAGE ESTIMATE
Estimated from Max Allowable Outflow
(Outflow Hydrograph Approximation)

Peak Inflow = 6608.00 cfs
Max Outflow = 1500.00 cfs

Estimate Type	Est.Storage ac-ft	From hrs	To hrs
Lower Boundary	2196.791	11.5112	40.6379
Linear	3819.219	5.0000	40.6379
Curvilinear	5807.122	3.0000	40.6379
Upper Boundary	6060.120	3.0000	40.6379
Total Inflow	9753.493	3.0000	149.5000

Stretch Factor = .000 % (Curvilinear Estimate Only)

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312) Compute Time: 09:48:41 Date: 02-02-2001

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

Storage Volume Calculation with Excavation

```
Type.... Vol: Elev-Area                                           Page 1.01
Name.... W/EXCAVATION

File.... K:\STLCOE\ESTL-IFC\PONDPACK\ELMSLOUGH.PPW
Title... Volume with excavation at east end of Elm Slough
```

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
402.00	-----	.0000	.0000	.000	.000
405.00	-----	1.0000	1.0000	1.000	1.000
406.00	-----	33.2800	40.0489	13.350	14.350
408.00	-----	371.7300	516.2358	344.157	358.507
410.00	-----	548.0000	1371.0700	914.047	1272.554

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

```
Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2     = Lower and upper elevations of the increment
       Area1,Area2  = Areas computed for EL1, EL2, respectively
       Volume       = Incremental volume between EL1 and EL2
```

```
S/N: 021801A06A86    Parsons
PondPack Ver: 7.0 (312)       Compute Time: 10:21:29    Date: 02-02-2001
```

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

E-Q-V Table

```
Type.... Pond E-V-Q Table                                              Page 9.03
Name.... POND1
File.... K:\STLCOE\ESTL-IFC\PONDPACK\ELMSLOUGH.PPW

                  LEVEL POOL ROUTING DATA

 HYG Dir            = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - POND1        IN  ex100
 Outflow HYG file = NONE STORED - POND1        OUT ex100

 Pond Node   Data = POND1
 Pond Volume Data = W/Excavation
 Pond Outlet Data = CULVERTS

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev    =   402.00 ft
 Starting Volume     =     .000 ac-ft
 Starting Outflow    =      .00 cfs
 Starting Infiltr.   =      .00 cfs
 Starting Total Qout=       .00 cfs
 Time Increment      =    .5000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + 0 cfs
402.00	.00	.000	.0000	.00	.00	.00
402.50	34.34	.005	.0278	.00	34.34	34.56
403.00	68.67	.037	.1111	.00	68.67	70.47
403.50	130.87	.125	.2500	.00	130.87	136.92
404.00	193.63	.296	.4444	.00	193.63	207.97
404.50	272.74	.579	.6944	.00	272.74	300.75
405.00	354.50	1.000	1.0000	.00	354.50	402.90
405.50	448.04	3.640	11.4544	.00	448.04	624.20
406.00	544.15	14.350	33.2800	.00	544.15	1238.67
406.50	650.61	42.635	83.6628	.00	650.61	2714.12
407.00	758.76	101.816	156.8654	.00	758.76	5686.64
407.50	876.21	203.303	252.8878	.00	876.21	10716.09
408.00	997.54	358.507	371.7300	.00	997.54	18349.27
408.50	1138.20	554.501	412.6007	.00	1138.20	27976.04
409.00	1266.31	771.463	455.6027	.00	1266.31	38605.11
409.50	1385.32	1010.459	500.7357	.00	1385.32	50291.52
410.00	1516.42	1272.554	548.0000	.00	1516.42	63108.02

S/N: 021801A06A86 Parsons
PondPack Ver: 7.0 (312)   Compute Time: 11:17:09   Date: 02-02-2001

Pond Analysis Summary

```
Type.... Pond Routing Summary                                    Page 9.07
Name.... POND1        OUT   Tag: ex100                       Event: ex100 yr
File.... K:\STLCOE\ESTL-IFC\PONDPACK\ELMSLOUGH.PPW
Storm... ex100    Tag: ex100

                    LEVEL POOL ROUTING SUMMARY

 HYG Dir          = K:\STLCOE\ESTL-IFC\PONDPACK\
 Inflow  HYG file = NONE STORED - POND1          IN  ex100
 Outflow HYG file = NONE STORED - POND1          OUT ex100

 Pond Node   Data = POND1
 Pond Volume Data = w/Excavation
 Pond Outlet Data = CULVERTS

 No Infiltration

 INITIAL CONDITIONS
 ----------------------------------
 Starting WS Elev   =   402.00 ft
 Starting Volume    =     .000 ac-ft
 Starting Outflow   =      .00 cfs
 Starting Infiltr.  =      .00 cfs
 Starting Total Qout=      .00 cfs
 Time Increment     =    .5000 hrs

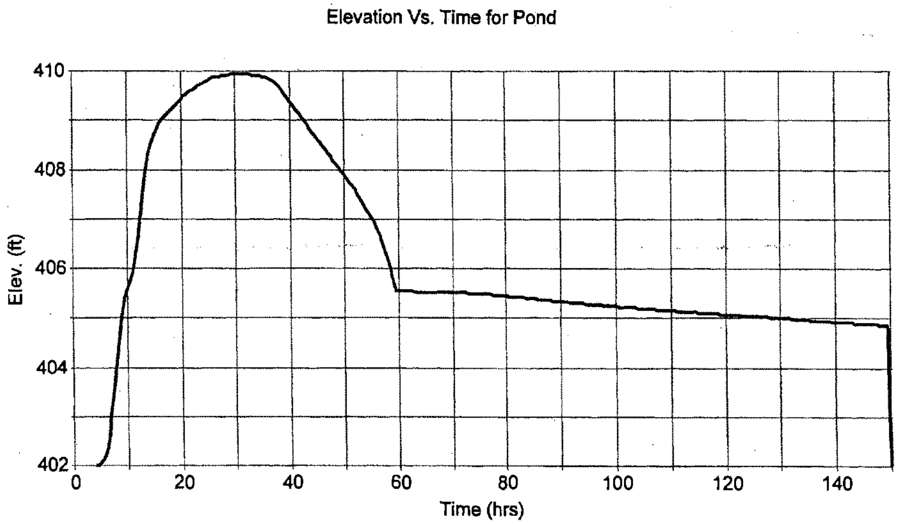
 INFLOW/OUTFLOW HYDROGRAPH SUMMARY
 =====================================================
 Peak Inflow      =   4497.00 cfs    at   13.5000 hrs
 Peak Outflow     =   1500.13 cfs    at   31.0000 hrs
 -----------------------------------------------------
 Peak Elevation   =    409.94 ft
 Peak Storage =      1238.691 ac-ft
 =====================================================

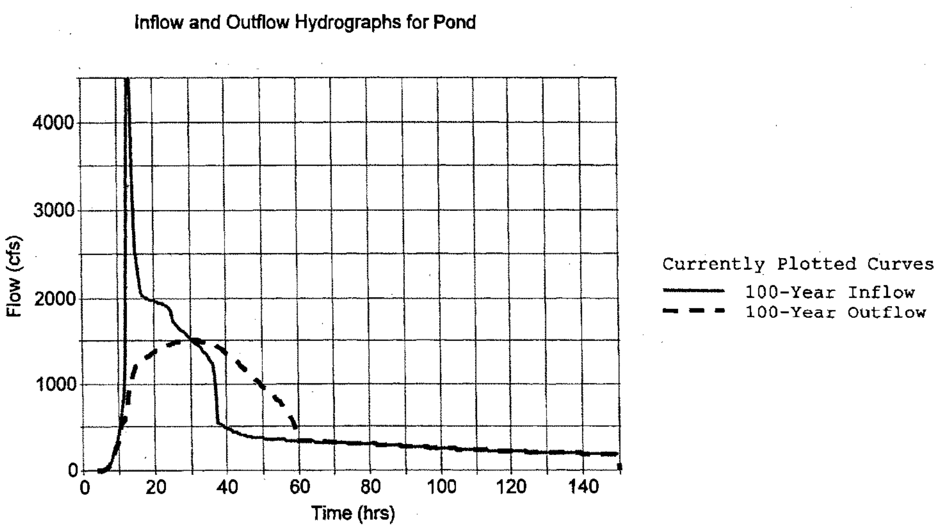
 MASS BALANCE (ac-ft)
 -------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =    6755.642
- Infiltration =        .000
- HYG Vol OUT  =    6755.649
- Retained Vol =        .000
                  ----------
  Unrouted Vol =        .007 ac-ft  (.000% of Outflow Volume)

 WARNING: Inflow hydrograph truncated on right side.


 S/N: 021801A06A86   Parsons
 PondPack Ver: 7.0 (312)      Compute Time: 11:17:09    Date: 02-02-2001
```

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project





APPENDIX D – GEOLOGY AND GEOTECHNICAL ENGINEERING

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TABLE OF CONTENTS - Continued

TABLE OF CONTENTS - Continued

APPENDIX D – GEOLOGY AND GEOTECHNICAL ENGINEERING

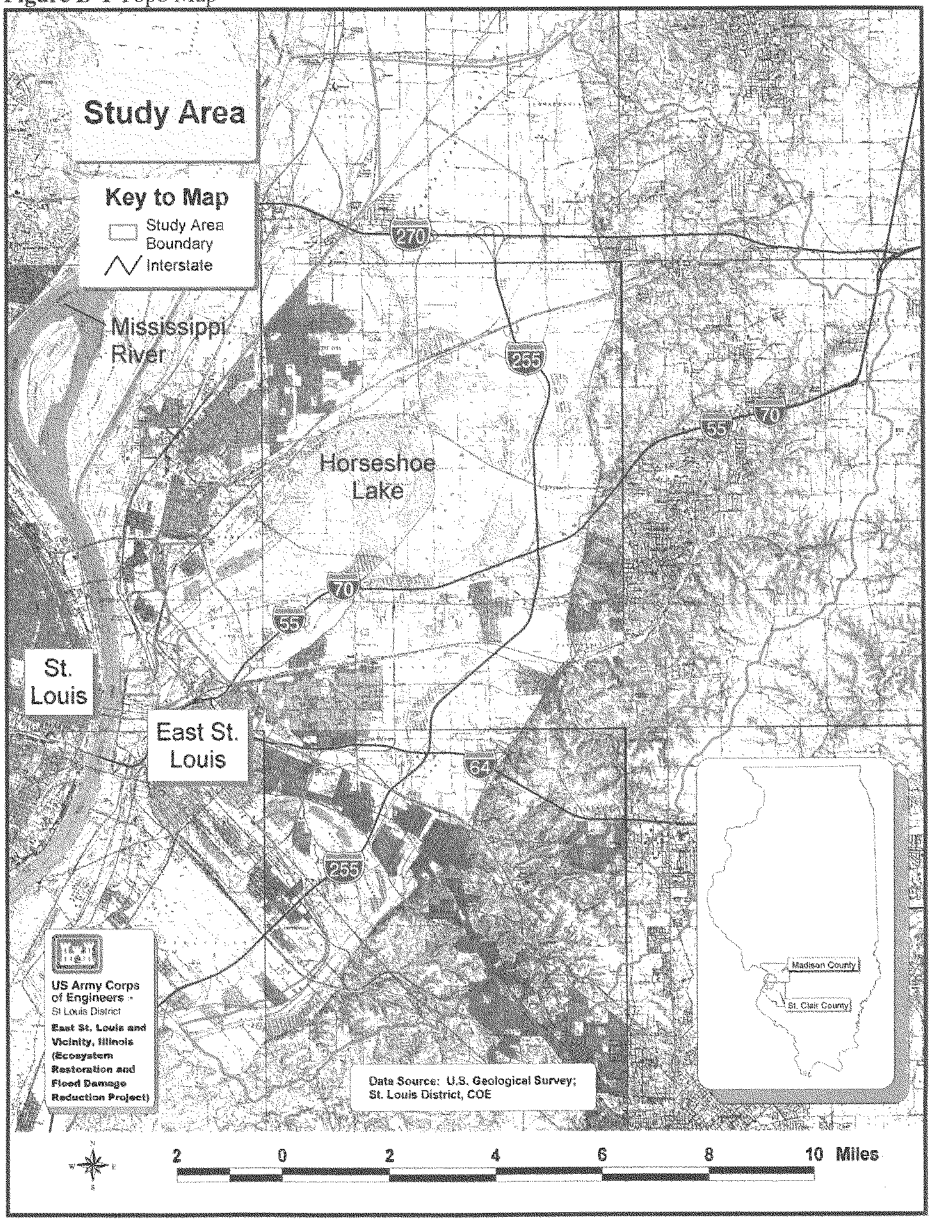
D.1 INTRODUCTION

This appendix provides an overall characterization of the geology and geotechnical engineering features within the study area. A significant portion of the geotechnical information contained in this section of the report is taken from existing U. S. Army Corps of Engineers (USACE), U. S. Geological Survey (USGS), Illinois State Geological Survey (ISGS), and Illinois State Water Survey (ISWS) reports and maps. To the extent possible information developed from previous reports of this area have been re-analyzed and used as appropriate in the development and assessment of alternative plans. It is important to understand the soils, geology, and geomorphology of this floodplain and its adjacent bluffs and uplands in order to understand how the ecosystem of the study area functions. This information also provides key determinations that will help guide potential ecosystem restoration efforts and to design flood damage reduction measures which can benefit, rather than detract from, ecosystem structures and functions. Unlike other features of the floodplain, the geology which was formed over millions of years maintains its characteristics in spite of the activities of man.

D.2 TOPOGRAPHY

D.2.1 General. The study area is located In Illinois on the eastern side of the Mississippi River. Most of the study area is within the Mississippi River floodplain area known locally as the "American Bottoms" which include western portions of Madison and St. Clair Counties. The American Bottoms extend well beyond the study area boundaries. The American Bottoms extend farther north up to Alton, Illinois and down south into Monroe County near Dupo, Illinois. The general topography of the study area is depicted on Figure D-1 along with the proposed project areas. The American Bottoms cover approximately 175 square miles (112,000 acres). The area is approximately 30 miles long and 11 miles wide at its widest point. The existing topography has not changed demonstrably since pre-settlement times except for those made by man. In the 1800's the area was crisscrossed with railroad embankments. Sometimes these railroad embankments provided flood protection by forming mini levee systems across the study area. East St. Louis, Illinois was served by the Ohio and Mississippi Railroad; the St. Louis and Southeastern Railroad; the St. Louis, Alton, and Terre Haute Railroad; and the Cairo Shortline Railroad. East St. Louis was protected from the high water by the railroad embankments except for an open culvert in the Ohio and Mississippi Railroad embankment between Third and Fourth Streets. When the waters began rising following heavy rains in 1863, the city of East St. Louis had the existing culvert closed. It was promptly reopened by the Ohio and Mississippi Railroad who feared damage to the embankments from the water pressure of the rising waters. The city closed it again and placed a guard over it. United States troops were sent in to open the embankment, and a riot ensued. The citizens were driven away with bayonets and the culvert remained open. The city sustained damage from the flood (Reavis 1876:69). In the later part of the 1900's the development of the interstate highway system through the area further changed the topography and drainage patterns with raised roadways that like the railroad embankments changed the natural characteristics of the area forever.

Figure D-1 Topo Map



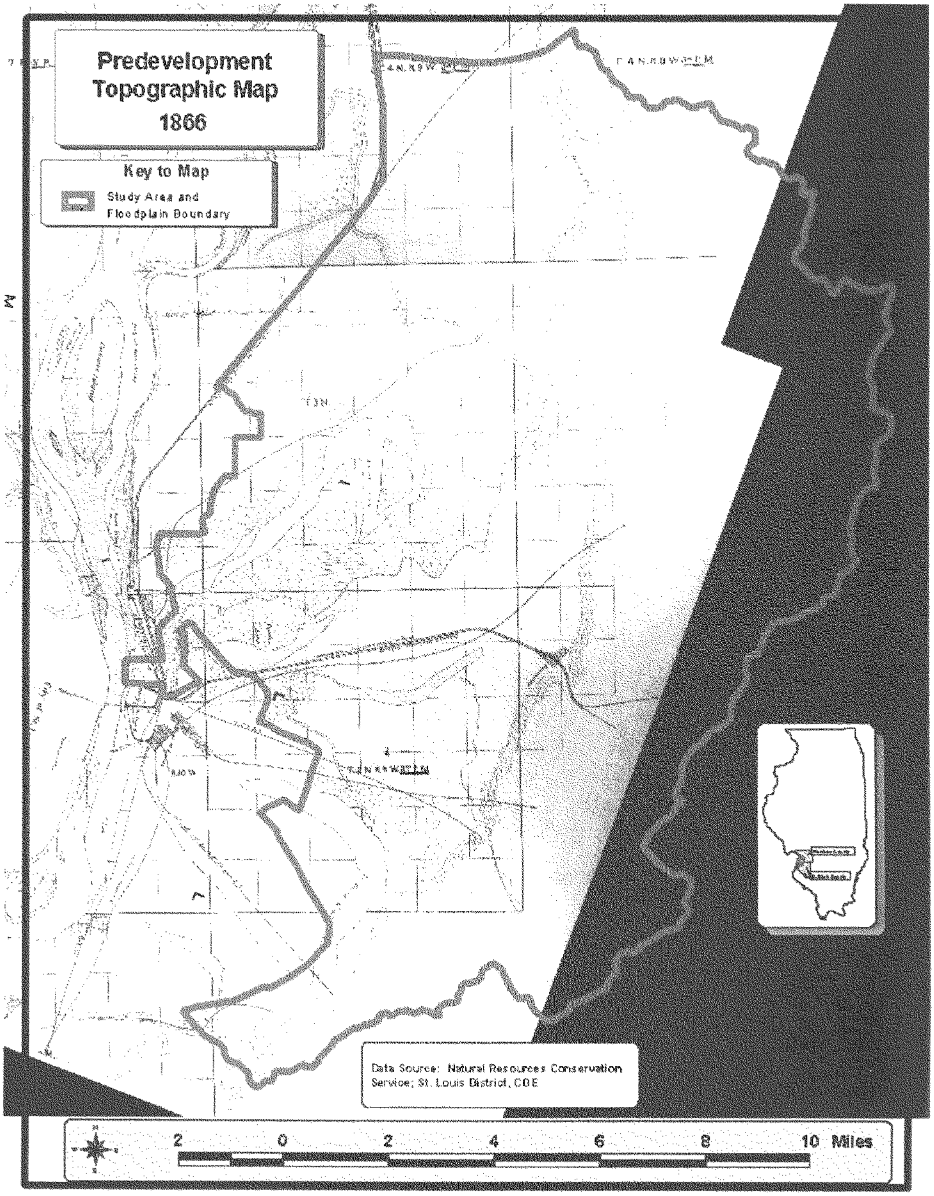
D.2.2 Floodplain Topography. The American Bottoms floodplain generally slopes to the south and drops in elevation approximately 0.5-foot per mile mirroring the Mississippi River surface profile. The floodplain exhibits river meander scars, abandoned channel oxbow lakes, low-relief ridges, and swales. Ancient Indian mounds rise above the bottoms with the largest being Monks Mound that rises 85 feet above the adjacent floodplain and is located east of Fairmont City. The average elevation to the north near Alton is 415 feet and to the south near Dupo is 405 feet. In the northern portion, there are terraces located along the foot of the bluff between East Alton and Roxana. The terraces are approximately 25 to 35 feet above the floodplain with elevations between 440 and 450 feet. The study area north of Horseshoe Lake is typically higher than the adjacent floodplain with elevations between 420 and 435 feet. The topography near the Illinois bluff on the eastern edge of the floodplain is generally higher than the adjacent floodplain with elevations between 435 and 465 feet. The topography of the American Bottoms has been shaped by the succession of former channels of the Mississippi River which created oxbow lakes: Pittsburg Lake, Cahokia Lake, and Horseshoe Lake as shown on Figure D-1. Associated with these lakes are a series of higher sandbars and shorelines while the lower areas are former drainage ways, creeks and sloughs. The topographic and soil patterns show a definite orientation related to the cutting and filing of the adjacent river. The Lake Region area north of the East St. Louis Rise contains the largest area of lakes and permanent swamps in the American Bottoms. Much of the area lies between four and ten feet above the top bank of the river. Topographically, the landforms are distinctly old river channels or sinuous ridge and swale features that parallel these channels. The soils vary as those do closer to the river, with sandbars and swampy clay materials in alternate fashion.

D.2.3 Bluff and Upland Topography. The bluff rises steeply between 150 to 200 feet above the floodplain. The bluff has a rather rugged topography with the creek channels forming valleys with steep slopes. Beyond the bluff line the topography consists of rolling hills and valleys with elevations ranging between 500 and 600 feet. Some shallow surface depressions less than 5 feet deep have been created in the last 100 years by mine subsidence located east of the bluff line.

D.3 DRAINAGE

D.3.1 Pre-development Drainage. Under Pre-development conditions, all the hillside streams in the study area except for Powdermill Creek drained to Cahokia Creek as it meandered through the American Bottoms. Cahokia Creek flowed naturally through McDonough Lake, Brushy Lake, Horseshoe Lake and Indian Lake areas before skirting the western edge of East St. Louis before entering the Mississippi River. The earliest map found during this study that illustrates the various topographic features is shown as Figure D-2. The original Cahokia Creek channel was located closer to the bluff line than the man-made Cahokia Canal that was built in the 1900's. Little Canteen Creek also flowed through Brushy Lake as it entered Cahokia Creek. Schoenberger Creek flowed northwesterly out of the bluff, through the Crooked Lake and Spring Lake areas and then westerly to Cahokia Creek downstream of Indian Lake. Powdermill Creek flowed into Pittsburg Lake, which became the Grand Marais Lakes in Frank Holten State Park. From Pittsburg Lake flow eventually entered Prairie Du Pont Creek.

Figure D-2 Predevelopment Topo Map



D.3.2 Existing Drainage. By the late 1800's changes to topography through the development of the railroad lines traversing the area had altered the natural drainage patterns of the area. Likewise manmade levee systems designed to protect cropland from flooding changed the natural drainage. Then in the 1900's as a result of increased development in the area, drainage districts were formed for the sole purpose of managing the drainage of the floodplain. By 1904 engineering plans were underway for the construction of a system of canals and drainage ditches, designed to carry water as quickly and directly as possible to the river in an effort to improve drainage. The construction of this system eliminated the creek system that originally meandered across the study area. By this time a substantial levee system had been constructed along the Mississippi River to protect the area from river flooding. In 1910, the upland drainage area of Cahokia Creek, was eliminated from the floodplain and diverted into a large diversion canal on the northern end of the study area designed to drain the creek directly into the river. This upland drainage was diverted into the Cahokia Creek Diversion Canal and levees were constructed along the northern boundary of the newly formed East Side Levee and Sanitary District. The Cahokia Creek Diversion Canal that is approximately 4.5 miles long flows directly west into the Mississippi River at Mile 195. A channel grade control structure with a low water dam was constructed near the diversion canal's mouth to prevent channel head cutting and to stabilize its channel bottom grade. The grade control structure was severely damaged during five flash flood events coincident with low Mississippi River levels in 1912, 1913, 1915, 1943, and 1946. The grade control structure was quickly rebuilt near, or at the same location, after each event. The Corps of Engineers rebuilt the structure in 1946 and was recently rehabilitated it in 1994. The levee system continued to be improved and today an urban design (500-year) flood control system protects the study area within the floodplain with large earthen levees and floodwalls. On the northern study boundary, a levee is located on the left descending bank of the Cahokia Creek Diversion Canal and ties into the bluff west of Edwardsville. On the southern study boundary, a levee is located on the right descending bank of the Prairie Du Pont Creek and ties in the bluff. While this mainline protection system has continually been improved over time the original interior drainage canals and ditches remain as originally constructed in the early 1900's. The natural topography is still a major factor contributing to storm drainage and flooding problems within the study area. The natural and manmade drainage channels have very little slope and are not efficient in moving surface water from either the bluff or the bottoms to reach the outlets to the Mississippi River. Surface water meanders slowly to the Mississippi River or remains in numerous natural depressions. These problems have increased because of the increased flows from the bluffs and uplands without any corresponding improvements to the drainage system. The flows out of the bluffs enter the American Bottoms with high velocities and are able to suspend more sediments than slower moving waters. The slower moving surface waters allow the sediments to aggrade (deposit sediments) in the channels and adjacent lands with overland (out-of banks) flows. The natural over bank drainage and meandering creeks flowing into the Mississippi River became blocked by the flood protection systems constructed in the early 1900's. The open water areas and wetlands have shrunk more than 40 percent in size with the excavation of 40 miles of drainage ditches and canals constructed between 1907 and 1950 (Bruin and Smith, 1953). Additionally, the carving up of the natural drainage areas by railroad and road embankments makes drainage of the floodplain areas even more difficult. These manmade features continue to isolate wetlands and open water areas, thus eliminating them from their pre-settlement function of storm water storage. To make the problem worse, groundwater was typically very shallow in most areas within the floodplain. The combination of shallow groundwater and poor draining alluvial soils of alternating layers of clays, silts, and sands further promoted the need for the development of the extensive drainage system of levees and varying sizes of drainage ditches, channels, and canals. During the height of the industrial period to until the mid 20th century, the groundwater surface was generally lowered between 2 and 12 feet with localized reductions as the result of extensive ground water pumping in ten areas for industrial and municipal purposes. When this pumping stopped, groundwater returned to its historical level and areas like Dobrey Slough that were constructed with dry basements in the 1950's today suffer groundwater flooding as a result of the cessation of groundwater pumping for industrial purposes.

D.4 GEOMORPHOLOGY

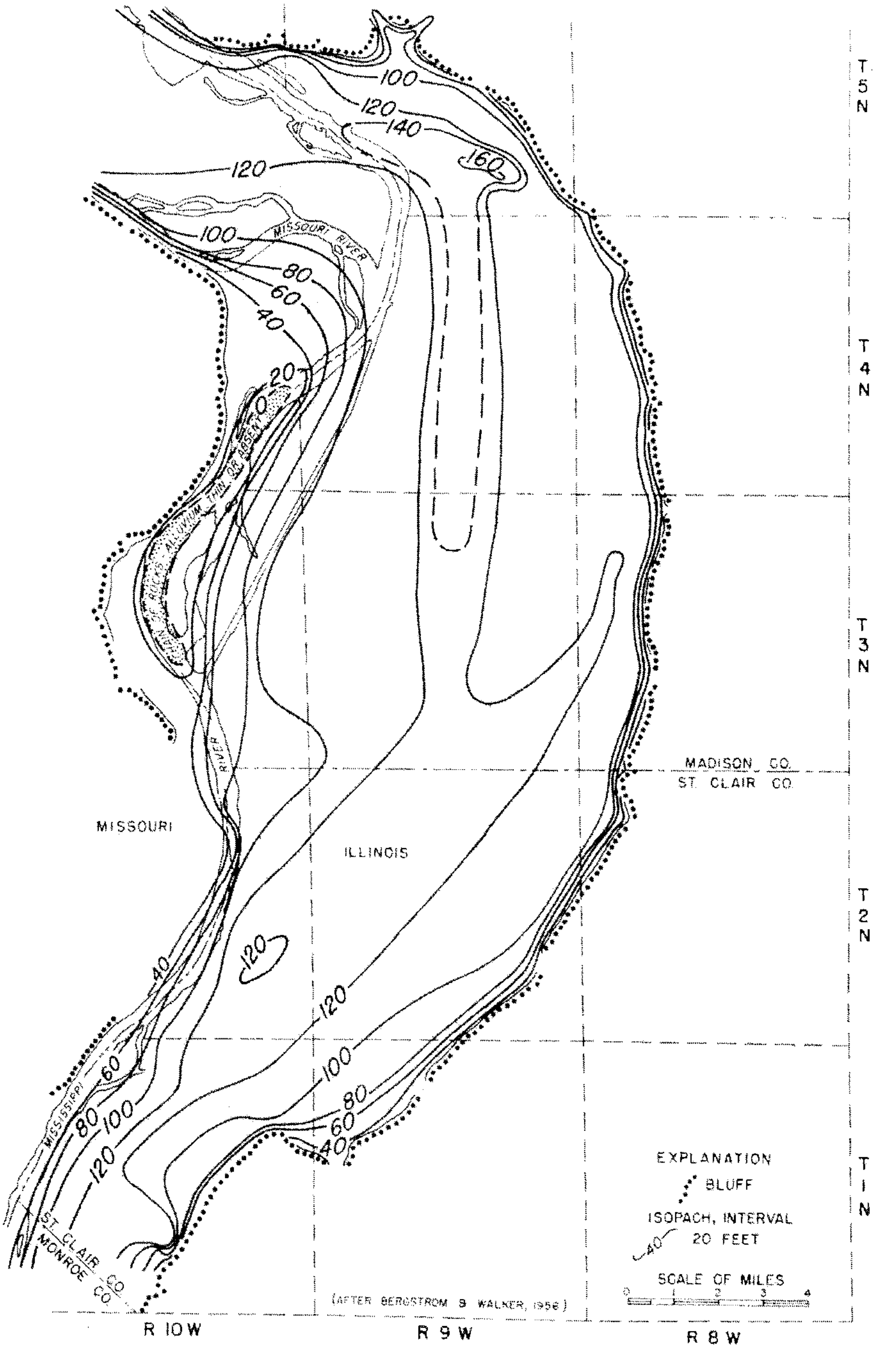
D.4.1 General. The fluvial geomorphology of the study area has been shaped by erosion and depositional forces through geologic time. During the past 7,000 years (Recent/Holocene Epoch) these forces have had the greatest effect upon the configuration of the landscape. The study area is comprised of three distinct areas: Mississippi River floodplain called the American Bottoms, the steep bluffs rising above the floodplain, and the uplands. The American Bottoms is an extensive floodplain characterized by the Mississippi River by numerous lakes, swamps, meandering creeks, marshes, and wet prairies. The bluffs are typically wooded and are carved with V-shaped valleys with steep grades. The uplands have relatively level terrain with glacial deposits left by the retreating glaciers. For a better understanding of the geomorphology, the following discussion will treat the American Bottoms and bluff and uplands separately.

D.4.2 Fluvial Geomorphology of the American Bottoms.

D.4.2.1 Alluvial Deposition. The Pre-development fluvial geomorphology of the American Bottoms surficial geology was shaped by the succession of meandering former channels of the Mississippi River and its related flooding. Most of the migration of the meandering Mississippi River occurred between the end of the Wisconsinan glaciation period and the 1800's. The continuous meandering of the Mississippi River across the American Bottoms created abandoned channel deposits, backswamp deposits, sand and gravel point bar deposits, chutes and bar deposits as shown on Figure D-3 and described in more detail below. A cross section of the valley fill material are shown on Figure D-4.

Figure D-3 Geology of the Project Area

Figure D-4 Valley Fill Thicknesses



Abandoned Channel Deposits. Abandoned channel deposits are the result of the gradual aggradation of fine-grained sediments within oxbow lakes formed by the lateral migration of the river. These deposits are thickest near the outside edge of the old channel meander loops. There are numerous abandoned channel deposits as shown on Figure D-3. Present marshy wetlands are located in these deposits since they drain so slowly.

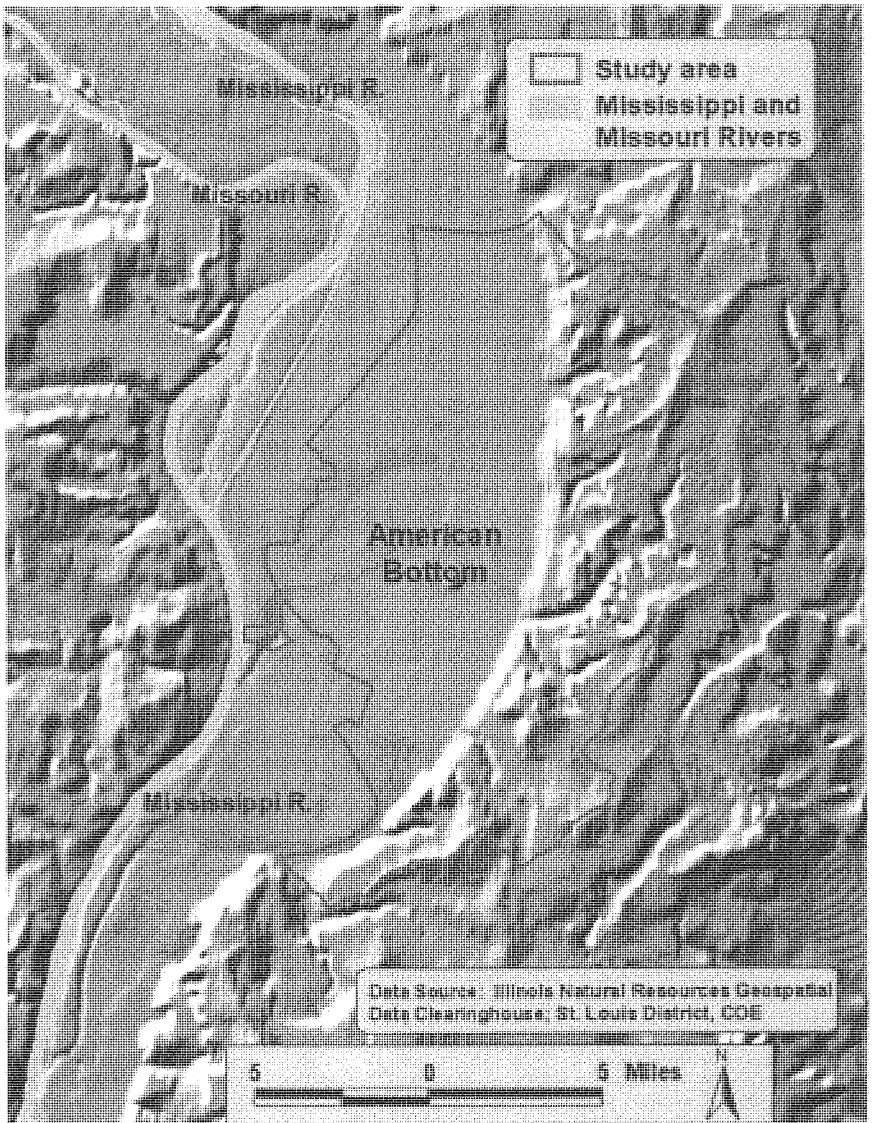
Point Bar Deposits. Point bar deposits formed on the inside of the meander loops during the horizontal migration of the river channel. The river migrates laterally by depositing bars of sand and sometimes gravel on its inside edge of the old channel meander loops and shifting to the outside cutting the bank through periodic failures of the outside bank. The building of these series of bars results in a corrugated surface of sand ridges and clay-filled depressions or swales. These deposits create the ridge and swale topography common throughout areas near the river, such as portions of Cahokia, Madison, and Granite City.

Chute and Bar Deposits. Chute and bar deposits were formed in a manner similar to the point bar deposits except that the surface was frequently changed by the cut and fill action of fast flowing floodwaters. Many of the resulting chutes have characteristics similar to the abandoned channel deposits.

Backswamp Deposits. Backswamp deposits consist of fine-grained sediments laid in broad shallow basins during periods of flooding. The sediment rich floodwaters were ponded between natural levee ridges on separate meander belts or between natural levees and the bluffs. Surface meander scars, shorelines, creeks, sloughs, and oxbow lakes are shown on Figure D-3 like Cahokia Creek, Pittsburg Lake, Cahokia Lake, and Horseshoe Lake. The topographic and soil patterns show a definite orientation related to the cutting and filing of the adjacent river. In the past it is possible that during periods of greater precipitation cycles that Pittsburg and Cahokia Lakes were connected while during periods of drought the lakes almost completely dried up. Also, it may be interpreted that because of elevational differences, topographic "breaks" and abrupt termination of surface patterns the former lakes differ in age. Thus, the American Bottoms area contains many distinctive topographic patterns associated with different-aged meanders of the Mississippi River and tributary streams (particularly Cahokia Creek) and adjacent chutes, islands, sand bars and sloughs. The scouring and flooding of the Mississippi River eroded some deposits while it transported and deposited sediments to other areas throughout the American Bottoms. The Mississippi River valley fill ranges in thickness from more than a 120 feet in places and feathers down to nothing near the bluff within the study area is shown in Figure D-5. The surface deposits within the American Bottoms are typically part of the Cahokia alluvium, which consists of up to 60 feet thick silty clay deposits on abandoned meanders, oxbow lakes, and point bar deposits (Grimley, 2000). These deposits have been characterized as poorly sorted silt, clay, and silty sand with lenses of sand and gravel (William et al., 1975). Cahokia alluvium overlies the Henry formation, which consists of outwash sands and gravels deposited as the river aggraded due to the retreating glaciers during the Wisconsinan glaciation period. The northern portion of the study area, along the Madison and St. Clair County line lies an area of recent oxbow lakes and marshy meander scars and local geologists commonly refer to it as the Lake Region. Drainage projects, filling of low areas with industrial and construction solid waste, and initial groundwater pumping resulted in a lowering of the water table, which had some effect on the removal of most of the major water bodies with the exception of Horseshoe Lake in the northern Lake Region.

The Lake Region is divided into two subregions separated by the East St. Louis Rise. Both areas are similar in terms of the physical parameters of recent river meandering and soil types.

Figure D-5 Physical Relief



Also, both subregions have similar problems in terms of the physical base affecting future construction of industrial and residential sites. The northern Lake Region contains the largest area of lakes and permanent swamps on the American Bottoms. Much of the area lies between four and ten feet above the level of the river. Topographically, the landforms are distinctly old river channels or sinuous ridge and swale features that parallel these channels. The soils vary as those do closer to the river, with sandbars and swampy clay materials in alternate fashion. The high water table and the lack of drainage works hampered development in the southern Lake Region. As a result, only the portion near Granite City, north of Horseshoe Lake, has been extensively utilized for urban purposes.

D.4.2.2 Glacial Deposition.

D.4.2.2.1 Terrace Deposits. Terrace deposits are fluvioglacial in nature and lie in the northern section of the American Bottoms floodplain. The terrace deposits are the only places in the American Bottoms where the Henry Formation is exposed at the surface. The terrace deposits are remnants of the Henry Formation formed by Wisconsinan Stage glacial outwash. These glacial outwash remnants have not been eroded away because of the stability of the Mississippi River above the mouth of the Missouri River in earlier times. Because of this stability, the area was not eroded and degraded away nor filled and aggraded as in most other areas within the American Bottoms. The terraces surface elevations between 430 and 445 feet NGVD and 10 to 25 feet above the mantle of younger Cahokia Formation alluvium of the Recent Stage. The Wood River Terrace, largest of the terrace deposit areas, is approximately six miles long and averages one mile in width and is north of the study area. The Poag Terrace is located what is now south of the Cahokia Creek Diversion Canal and is about three miles long and one mile wide. The soils are either silty or sandy with a few pebbles, contain little humus, and have poor water holding qualities. When dry, the silts and sands are white or pinkish white, much in contrast to the darker river silts. The medium to coarse sands are well sorted and have a mineral content of 75 to 80 percent quartz, 13 to 25 percent feldspar and 2 to 6 percent other materials.

D.4.2.2.2 Henry Formation. The Henry Formation is Wisconsinan Stage glacial outwash. Materials were carried by melt water beyond the glacial terminus. This formation probably has experienced less fluvial action than the two overlying Formation units; therefore, has greater variability in sorting and particle size. These materials are generally medium to coarse sands, gravelly sands, and sandy gravels and slightly to moderately calcareous. Fine sands, silty sands, and silts may also be encountered. Horizons of cobble-sized particles with occasional boulders have been encountered and can be expected throughout this formation. These horizons may have a lateral extent as much as several hundred feet. Seismic reflection surveys suggest that this formation may be composed of two subunits separated by a thin gravel and cobble zone.

D.4.2.2.3 Ice Contact Deposits. Ice contact deposits may be found underlying the Henry Formation. The ice contact deposits are stratified glacial drift which accumulated upon, against, and beneath a wasting and generally stagnant glacial ice front from the Illinoian Stage. Initial aggradation of sediments may be the result of fluvial, lacustrine, and gravitational processes, followed in many cases by melting of the supporting ice. This melting can cause sagging, collapse, slumping and even debris flow of the accumulated sediments.

The resulting deposits exhibit a wide variation in their characteristics, particle angularity, mineral content, maximum particle size, amount of fines, degree of sorting (gradation distribution) and particle size distribution throughout the ice contact sediments. Materials in these deposits range in particle size from clay to large boulders and are slightly to moderately calcareous. Gravel and cobbles are composed primarily of limestone, dolomite, and chert with lesser amounts of igneous and metamorphic rocks.

D.4.2.2.4 Glacial Illinoian Stage Till. Glacial till is composed of ice-laid debris during the Illinoian Stage glacial advance which exhibits little or no sorting. The glacial till was likely deposited below the glacial ice and above the bedrock floor under extremely high pressure. This deposition of drift particles and aggregates was transported at or near the base of the glacier. The Illinoian Stage Till is discontinuous in lateral extent in the study area. This unit is composed of gray, hard, compact, calcareous, clayey silt and silty clay with varying amounts of sand, gravel, cobbles, and boulders. Larger gravel and cobbles have been found to be angular to subangular. The clay and mineral composition of the till, as determined by the Illinois Geological Survey, utilizing X-ray diffraction methods is as follows: 40 to 50 percent (%) of illite, 30 to 40% of expansive clay minerals, and 20 to 30% of kaolinite plus chlorite. The percentages of gravel, sand silt and clay were also determined by the Illinois Geological Survey and are summarized as follows: 3 to 7% of gravel, 20 to 30% of sand, 35 to 55% of silt, and 17 to 35% of clay.

D.4.2.2.5 Older Sediments Deposits. The Older Sediment deposits are discontinues patches of sand and gravel glacial outwash and glacial lacustrine deposits. They are extremely varied in nature and very localized in occurrence. Samples from this unit are reported to exhibit a moderate degree of sorting and roundness. Since the formation was overlain by Illinoian Stage till and exhibited high resistance to penetration, it was likely that this unit was compacted by the glacial ice advance. A layer of cobbles and occasionally boulders overlying bedrock were encountered. The Older Sediments unit has been differentiated only where it is overlain by glacial till.

D.4.2.3 Colluvial Deposition. Colluvial deposits are located along the base of the bluff on the floodplain. The colluvial deposits in the study area is the Peyton Colluvium (Willman and Frye, 1970) that is named after Peyton Creek in Peoria County located at the base of the Illinois River bluff. The formation is sometimes described as slope wash and alluvial fans (Wanless, 1957). The formation consists of narrow bands located at the base of the bluff of poorly sorted materials from bluff slope failures and eroded materials from the tributary streams and bluff areas. The materials have accumulated on the lower slopes and at the base of the slopes by erosion, soil creep, slope instability failures, slope wash, and mudflows. Numerous alluvial fans and cones developed at the mouths of stream and gullies and are deposited on floodplain areas and terrace surfaces. The Peyton Formation is a surficial deposit and possibly intertongued with the Cahokia Alluvium as shown on Figure D-3.

D.4.3 Bluff and Upland Geomorphology. The Bluffs and uplands consist of a highly dissected drift plain in which a series of streams flow a short distance to the Mississippi River alluvial valley. The streams have an average gradient of 30 to 40 feet per mile. About 30 percent of the study area on the uplands are level upland prairies. These relatively level uplands form some of the divides between the westward flowing streams and the major drainage divide on the eastern edge of the area, between the Mississippi River and Kaskaskia River basins. The relatively level uplands are the remnants of a glacial plain formed by the deposition of a nearly flat, surficial body of lodgment till over which a mantle of loess was deposited by the wind. The stream valleys and the slopes are a reflection of the pre-Pleistocene topography. The valleys were probably only partly filled with drift or were re-excavated by post-Illinoian streams. Most of the streams have eroded to bedrock somewhere along the valleys and have narrow floodplains.

D.4.4 Physiography. The study area is located in part in two geological provinces, Ozark Plateau on the west and Central Lowlands on the east. The uplands are in the Springfield Till Plain of the Central Lowlands. The Springfield Till Plain was formed by Illinoian glacial drift that formed a nearly level surface, except where stream dissection has taken place (Ekblaw, Horberg, 1948). The bluff is characterized by narrow flat-topped divides, V-shaped valleys and slopes of up to 35 percent. The area has a mean slope of eight degrees and an average local relief of 132 feet (Sandy, 1971 and Schoen, 1972). Figure D-5 shows generally the physical relief of the study area.

D.5 GEOLOGY

D.5.1 Historical Geology.

D.5.1.1 General. The geologic history of the study area may be divided into three distinct geologic time periods. The formations and deposits within the American Bottoms are illustrated on Figure D-3. The first period was the creation of the bedrock formations during the Paleozoic Era. The second period was the deposition of the unconsolidated glacial materials during the Pleistocene Epoch. The third period was the erosion and deposition of the unconsolidated materials and the creation of modern soils during the Recent/Holocene Epoch. A generalized geologic column of the bluff and upland areas that shows the deposition from the three geologic time periods is shown on Figure D-6. The geologic time periods are shown of Figure D-7

Figure D-6 Upland Ggeologic Column

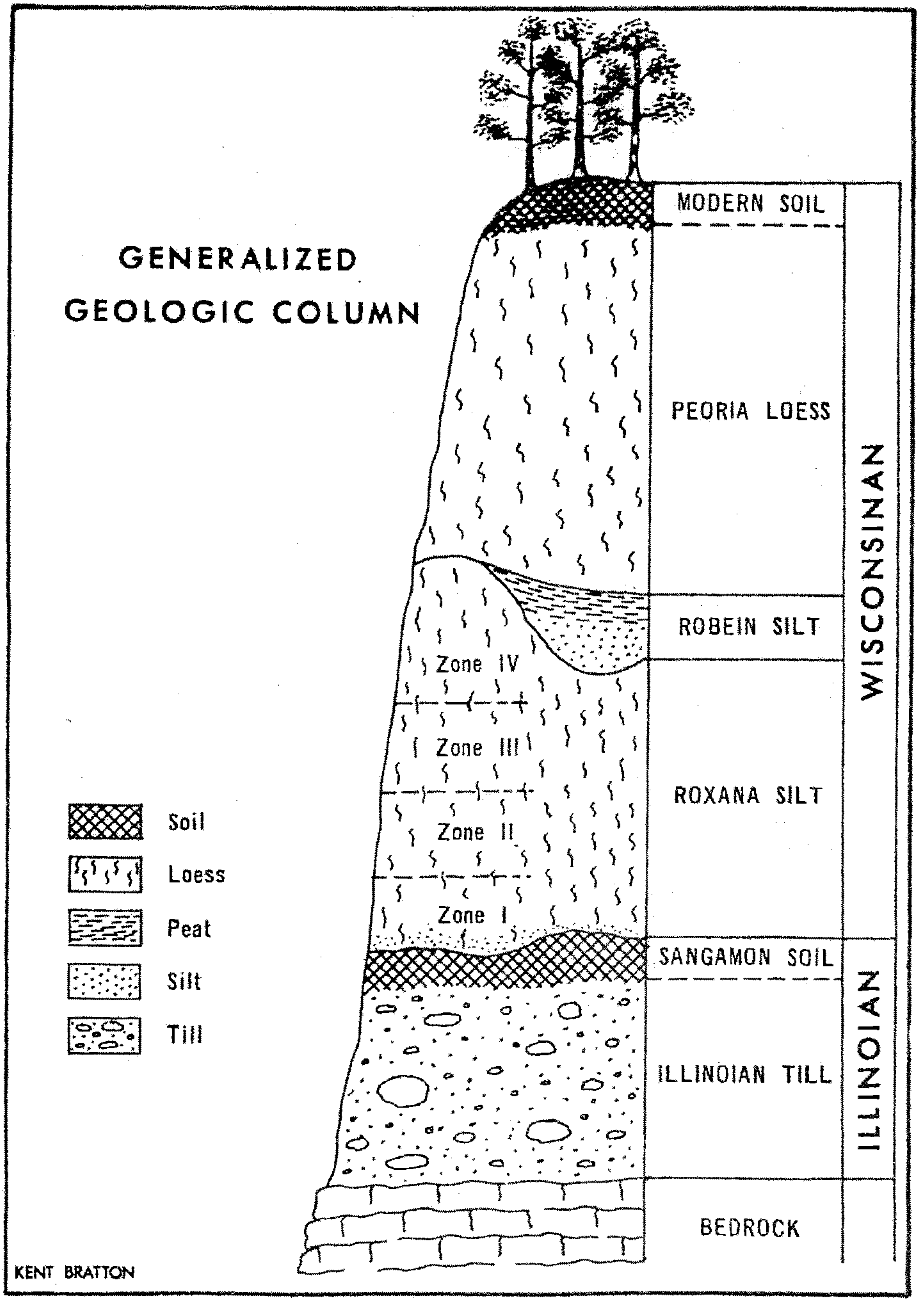


Figure D-7 Geologic Deposition Periods

ERA		PERIOD	EPOCH	AGE	YEARS BEFORE PRESENT
Cenozoic "Recent Life"	Age of Mammals	Quarternary	Pleistocene (Ice Age-Most Important Epoch)	Holocene	7,000 To Present
				Wisconsinan	75,000
				Sangamon	
				Illinoian	
				Yarmouth	
				Kansan	
				Aftonian	
				Nebraskan	1,000,000
		Tertiary			63,000,000
Mesozoic "Middle Life"	Age of Reptiles	Cretaceous			135,000,000
		Jurassic			180,000,000
		Triassic			230,000,000
Paleozoic "Ancient Life"	Age of Amphibians and Early Plants	Permian			280,000,000
		Pennsylvanian			310,000,000
		Mississippian			345,000,000
	Age of Fishes	Devonian			405,000,000
		Silurian			425,000,000
	Age of Inverte-brates	Ordovician			500,000,000
		Cambrian			600,000,000
Proterozoic Archeozoic		Referred to as "Pre-Cambrian Time"			

D.5.1.2 Paleozoic Era. During the Paleozoic Era the study area, as well as most of the Midwest, was intermittently submerged beneath the sea. Responding to continental tectonic activity with continental plate movements in the nearby Ozark area and the more distant Appalachian area to the east, the seas alternately advanced, depositing sedimentary rocks, and retreated from the area. This migration of seas brought periods of marine deposition, followed by times of erosion. These events are recorded in some 1,500 to 3,000 feet of sedimentary rocks, mostly limestone, shale and sandstone, which underlie the glacial and Holocene sediments. The surface bedrock of the study area is late Paleozoic age. Rocks of the Mississippian Period underlie the western section of the region and strata of the Pennsylvanian Period underlie the eastern sector of the study area. The Mississippian Period materials are chiefly limestone and shale while the Pennsylvanian materials include shale, coals, some sandstone and shaly limestone. The Pennsylvanian materials occasionally outcrop along some of the more deeply incised valleys on the upland.

D.5.1.3 Mesozoic Era. The Mississippi River in the study area is quite old and was probably formed during the Mesozoic Era. The river maintained its course at the eastern edge of the Ozark uplift and eroded a broad bedrock valley 300 feet above sea level and 300 feet below the surrounding uplands (Berstrom and Walker, 1965). North of Alton and south of Dupo the outcroppings along the bluff are hard Mississippian limestone. In between soft Pennsylvanian coals and shale extend as a tongue into St. Louis County. It is this tongue of weaker shale and coals that enabled the early Mississippi River to cut a wide floodplain (eleven miles) within the study area. The Mississippi River was unable create a wide floodplain both upstream and downstream against the harder limestone that restricted the channel width to only three and one half miles. The seas withdrew from the study area after the Pennsylvanian Period and a long period of erosion occurred until the ice sheets appeared in the Midwest about one million years ago and began the depositional history of the Pleistocene Epoch on the upland and the Mississippi River Valley.

D.5.1.4 Cenozoic Era, Quaternary Period.

D.5.1.4.1 Pleistocene Epoch. The dawn of the Pleistocene Epoch (Ice Age) changed the character of the Mississippi River substantially. The history of the Nebraskan glacial stage (first) in the study area is not known and the Kansanan glacial stage (second) development is very obscure. Several deposits of old till that have been found are thought to be of Kansan age and probably the leading edge of the ice sheet lay somewhere in the vicinity of the study area. The Liman substage (first substage) of the Illinoian glacier (third glacial stage) moved across the river and a portion of the moraine was located in St. Louis County (Bergstrom and Walker, 1956). The river probably flowed under the ice, but ponding action took place upstream and some of the results are preserved today in outstanding terraces along the lower Illinois River. Large boulders are occasionally struck by drills in the American Bottoms several feet below the true bedrock surface indicating deposits of till resting near the old riverbed. The Wisconsinan glaciers (fourth stage) approached the study area from the northeast, but stopped some seventy-five miles to the north. However, these ice sheets had a major impact on the American Bottoms, because the Mississippi, as well as the Missouri and the Illinois Rivers were major drainage ways for the heavily sediment-laden melt waters. The river began to aggrade to a level of the least 445 feet in elevation that is 47 feet higher than the present river level.

Today, the valley fill averages 120 feet in thickness in the study area. In the northern part of the Bottoms as much as 160 feet of alluvial material lie in the old bedrock valley of the Mississippi River. Heavy deflation took place during Wisconsinan winters when westerly winds blew across the exposed rock flour outwash. The lighter particles were deposited on the upland as loess, attaining a thickness of 50 feet in places adjacent to the floodplain with a progressive decline in thickness as one moves eastward. As the Wisconsinan glaciers retreated from the Mississippi River basin, the river began to degrade and to remove the valley fill deposited during the Pleistocene Period.

D.5.1.4.2 Recent (Holocene) Epoch. On the uplands, the streams incised themselves in the Wisconsinan loess and Illinoian till and on occasions have exposed the underlying bedrock. The forces of erosion, deposition, and weathering have created the modern soil profile and have on occasion buried evidences of post weathering cycles. Loess is the dominant surficial soil in the upland and bluff areas. Loess consists of wind-deposited silt-sized particles carried by the wind from the glacial outwash as valley terrain along the Mississippi River. The glacial outwash came from the melting ice sheets to the north and consists of gravels, sands, silts and clays which were deposited in the aggrading river valley. The prevailing westerly winds picked up the smaller particles of silts and clays and deposited them on the upland as loess. As a result of this major source area, the American Bottoms, the thicker deposits are located in juxtaposition to the alluvial valley and thin to the east. Also, the loess is coarser in texture along the floodplain and becomes finer as one proceeds eastward. The level uplands are the remnants of a glacial plain formed by the deposition of a nearly flat, surficial body of lodgment till over which a mantle of loess was deposited by the wind. The stream valleys and the slopes are a reflection of the pre-Pleistocene Series topography. The valleys were probably only partly filled with drift or were eroded by post-Illinoian Stage streams. Most of the streams have eroded to bedrock somewhere along the valleys and have narrow floodplains.

D.5.2 Structural Geology. The structural geology of the bedrock is not complex. The formations are essentially horizontal, except for a gentle easterly dip toward the center of the Illinois River basin. The bedrock structure is not expressed in the surface configuration in the study area but an asymmetrical fold, Waterloo-Dupo anticline, has formed an impressive scarp some 150 feet high southeast of the study area at Dupo. This structure extends for a distance of 18 miles from the vicinity of Waterloo, northwest through Dupo, through the western portion of the study area, and into St. Louis County. The pre-Pleistocene eroded surface in the bedrock materials is important in that the present day streams follow essentially these old bedrock valleys west to the Mississippi River Valley. Thus, the overlying mantle of Illinoian till and Wisconsinan loess do not control the courses of the aforementioned short streams on the bluff. To the southeast of the study area, along the bluffs, the St. Louis limestone outcrops and is quarried at Stolle and Dupo. The Kimmswich or "Trenton" limestone, of Ordovician age, lies at a depth of about –500 feet in elevation. Bituminous coal (No. 6, Herrin) exists in the Carbondale Formation of Pennsylvanian age bedrock.

D.5.3 Stratigraphy.

D.5.3.1 Pleistocene Stratigraphy. The upland areas of the project are covered with glacial materials that vary in thickness from zero to over one hundred feet. The Banner Formation of the Kansan glacial stage probably overlies much of the bedrock of the study area. The extent and thickness of this formation is not known and has not been mapped. This geological unit consists of glacial till and outwash of sands, gravels, and silts (Willman and Frye, 1970). Overlying the Banner Formation is the Glasford Formation of Illinoian glacial age. It includes glacial tills, outwash deposits and overlying accretion-gley deposits (Willman and Frye, 1970). The material is overlain by the Sangamon soil developed in the formation during the Sangamon interglacial stage (the Sangamon ended about 75,000 years B.P.) The till represents deposits laid down directly by the ice and consists of particle sizes ranging from clays to large boulders. Overlying the earlier glacial tills is loess of Wisconsinan glacial age. The loess is the dominant surficial soil deposit in the bluff section of the study area and most of the modern soils are developed in the material. Loess consists of wind-deposited silt-sized particles carried by the wind from the glacial outwash as valley terrain in the Mississippi River Valley. The glacial outwash came from the melting ice sheets to the north and consists of gravels, sands, silts, and clays that were deposited in the aggrading river valley. The prevailing westerly winds picked up the smaller particles of silts and clays and deposited them on the upland as loess. As a result of this major source area, the American Bottoms, the thicker deposits are located in juxtaposition to the alluvial valley and thin to the east. Also, the loess is coarser in texture along the floodplain and becomes finer as one proceeds eastward.

D.5.3.2 Wisconsinan Stratigraphy.

D.5.3.2.1 General. The Wisconsinan deposits may be divided into three geologic formations; Roxana Silt, Robein Silt, and Peoria Loess. The Roxana and Peoria are composed mostly of silts of varying mineral composition while the Robein Silt consists of peat, and organic-rich and deozidized silts deposited in water. The Robein occurs only locally and in rather small deposits that have not been adequately mapped (Bratton, 1971).

D.5.3.2.2 Roxana Silt. The Roxana Silt was deposited during the Altonian substage of the Wisconsinan and has been dated as extending from 70,000 B.P. to about 28,000 years B.P. In the study area the Roxana usually composes about one half of the total loess deposits. However, in some portions of the upland the overlying Peoria has been removed by erosion and the modern soil profile is developed in the Roxana Silt. The most distinctive characteristics of the Roxana Silt are the red color, caused by the rare iron mineral lepidocrocite and the weathered surface at the Roxana-Peoria contact. This contact surface is high in clay content and as a result gravitational waters tend to slide laterally along the surface (Lutzen, 1970), reported that about fifty percent of the gravitation water flowed along this contact). This condition may cause construction problems related to the water seeps and the possibility of slab failures in the loess deposits on steep slopes.

D.5.3.2.3 Robein Silt. The Robein Silt is a localized formation that was deposited during the Farmdlian Substage from 28,000 to 20,000 B.C. Farmdalian time was a period of warming during the Wisconsinan Stage. This is evident in that the formation consists of peat, tree limbs, roots and high organic silts that are probably reworked sheet wash from the Roxana Silt. The Robein Silt appears to be localized in old stream valleys or lakes on the Roxana Silt surface. This is apparent because the deposition occurred in water-saturated conditions.

D.5.3.2.4 Peoria Loess. The Peoria Loess has from many years been thought to be the dominant upland surficial deposit in Illinois and the parent material for most of the upland soils. Either erosion has removed the Peoria material or it was never deposited to the depth and to the extent once thought. The Peoria Loess was deposited during the period from 20,000 to 7,000 years B.C. It is more dominant surficial material in the study area as can be seen in the prominent loess pits along the Mississippi River Valley and bluffs. The particle size distribution of the Peoria Loess is about 80 percent silt-sized material (0.05-0.002 mm). The most important aspect of the mineralogy of the Peoria is the 20 per cent or so of clay. Seventy per cent of the clay minerals are montmorillonite or expanding clays (Frye and Glass, 1962). These expanding clays have the ability to trap water and thus increase volume.

D.5.3.3 Recent Epoch Alluvial Deposits. The surficial alluvial deposits in the Mississippi River valley are generally classified as Modern Soil that is applied to any exposed soil profile (Willman and Frye, 1970). Modern Soil are underlain by two main formations: the Cahokia Alluvium Formation of the Recent Epoch and to a lesser extent the Henry Formation of the Wisconsinan Stage (Willman and Frye, 1970). Most of the surficial alluvial deposits consist of particles transported down the Mississippi River valley and deposited sediments of various sizes during periods of flooding. Coarser and heavier materials like sands drop out rather quickly after the flow velocities are 2 feet per second or slower. Sand ridges are formed short distances from the main river channel at the time of flooding. In the natural course of flooding, the high overland flows often cut across the land between the meander loops. If the flood had adequate energy with high levels, flow quantities, and long enough duration the Mississippi River cut though existing lands between the meander loops and formed a new channel. The abandoned meander loop would eventually fill up with clay and silt sediments with slow moving or stagnant flows allowed the lighter and smaller soil particles to settle out enough and then deposited during periods of flooding with the greatest thickness in old river channels, lakes and sloughs. Some surface alluvial soils were deposited by tributary streams that were eroded from the uplands to the east. The thickness of the unit varies from approximately ten to fifty feet and is the present material for the highly variable soils of the study area. The Cahokia Alluvium on the American Bottoms varies in thickness from zero to over fifty feet. The variability in thickness is due to cut-and-fill processes in recent times on the underlying Henry sands and gravels. It is known that the Mississippi River has scoured its bed over fifty feet during periods of high water or when ice packs in winter cause the river to deepen its channel to flow under the ice (Woodward, 1880). This, the many migrations of the channel across the floodplain, such as the channels that created old Pittsburg have replaced the valley train with thick deposits of Holocene materials. Well records reveal that the Cahokia material is poorly sorted as to particle size, although the most common cross-section consists of an upper strata of silt or clay with interbedded layers of sands, silts, and clays below. The silts and a portion of the clays on the surface probably result from slack water settlement from flooding as the channel migrated to another position.

Because of the fine texture of the materials in the abandoned river channels, these regions are areas of low permeability and are not as favorable for the development of large supplies of groundwater. Underlying the Cahokia alluvium is the Mackinaw member of the Henry Formation that consists dominantly of sand and gravel deposits form Wisconsinan Stage glaciers that were deposited in stream valleys. The Henry is not exposed at the surface within the study area but forms distinctive terraces near the city of Wood River in the northern American Bottoms. The Henry Formation, with its permeable sands and gravels is the major aquifer for high yielding wells on the American Bottoms. The total thickness of the Cahokia and Henry Formations is approximately 100 feet. It is possible that much of the bit refusal documented by drilling logs that marks the contact between the unconsolidated aforementioned formations and underlying bedrock could be boulders of Illinoian Stage ice age till which rest upon bedrock.

D.6 SURFICIAL SOILS

D.6.1 Alluvial Soils. The surficial alluvial soils that cover the American Bottoms are related to their mode of river deposition. The alluvial soils are underlying glacial deposits from the Pleistocene Epoch. The alluvial soils vary in thickness from a few feet to 50+ feet. The soil classifications used for the alluvial soil types are based on the engineering Unified Classification System. Five alluvial soil types: abandoned channel, backswamp, point bar, chutes and bar deposits comprise the majority of the unconsolidated deposits and are described below:

Abandoned Channel Deposits. Abandoned channel deposits are predominately fine-grained sediments transported into the abandoned channel during periods of flooding. These deposits normally accumulate slowly and in thin layers. Soil types vary from silty sand (SM) to silt (ML) mixtures classified under the that are prevalent in the channel neck area to highly plastic fat clays (CH) common in the bendways. The predominate soil type found in the abandoned channel is fat clay (CH).

Backswamp Deposits. Backswamp sediments occur in thin layers deposited by the floodwaters which periodically deposited on the floodplain. The soil types found in the backswamp deposits vary from silty sand (SM) to fat clay (CH). The predominate soil type found in the backswamp deposits is lean clay (CL).

Point Bar Deposits. Point bar sediments extend as deep as the bottom of the old channel (thalweg). There are two main soil types within the point bar sand and silt in the elongated bar deposits or ridges deposited during rising river stages. Silty clay and fat clay were deposited in the depressions or swales during receding flood stages. Soil types found in point bar deposits vary from silty sand (SM) to fat clay (CH). The predominate soil type in the ridge areas is silty sand (SM). In the swale areas silty clay (CL) and fat clay (CH) are predominate soil types.

Chutes and Bar Deposits. Chutes and bar sediments form more irregular surface topography than point bar deposits. The chutes and bar deposits are graded at the base with sand and gravel and become finer with silty sand (SM) and sand (SP) toward the surface in the ridges and silty clay (CL) and fat clay (CH) in the chutes.

D.6.2 Upland Soils. The bluffs and uplands within the study area are predominately glacial drift deposits and aeolian (wind deposited) loess deposits. The loess deposits are up to 100 thick in regions near Collinsville and thin down to about 20 feet thick immediately east of the study area. Wisconsinan Loess deposits are categorized as two formations, the Peoria Silt and the Roxana Silt. The older of these is the Roxana Silt that consists of yellow-gray to pinkish tan loam (William and others, 1975). The Roxana Silt is generally darker brown with more clay content than Peoria Silt. The younger and thicker Peoria Silt is yellow-brown to gray loam (Grimley, 2000). The Wisconsinan Loess is underlain by the Glasford Formation that is a glacial lacustrine till consisting of loam, silty loam, and silty clay that were deposited during the glacial Illinoisan Stage. Sand and gravel inclusions are common is this glacial lacustrine formation. The sand and gravel inclusions vary in thickness from a few inches to two feet and are poorly graded reddish yellow sands.

D.6.3 Soil Mapping Units.

D.6.3.1 General. The Natural Resources Conservation Service (NRCS) has completed their soil surveys for Madison County and St. Clair County that characterize the upper 60 inches of soil. The soil surveys are very detailed and useful in defining soil types to assist in agricultural planning and operations and also in delineating wetlands and creating wetlands. The following table is a summary of the NRCS soil classifications.

D.6.3.2 Floodplain Soil Mapping Units.

Table D–1 Floodplain Soil Mapping Units

Soil Unit No.	Floodplain Major Soils Mapping Units Soil Name	Area (acres)	Percent Of Area
8071L	Darwin silty clay, 0 to 2 percent slopes	11,913.8	20.92
2071L	Darwin-Urban land complex, 0 to 2 percent slopes	1,942.5	3.41
1071A	Darwin silty clay loam, undrained, 0 to 2 percent slopes	2,302.1	4.04
2071A	Darwin-Urban land complex, 0 to 2 percent slopes	269.5	0.47
1071	Darwin silty clay loam, undrained, 0 to 2 percent slopes	3.8	0.01
8071A	Darwin silty clay, 0 to 2 percent slopes	90.1	0.16
	Darwin silty clay, 0 to 2 percent slopes	**16,521.7**	**29.00**
2183A	Shaffton-Urban land complex, 0 to 2 percent slopes	4,017.5	7.05
8183A	Shaffton clay loam, 0 to 2 percent slopes	2,444.5	4.29
	Shaffton clay loam, 0 to 2 percent slopes	**6,462.0**	**11.34**
8304B	Landes very fine sandy loam, 2 to 5 percent slopes	3,874.1	6.80
2304B	Landes-Urban land complex, 2 to 5 percent slopes	676.5	1.19
8304A	Landes very fine sandy loam, 2 to 5 percent slopes	7.1	0.01
6304A	Landes Variant v. fine sandy loam, 0 to 3 percent slopes	5.4	0.01
	Landes very fine sandy loam, 2 to 5 percent slopes	**4,563.2**	**8.01**

Table D–1 Continued

Soil Unit No.	Floodplain Major Soils Mapping Units Soil Name	Area (acres)	Percent Of Area
W	**Water**	**4,058.5**	**7.12**
533	**Urban land**	**2,633.3**	**4.62**
8180A	Dupo silt loam, 0 to 2 percent slopes	2,257.1	3.96
3180A	Dupo silt loam, 0 to 2 percent slopes	23.9	0.04
	Dupo silt loam, 0 to 2 percent slopes	**2,281.0**	**4.00**
8674A	**Dozaville, 0 to 2 percent slopes**	**1,003.2**	**1.76**
37A	Worthen silt loam, 0 to 2 percent slopes	1,504.2	2.64
37B	Worthen silt loam, 2 to 5 percent slopes	383.4	0.67
	Worthen silt loam, 0 to 5 percent slopes	**1,887.7**	**3.31**
8591A	**Fults silty clay, 0 to 2 percent slopes**	**1,407.4**	**2.47**
8284A	Tice silty clay loam, 0 to 2 percent slopes	1,302.4	2.29
2284A	Tice-Urban land complex, 0 to 2 percent slopes	208.8	0.37
	Tice silty clay loam, 0 to 2 percent slopes	**1,511.2**	**2.65**
8592A	Nameoki silty clay, 0 to 2 percent slopes	1,300.3	2.28
2592A	Nameoki-Urban land complex, 0 to 3 percent slopes	794.1	1.39
2591A	Nameoki-Urban land complex, 0 to 3 percent slopes	5.6	0.01
	Nameoki silty clay, 0 to 3 percent slopes	**2,100.0**	**3.69**
8646A	Fluvaquents, loamy, 0 to 2 percent slopes	1,245.3	2.19
3847L	Fluvaquents-Orthents complex	218.1	0.38
	Fluvaquents, loamy, 0 to 2 percent slopes	**1,463.4**	**2.57**
8070A	Beaucoup silty clay loam, 0 to 2 percent slopes	1,146.5	2.01
1070A	Beaucoup silty clay loam, 0 to 2 percent slopes	380.1	0.67
3070L	Beaucoup silty clay loam, 0 to 2 percent slopes	120.5	0.21
8070B	Beaucoup silty clay loam, 0 to 2 percent slopes	35.7	0.06
	Beaucoup silty clay loam, 0 to 2 percent slopes	**1,682.8**	**2.95**
802B	Orthents, loamy, undulating	1,014.1	1.78
801D	Orthents, silty, steep	785.5	1.38
802D	Orthents, loamy, steep	404.6	0.71
801B	Orthents, silty, undulating	69.2	0.12
	Orthents, loamy, undulating	**2,273.3**	**3.99**
1248A	**McFain silty clay loam, 0 to 2 percent slopes**	**819.6**	**1.44**

Table D–1 Continued

Soil Unit No.	Floodplain Major Soils Mapping Units Soil Name	Area (acres)	Percent Of Area
8334A	Birds silt loam, 0 to 2 percent slopes	802.5	1.41
3334A	Birds silt loam, 0 to 2 percent slopes	75.8	0.13
	Birds silt loam, 0 to 2 percent slopes	**878.2**	**1.54**
3333A	Wakeland silt loam, 0 to 2 percent slopes	557.7	0.98
8333A	Wakeland silt loam, 0 to 2 percent slopes	258.5	0.45
	Wakeland silt loam, 0 to 2 percent slopes	**816.2**	**1.43**
53B	**Bloomfield loamy fine sand, 1 to 3 percent slopes**	**551.1**	**0.97**
			(%)
8150A	Onarga sandy loam, 0 to 3 percent slopes	312.8	0.55
7150A	Onarga sandy loam, 0 to 3 percent slopes	15.0	0.03
	Onarga sandy loam, 0 to 3 percent slopes	**327.9**	**0.58**
8302A	**Ambraw loam, 0 to 2 percent slopes**	**312.4**	**0.55**
536	Dumps	298.4	0.52
866	Dumps, slurry	6.4	0.01
	Dumps	**304.7**	**0.53**
3331A	Wilbur silt loam, 0 to 2 percent slopes	293.1	0.51
3336A	Wilbur silt loam, 0 to 2 percent slopes	50.9	0.09
	Wilbur silt loam, 0 to 2 percent slopes	**344.0**	**0.60**
81A	Littleton silt loam, 0 to 2 percent slopes	285.1	0.50
3081A	Littleton silt loam, 0 to 2 percent slopes	280.4	0.49
	Littleton silt loam, 0 to 2 percent slopes	**565.6**	**0.99**
8331A	**Haymond silt loam, 0 to 2 percent slopes**	**234.4**	**0.41**
8038B	Rocher loam, 2 to 5 percent slopes	216.3	0.38
3038B	Rocher loam, 2 to 5 percent slopes	9.9	0.02
8038A	Rocher loam, 0 to 2 percent slopes	9.1	0.02
	Rocher loam, 0 to 5 percent slopes	**235.3**	**0.41**
8078A	**Arenzville silt loam, 0 to 2 percent slopes**	**213.1**	**0.37**

Table D–1 - Continued

Soil Unit No.	Floodplain Major Soils Mapping Units Soil Name	Area (acres)	Percent Of Area
8162A	**Gorham silty clay loam, 0 to 2 percent slopes**	**207.3**	**0.36**
8415A	Orion silt loam, 0 to 2 percent slopes	188.9	0.33
3415A	Orion silt loam, 0 to 2 percent slopes	57.7	0.10
	Orion silt loam, 0 to 2 percent slopes	246.6	0.43
8151A	Ridgeville fine sandy loam, 0 to 2 percent slopes	160.7	0.28
8741B	Oakville fine sand, 2 to 5 percent slopes	155.6	0.27
8741C	Oakville fine sand, 5 to 10 percent slopes	64.8	0.11
7741B	Oakville fine sand, 2 to 5 percent slopes	31.5	0.06
	Oakville fine sand, 2 to 10 percent slopes	**251.9**	**0.44**
			(%)
75B	**Drury silt loam, 2 to 5 percent slopes**	**150.1**	**0.26**
865	**Pits, gravel**	**69.7**	**0.12**
7430A	**Raddle silt loam, 0 to 3 percent slopes**	**59.4**	**0.10**
8102A	**La Hogue loam, 0 to 3 percent slopes**	**58.7**	**0.10**
3076A	**Otter silt loam, 0 to 2 percent slopes**	**54.4**	**0.10**
466A	**Bartelso silt loam, 0 to 2 percent slopes**	**46.7**	**0.08**
409A	**Aquents, clayey, 0 to 2 percent slopes**	**42.5**	**0.07**
8452A	**Riley clay loam, 0 to 3 percent slopes**	**30.1**	**0.05**
8338A	Hurst silt loam, 0 to 2 percent slopes	22.7	0.04
8338C	Hurst silty clay loam, 5 to 10 percent slopes	8.8	0.02
8338B	Hurst silt loam, 2 to 5 percent slopes	5.0	0.01
	Hurst silt loam, 0 to 10 percent slopes	**36.6**	**0.06**
8122B	Colp silt loam, 1 to 4 percent slopes	20.2	0.04
8122C	Colp silty clay loam, 5 to 10 percent slopes	4.6	0.01
	Colp silty clay loam, 1 to 10 percent slopes	**24.8**	**0.05**

Table D–1 - Continued

Soil Unit No.	Floodplain Major Soils Mapping Units Soil Name	Area (acres)	Percent Of Area
962F	Sylvan-Bold silt loams, 18 to 35 percent slopes	19.6	0.03
962F2	Sylvan-Bold silt loams, 18 to 35 percent slopes	15.2	0.03
962G	Sylvan-Bold silt loams, 35 to 60 percent slopes	5.3	0.01
962D2	Sylvan-Bold silt loams, _ to 18 percent slopes	0.8	0.00
	Sylvan-Bold silt loams, 18 to 60 percent slopes	**40.9**	**0.07**
8084A	**Okaw silt loam, 0 to 2 percent slopes**	**13.6**	**0.02**
8434B	**Ridgway silt loam, 2 to 5 percent slopes**	**7.9**	**0.01**
8394A	**Haynie silt loam, 0 to 2 percent slopes**	**6.8**	**0.01**
35F	**Bold silt loam, 15 to 30 percent slopes**	**1.0**	**0.00**
			(%)
79C2	Menfro silt loam, 5 to 10 percent slopes	1.0	0.00
79F	Menfro silt loam, 18 to 35 percent slopes	0.1	0.00
	Menfro silt loam, 5 to 35 percent slopes	**1.1**	**0.00**
	Floodplain Total	**56,962.0**	**100.00**

D.6.3.3 Upland Soil Mapping Units.

Table D–2 Upland Soil Mapping Units

Soil Unit No.	Upland Soils Mapping Units Soil Name	Area (acres)	Percent of Area
			(%)
79B	Menfro silt loam, 2 to 5 percent slopes	5,621.2	11.31
79F	Menfro silt loam, 18 to 35 percent slopes	5,354.6	10.78
79D3	Menfro silty clay loam, 10 to 18 percent slopes	2,366.2	4.76
79C2	Menfro silt loam, 5 to 10 percent slopes	1,867.5	3.76
79G	Menfro silt loam, 35 to 60 percent slopes	1,356.4	2.73
79D2	Menfro silt loam, 10 to 18 percent slopes	1,280.9	2.58
79C3	Menfro silt clay loam, 5 to 10 percent slopes	238.7	0.48
79F3	Menfro silty clay loam, 18 to 35 percent slopes	229.7	0.46
2079D	Menfro-Urban land complex, 8 to 15 percent slopes	208.0	0.42
2079D2	Menfro-Urban land complex, 10 to 18 percent slopes	166.3	0.33
2079B	Menfro-Urban land complex, 2 to 5 percent slopes	106.9	0.22
2079E	Menfro-Urban land complex, 15 to 25 percent slopes	17.2	0.03
2079D3	Menfro-Urban land complex, 10 to 18 percent slopes	9.7	0.02
2079C2	Menfro-Urban land complex, 5 to 10 percent slopes	3.3	0.01

Table D–2 Continued

Soil Unit No.	Upland Soils Mapping Units Soil Name	Area (acres)	Percent of Area (%)
	Menfro silt loam, 2 to 60 percent slopes	**18,826.5**	**37.90**
962F2	Sylvan-Bold silt loams, 18 to 35 percent slopes, eroded	5,577.2	11.23
962F	Sylvan-Bold silt loams, 18 to 35 percent slopes	1,929.5	3.88
962G	Sylvan-Bold silt loams, 35 to 60 percent slopes	1,784.6	3.59
962D2	Sylvan-Bold silt loams, _ to 18 percent slopes, eroded	1,578.5	3.18
	Sylvan-Bold silt loams, 18 to 60 percent slopes	**10,869.9**	**21.88**
477B	Winfield silt loam, 2 to 5 percent slopes	3,320.7	6.68
2477B	Winfield-Urban land complex, 2 to 8 percent slopes	3,077.2	6.19
477D3	Winfield silty clay loam, 10 to 15 percent slopes	827.3	1.67
477C3	Winfield silty clay loam, 5 to 10 percent slopes	575.3	1.16
477C2	Winfield silt loam, 5 to 10 percent slopes, eroded	492.9	0.99
477B3	Winfield silt loam, 2 to 5 percent slopes, severely eroded	49.0	0.10
2477C2	Winfield-Urban land complex, 8 to 15 percent slopes, eroded	13.8	0.03
2477D3	Winfield-Urban land complex, 15 to 20 percent slopes	13.0	0.03
2078A	Winfield-Urban land complex, 2 to 8 percent slopes	9.8	0.02
477D2	Winfield silty clay loam, 10 to 15 percent slopes, eroded	9.5	0.02
447C3	Winfield silty clay loam, 5 to 10 percent slopes	7.8	0.02
447B	Winfield silt loam, 2 to 5 percent slopes	6.3	0.01
447C2	Winfield silt loam, 5 to 10 percent slopes, eroded	3.3	0.01
477B2	Winfield silt loam, 2 to 5 percent slopes, eroded	3.2	0.01
	Winfield silty clay loam, 2 to 20 percent slopes	**8,409.0**	**16.93**
384B	Edwardsville silt loam, 2 to 5 percent slopes	1,164.4	2.34
384A	Edwardsville silt loam, 0 to 2 percent slopes	455.3	0.92
2384B	Edwardsville-Urban land complex, 1 to 4 percent slopes	307.2	0.62
	Edwardsville silt loam, 0 to 5 percent slopes	**1,926.9**	**3.88**
3333A	Wakeland silt loam, 0 to 2 percent slopes, frequently flooded	1,894.7	3.81
333A	Wakeland silt loam, 0 to 2 percent slopes	11.3	0.02
	Wakeland silt loam, 0 to 2 percent slopes	**1,906.0**	**3.84**
283B	Downsouth silt loam, 2 to 5 percent slopes	712.6	1.43
283C2	Downsouth silt loam, 5 to 10 percent slopes, eroded	158.8	0.32
2283B	Downsouth-Urban land complex, 2 to 5 percent slopes	8.1	0.02
	Downsouth silt loam, 2 to 5 percent slopes	**879.5**	**1.77**

Table D–2 - Continued

Soil Unit No.	Upland Soils Mapping Units Soil Name	Area (acres)	Percent of Area (%)
90B	Bethalto silt loam, 2 to 5 percent slopes	582.9	1.17
90A	Bethalto silt loam, 0 to 2 percent slopes	260.2	0.52
2090B	Bethalto-Urban land complex, 2 to 5 percent slopes	21.1	0.04
	Bethalto silt loam, 0 to 5 percent slopes	**864.2**	**1.74**
385A	**Mascoutah silty clay loam, 0 to 2 percent slopes**	**840.6**	**1.69**
801D	Orthents, silty, steep	502.3	1.01
801B	Orthents, silty, undulating	201.4	0.41
826D	Orthents, silty, acid substratum, rolling	85.7	0.17
802B	Orthents, loamy, undulating	13.6	0.03
	Orthents, silty, steep	**802.9**	**1.62**
3331A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	499.2	1.00
3336A	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	237.6	0.48
	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	**736.8**	**1.48**
W	**Water**	**456.5**	**0.92**
19D3	**Sylvan silty clay loam, 10 to 15 percent slopes**	**433.8**	**0.87**
37B	Worthen silt loam, 2 to 5 percent slopes	361.2	0.73
37A	Worthen silt loam, 0 to 2 percent slopes	50.8	0.10
	Worthen silt loam, 0 to 5 percent slopes	**412.0**	**0.83**
75B	**Drury silt loam, 2 to 5 percent slopes**	**391.2**	**0.79**
3415A	**Orion silt loam, 0 to 2 percent slopes, frequently flooded**	**345.3**	**0.69**
267A	Caseyville silt loam, 0 to 2 percent slopes	313.5	0.63
267B	Caseyville silt loam, 2 to 5 percent slopes	225.5	0.45
2267B	Caseyville-Urban land complex, 2 to 5 percent slopes	8.5	0.02
	Caseyville silt loam, 0 to 5 percent slopes	**547.6**	**1.10**
441B	Wakenda silt loam, 2 to 5 percent slopes	216.9	0.44
441C2	Wakenda silt loam, 5 to 10 percent slopes, eroded	32.7	0.07
	Wakenda silt loam, 2 to 10 percent slopes	**249.6**	**0.50**

Table D–2 - Continued

Soil Unit No.	Upland Soils Mapping Units Soil Name	Area (acres)	Percent of Area
3334L	**Birds silt loam, 0 to 2 percent slopes**	**238.4**	**0.48**
533	Urban land	217.1	0.44
2385A	either Edwardsville (384) or Mascoutah (385) -Urban land	3.4	0.01
7903	not given	0.5	0.00
	Urban land	**221.0**	**0.44**
3081A	Littleton silt loam, 0 to 2 percent slopes, frequently flooded	39.3	0.08
81A	Littleton silt loam, 0 to 2 percent slopes	33.2	0.07
	Littleton silt loam, 0 to 2 percent slopes	**72.5**	**0.15**
536	**Dumps**	**49.4**	**0.10**
53B	**Bloomfield loamy fine sand, 1 to 3 percent slopes**	**37.6**	**0.08**
35F	**Bold silt loam, 15 to 30 percent slopes**	**33.7**	**0.07**
3078A	**Arenzville silt loam, 0 to 2 percent slopes**	**24.2**	**0.05**
50A	**Virden silt loam, 0 to 2 percent slopes**	**21.7**	**0.04**
2183A	**Shaffton-Urban land complex, 0 to 2 percent slopes**	**18.4**	**0.04**
8331A	**Haymond silt loam, 0 to 2 percent slopes**	**15.2**	**0.03**
3076A	**Otter silt loam, 0 to 2 percent slopes, frequently flooded**	**14.2**	**0.03**
31A	**Pierron silt loam, 0 to 2 percent slopes**	**9.6**	**0.02**
8180A	**Dupo silt loam, 0 to 2 percent slopes, occasionally flooded**	**6.3**	**0.01**
517A	**Marine silt loam, 0 to 2 percent slopes**	**5.8**	**0.01**
3070L	**Beaucoup silty clay loam, 0 to 2 percent slopes**	**4.5**	**0.01**
1248A	**McFain silty clay loam, undrained, 0 to 2 percent slopes**	**3.9**	**0.01**

Table D–2 - Continued

Soil Unit No.	Upland Soils Mapping Units Soil Name	Area (acres)	Percent of Area
630D3	Navlys, severely eroded	3.5	0.01
8674A	Dozaville, 0 to 2 percent slopes, occasionally flooded	1.1	0.00
8084A	Okaw silt loam, 0 to 2 percent slopes, occasionally flooded	0.3	0.00
3847L	Fluvaquents-Orthents complex, frequently flooded	0.1	0.00
		49,679.5	100.00

D.7 SEDIMENTATION

The tributary streams carry significant quantities of sediments down into the American Bottoms. Appendix E addresses these issues.

D.8 COAL FORMATIONS AND MINING

D.8.1 Coal Stratigraphy. Bituminous coal underlies the entire upland portion of the study area. This area lies at the southwestern margin of the Eastern Interior Coal Field. Sediments deposited during the Pennsylvanian Period lie on an uneven surface of underlying limestone deposited during the Mississippian Period. These Pennsylvanian deposits are divided into four formations which are identified from the youngest and highest in elevation to oldest and lowest in elevation: McLeansboro, Carbondale, Tradewater, and Caseyville. It is the Carbondale Formation that contains the Herrin No. 6 bituminous coal seam. This major coal seam and along with lesser ones have a regional easterly dip with an average slope of 14 feet per mile (N. Payne, 1941). The formations slope toward the center of a structural basin in southern Illinois known as the Illinois Basin. The Herrin No. 6 Coal seam is relatively thick. The seam ranges between five and eight feet thick and averages 6.5-foot thick. Variations in thickness of a foot or more are not uncommon within a short distance. The coal is generally underlain by clay which is underlain by a stratum of limestone or shale. The underlying clay varies in thickness from a few inches to several feet in a short distance (W.E. Parham, 1968). The overburden thickness above the coal seam ranges from a few feet near coal outcrops at the base of the bluff on the west to over 170 feet at the eastern limits of the study area. The overburden thickness is extremely thin when compared to other areas within the state and nation. The overburden is composed of widely varying materials. Modern soils are at the surface, underlain by glacial till and thick loess deposits, underlain by interbedded strata of gray shale, limestone, sandstone, and clay, underlain by black slaty shale, and finally underlain by the Herrin No. 6 coal.

D.8.2 Underground Coal Mining. Coal was reported to have been mined by early immigrants for home use as early as 1823. The Herrin No. 6 Coal has been commercially mined by underground methods within the study area since the 1860's (Brink and others, 1881). There were over 57 known mines within the study area. The last local mine was closed in 1954 after it opened in 1904. The coal was mined by room and pillar methods of extraction. As the name implies, a pillar of coal was left to provide support to the roof and the overburden above the mine. Actual dimensions of the room and pillars were irregular and unsystematic, particularly in the older mines. Patterns of coal extraction in the newer mines were more apt to be more uniform with government regulation and inspection. It was reported that the good roof conditions allowed the operators to extract roughly between 50 and 55 percent of the coal present in the seam. Each mine had different physical conditions and mining methods which permitted either a greater or lesser percentage of coal to be extracted. The Illinois State Geological Survey attempted to document and map the outer boundaries of these mined-out areas. However, the total extent of the undermining may not reflect reality due to lost, misplaced, or nonexistent records. The Illinois State Geological Survey produced a print map entitled, Mined-Out Coal Area 27, in January 1969.

D.8.3 Mine Surface Subsidence. Mine surface subsidence is the downward movement of the ground surface as a result from a collapse of a roof of a mine. Widespread depressions in the land surfaces along with cracks in the earth and settling or heaving of surface features. The surface subsidence is rarely uniform with old room and pillar mined-out areas and is not easily predicted. This surface subsidence can and often does not occur until many years or decades after the mine was abandoned. Deterioration of the mine roof, crushing of the coal pillars, and clay underlying the coal squeezing out from beneath the coal pillar can eventually fail to provide necessary support of the overburden loads. There have been several areas in the vicinity of Belleville and Collinsville that experienced old mine surface subsidence. Techniques have been developed to lessened or eliminated surface subsidence by backfilling stabilizing materials like grouts into the old mined-out areas. Construction of concrete piers or columns in the mined-out areas either by working inside the mine or remotely by drilling boreholes where the support is needed have also been successful.

D.9 GEOTECHNICAL CHARACTERIZATION OF PROJECT AREAS

D.9.1 Old Cahokia Creek. Old Cahokia Creek action area is located in the floodplain area is located along the base of the bluff and in the tributary streams in the northern portion of the study area. The Cahokia Creek Diversion Canal diverts the flows from the uplands to the Mississippi River. The area is now protected from Mississippi River backwater flooding and Cahokia Creek flash flooding with the northern flank levee which is located immediately upstream. The Old Cahokia Creek is located in an old abandoned Mississippi River channel. Abandoned channel deposits are predominately fine-grained sediments transported into the abandoned channel during periods of flooding. These deposits normally accumulate slowly and in thin layers. Soil types vary from silty sand (SM) to silt (ML) mixtures classified under the that are prevalent in the channel neck area to highly plastic fat clays (CH) common in the bendways. The predominate soil type found in the abandoned channel is fat clay (CH). Backswamp deposits are located adjacent to the abandoned channel deposits. Backswamp sediments occur in thin layers deposited by the floodwaters which periodically deposited on the floodplain.

The soil types found in the backswamp deposits vary from silty sand (SM) to fat clay (CH). The predominate soil type found in the backswamp deposits is lean clay (CL). The upland soils are primarily aeolian loess that classify as silt (ML) and silty Clay (CL). No soil borings were obtained in this project area.

D.9.2 Judy's and Burdick Branches. The tributary stream action areas of the Judy's and Burdick Branches are located in the regions with thick Peoria Loess and Roxana Loess which may be observed at the State Route 157 Bridge and in Glen Carbon. The loess deposits are highly susceptible to erosion that create steep incisions and mass failures in the upper and middle channel banks. These failures are the source for much of the sediment flowing into the floodplain. The Glasford Formation underlies the loess deposits that consists of loam, silty loam, and silty clay that were deposited during the glacial Illinoisan Stage. Sand and gravel inclusions are common is this glacial lacustrine formation. The sand and gravel inclusions vary in thickness from a few inches to two feet and are poorly graded reddish yellow sands. The Glasford Formation controls most of the channel bottom and lower channel banks by the high shear strength till deposits that is resistant to scour and erosion. The Judy's and Burdick Branches flow into the relocated Cahokia Canal in the American Bottoms. The two streams flow out of the bluffs and into alluvial fans and backswamp deposits. These depositional strata are shown with soil borings C-177-79, C-178-79, C-180-79, C-181-79, C-182-79, C-183-79, C-184-79, C-185-79, C-186-79, and C-187-79. Abandoned channel deposits are in the southern portion of the project area that are contiguous with McDonough Lake. The Pre-development Cahokia Creek once flowed in the old Mississippi River meander scars filled with the abandoned channel deposits. These are evident with soil borings C-173-79, C-174-79, C-175-79, and C-181-79. Some of the fat clay (CH) deposits have liquid limits with water contents as high as 105 percent.

D.9.3 McDonough Lake. McDonough Lake, potential action area< is located in two main floodplain deposits, abandoned channel deposits and backswamp deposits in the northwestern portion of the studied project area. Alluvial fan deposits are located along the base of the bluff. The Pre-development Cahokia Creek once flowed in the old Mississippi River meander scars filled with the abandoned channel deposits. The abandoned channel deposits located within the studied project area are characterized with soil borings C-164-79, C-143-79, and C-141-79. The backswamp deposits are shown with soil borings C-140-79 and C-147-79.

D.9.4 Elm Slough. The Elm Slough action area is located entirely in the American Bottoms. Long Lake drains into Elm Slough which then drains into Horseshoe Lake. Elm Slough is located in the old Mississippi River meander scars filled with abandoned channel deposits. Abandoned channel deposits are predominately fine-grained sediments transported into the abandoned channel during periods of flooding. These deposits normally accumulate slowly and in thin layers. Soil types vary from silty sand (SM) to silt (ML) mixtures classified under the that are prevalent in the channel neck area to highly plastic fat clays (CH) common in the bendways. The abandoned channel deposits in the Elm Slough project area are shown in soil borings: C-162U-79, C-164-79, C-216-79, C-150-79, C-172-79, and C-171-79. The abandoned channel deposits in Long Lake are shown in soil borings: C-196U-79, C-197U-79, and C-198U-79.

D.9.5 Brushy Lake. Brushy lake action area is located in the American Bottoms and tributary streams that are located within the watershed of the Schoolhouse Branch and its tributaries. The tributary stream action areas of the Schoolhouse Branch and its tributaries are located in the regions with thick Peoria Loess and Roxana Loess. The loess deposits are highly susceptible to erosion that create steep incisions and mass failures in the upper and middle channel banks. These failures are the source for much of the sediment flowing into the floodplain. The Glasford Formation underlies the loess deposits that consists of loam, silty loam, and silty clay that were deposited during the glacial Illinoisan Stage. Sand and gravel inclusions are common is this glacial lacustrine formation. The sand and gravel inclusions vary in thickness from a few inches to two feet and are poorly graded reddish yellow sands. The Glasford Formation controls most of the channel bottom and lower channel banks by the high shear strength till deposits that is resistant to scour and erosion. The Schoolhouse Branch flow into the relocated Cahokia Canal in the American Bottoms. The stream flows out of the bluff and into alluvial fans and backswamp deposits which are shown with soil borings: C-133U-79, C-134-79, and C-135-79. Abandoned channel deposits are in the southern portion of the project area that are contiguous with McDonough Lake. The Pre-development Cahokia Creek once flowed in the old Mississippi River meander scars filled with the abandoned channel deposits. These are evident with soil borings C-130U-79, C-127U-79, C-125-79, C-124-79, C-122-79, C-121-79, C-120-79, C-118-79, C-117-79, C-136U-79, C-137U-79, C-130-79, C-114-79, and C-131-79. C-132-79, and C-115-79. Some of the fat clay (CH) deposits have liquid limits with water contents as high as 120 percent. No soil borings were drilled in the tributary stream action areas.

D.9.6 State Park Place. The geological deposits located at and the vicinity of the State Park Place action area include four major alluvial soil types: abandoned channel, point bar, backswamp, and alluvial fan deposits. Abandoned channel deposits are predominately fine-grained sediments transported into the abandoned channel during periods of flooding. These deposits normally accumulate slowly and in thin layers. Soil types vary from silty sand (SM) to silt (ML) mixtures classified under the that are prevalent in the channel neck area to highly plastic fat clays (CH) common in the bendways. The predominate soil type found in the abandoned channel is fat clay (CH). The abandoned channel deposits are shown with soil borings: C-103-79, C-104-78, C-105-78, C-106U-79, C-107U-79, and C-108-78 which are located along Canteen Creek. Point bar sediments extend as deep as the bottom of the old channel. There are two main soil types within the point bar sand and silt in the elongated bar deposits or ridges deposited during rising river stages. Silty clay and fat clay were deposited in the depressions or swales during receding flood stages. Soil types found in point bar deposits vary from silty sand (SM) to fat clay (CH). The predominate soil type in the ridge areas is silty sand (SM). In the swale areas silty clay (CL) and fat clay (CH) are predominate soil types. The point bar deposits are located along Black Lane between Canteen Creek and the railroad tracks. The backswamp sediments occur in thin layers deposited by the floodwaters which periodically deposited on the floodplain. The soil types found in the backswamp deposits vary from silty sand (SM) to fat clay (CH). The predominate soil type found in the backswamp deposits is lean clay (CL). The soil borings drilled in the backswamp and alluvial fan deposits which are located along Canteen Creek are designated as: C-109-78, C-110-78, C-111-78, C-112-78, H-123-78, and C-113U-79.

The soil borings that are located between Canteen Creek and Black Lane and are backswamp and alluvial fan deposits are numbered: H-131-78, H-147-78, H-133-78, H-121-78, and H-122-78. It is proposed in this study to divert the tributary stream flows from the Canteen Creek watershed to the Harding Ditch and Spring Lake to significantly reduce out of bank events along the downstream reaches of Canteen Creek.

D.9.7 Dobrey Slough. The Dobrey Slough action area is located north of Granite City. It borders a large area of abandoned channel deposits on the north and a large area of point bar deposits to the south. The soil borings which depict the point bar deposits are designated as C-202-79 and C-203-79. The soil boring that illustrates abandoned channel deposits is C-204-78.

D.9.8 Nameoki Ditch. The subsurface profile of the potential action area called Nameoki Ditch is represented by soil borings: C-212-78, C-213-78, C-214-78, and C-215-78. The study area has point bar deposits and abandoned channel deposits.

D.9.9 Spring Lake and Harding Ditch. The tributary stream action areas of the Little Canteen Creek watershed flow into Harding Ditch. Tributary stream flows from the Canteen Creek watershed are proposed to be diverted to Harding Ditch and then to Spring Lake. These two watersheds are located in the regions with thick Peoria Loess and Roxana Loess. The loess deposits are highly susceptible to erosion that create steep incisions and mass failures in the upper and middle channel banks. These failures are the source for much of the sediment flowing into the floodplain. The Glasford Formation underlies the loess deposits that consists of loam, silty loam, and silty clay that were deposited during the glacial Illinoisan Stage. Sand and gravel inclusions are common is this glacial lacustrine formation. The sand and gravel inclusions vary in thickness from a few inches to two feet and are poorly graded reddish yellow sands. The Glasford Formation controls most of the channel bottom and lower channel banks by the high shear strength till deposits that is resistant to scour and erosion. No borings were drilled in either upland watershed areas. The canalized Harding Ditch is located in the American Bottoms and currently intercepts the flows at the base of the buff from the Little Canteen Creek just north of Caseyville. The portions of Harding Ditch that are located between the bluff and the western corporate boundary of Caseyville is located in alluvial fans and backswamp deposits. The soil borings H-120U-79 and H-137-78. Abandoned channel deposits are in the majority of the project area that are contiguous with State Park Place to the north and St. Clair Farms on the south. The old Mississippi River meander scars filled with the abandoned channel deposits. These are evident with soil borings H-142-78, H-142-79, H-144-78, H-115-78, H-116U-79, H-117-78, and H-118U-79. Some of the fat clay (CH) deposits have liquid limits with water contents as high as 112 percent. Soil boring H-145-78 is located in point bar deposits.

D.9.10 St. Clair Farms. The St. Clair Farms action area has two prominent alluvial deposit types, abandoned channel deposits and point bar deposits. The abandoned channel deposits are located in the western portion of the St. Clair Farms study area. No soil borings were drilled in the abandoned channel deposits. Point bar deposits are located in the eastern portion of the St. Clair Farms study area and are depicted with soil borings: H-112-78, H-113U-79, and H-114-78.

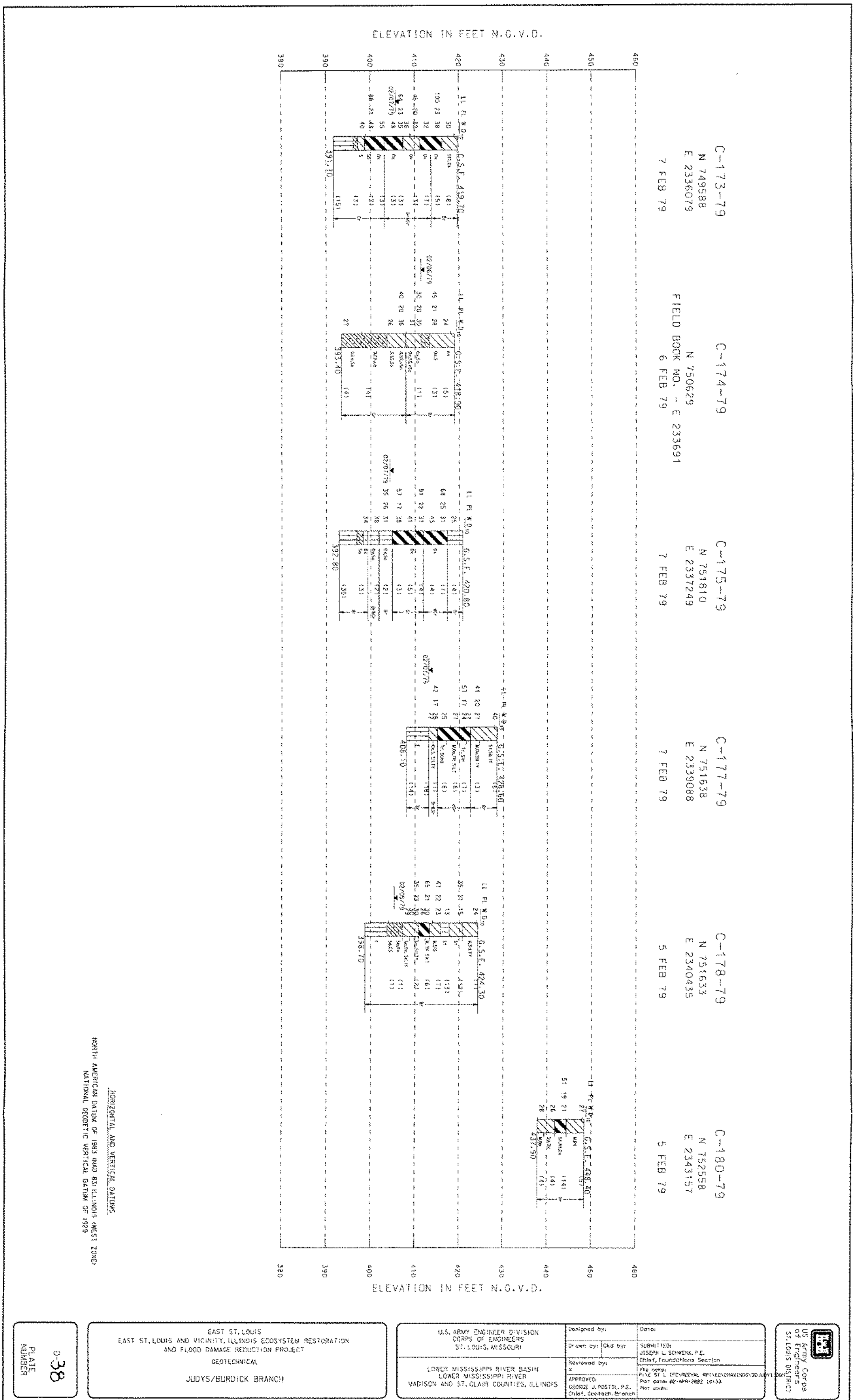
D.9.11 Wedgewood. The Wedgewood action area has floodplain and tributary stream detention components. The soils in the floodplain component have two prominent alluvial deposit types, abandoned channel deposits and point bar deposits. The abandoned channel deposits are located in the eastern portion of the Wedgewood action area. The abandoned channel deposits are depicted with soil borings: H-108U-79, H-109-78, H-110U-79, and H-111U-79 that are located along Harding Ditch and H-124-7 and H-125-78 that are located along the downstream portion of Schoenberger Creek. Point bar deposits are located in the western portion of the of the floodplain component of the Wedgewood action area. No soil borings were drilled in point bar deposits. Schoenberger Creek carries the flows out of the tributary streams across the American Bottoms through backswamp and alluvial fan deposits. These deposits are shown with soil borings H-124-7 and H-125-78. The tributary stream detention components are in 25 to 40-foot deep loess deposits underlain by thin shale strata and underlain by limestone as shown with soil and rock borings SC-01-78, SC-02U-79, SC-03U-79, and SC-04-78.

D.9.12 Canal No. 1. Canal No. 1 is a potential action area since it is located along the base of the bluff between Schoenberger Creek on the north and Prairie Du Pont Creek on the south. Canal No. 1 was originally constructed in the early 1900's to capture the tributary stream flows to control drainage and flooding in the American Bottoms. The alignment of Canal No. 1 was along an old Mississippi River meander scar filled with abandoned channel deposits. The abandoned channel deposits are depicted by soil borings: C-13-78, C-14-78, C-15U-78, C-16-78, C-18U-79, C-19U-78, C-20-78, C-21U-78, C-22-78, C-23-78, C-24U-78,C-26U-78, C-27-78, C-28-78, and C-29U-78. Backswamp and alluvial fan deposits are located in the vicinity of the Canal No. 1 proposed alignment between St. Clair Avenue (U.S. Highway 50) to the north and State Street to the south. These deposits are depicted by soil borings: C-30U-78, C-31-78, and C-32U-78.

D.9.13 Mullens Slough. Mullens Slough is an action area with both floodplain and tributary stream detention components. The floodplain component is located between the bluffs and Harding Ditch and includes some of the downstream section of Canal No. 1. Mullens Slough is located in an old Mississippi River meander scar filled with abandoned canal deposits. These abandoned canal deposits are illustrated by soil borings: C-01-78, C-02-78, C-03-78, C-04-78, C-05-78, C-06-78, C-07-78, C-08-78, C-09-78, C-10-78, C-11-78, and C-12-78. No soil borings were obtained for the tributary stream detention components.

D.9.14 Indian Lake and Landsdown Ditch. Indian Lake and Landsdown Ditch action area is located north of Fairmont City and has only a floodplain component. Indian Lake and Landsdown Ditch action area is located in an old Mississippi River meander scar filled with abandoned canal deposits. These abandoned canal deposits are illustrated by soil borings: C-100-79, C-101-79, and C-102-78.

D.9.15 Upper Cahokia Canal. Upper Cahokia Canal potential floodplain action area is located in the upper reaches of the manmade Cahokia Canal. The area is located in the backswamp and alluvial fan deposits. These deposits are depicted by soil borings: C-188-79, C-189-79, C-190-79, C-191-79, C-192-79,C-193-79, C-194-79, and C-195-79.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7 FEB 79
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N 750629
FIELD BOOK NO. -- E 233691
6 FEB 79
G.S.E. 418.90
393.40
C-175-79
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E 2337249
7 FEB 79
G.S.E. 420.80
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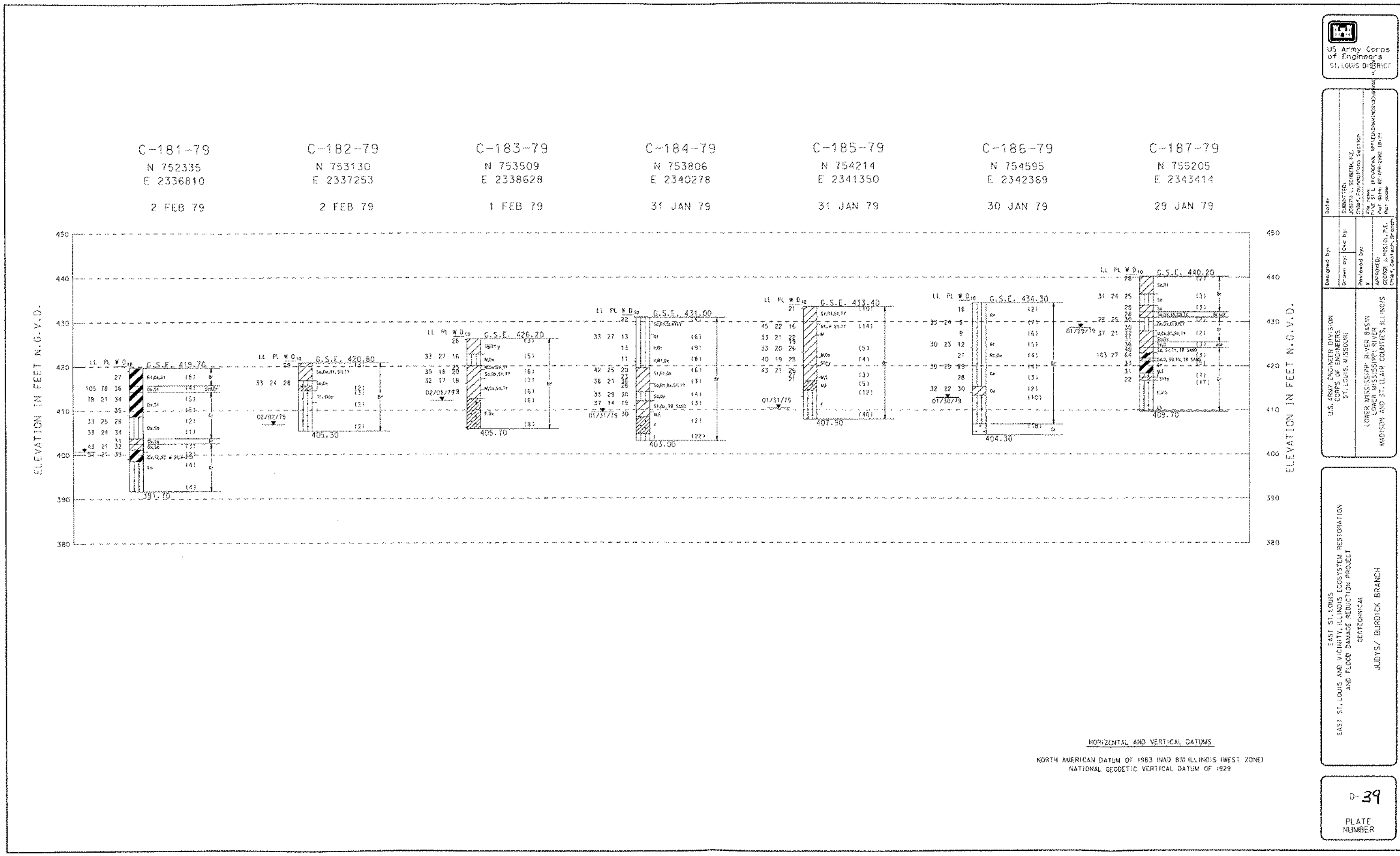
398.70
C-180-79
N 752558
E 2343157
5 FEB 79
G.S.E. 446.40
437.90
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
JUDYS/BURDICK BRANCH
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
SUBMITTED:
JOSEPH L. SCHWENK, P.E.
Chief, Foundations Section
APPROVED:
GEORGE J. POSTOL, P.E.
Chief, Geotech Branch
US Army Corps of Engineers
St. Louis District
PLATE NUMBER
D-38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C-187-79
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E 2343414
29 JAN 79
ELEVATION IN FEET N.G.V.D.
G.S.E. 419.70
G.S.E. 420.80
G.S.E. 426.20
G.S.E. 431.00
G.S.E. 433.40
G.S.E. 434.30
G.S.E. 440.20
391.70
405.30
405.70
403.00
407.90
404.30
409.70
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
US Army Corps of Engineers
ST. LOUIS DISTRICT
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ST. LOUIS, MISSOURI
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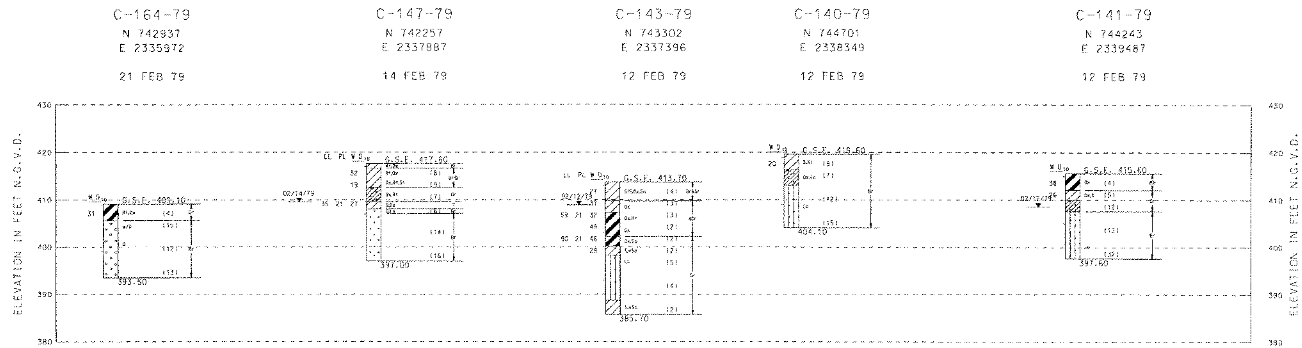
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
JUDYS/ BURDICK BRANCH
D-39
PLATE NUMBER



HORIZONTAL AND VERTICAL DATUMS

NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929

US Army Corps of Engineers
ST. LOUIS DISTRICT

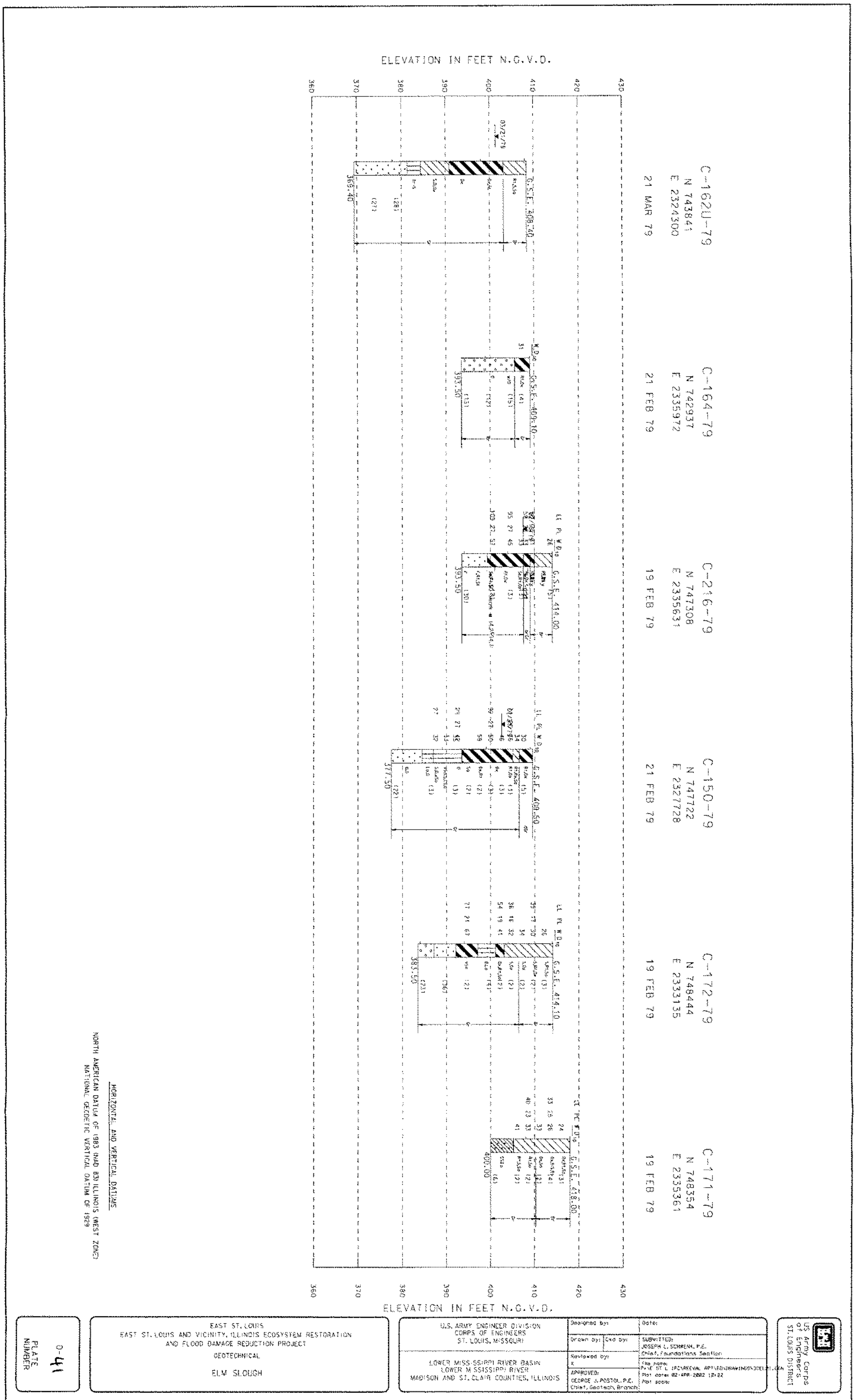
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS

Designed by: | Date:
Drawn by: | Ckd by:
Reviewed by:
APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch
SUBMITTED: JOSEPH L. SCHWENK, P.E. Chief, Foundations Section
Plot date: 02-APR-2002

EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
McDONOUGH LAKE

D-40
PLATE NUMBER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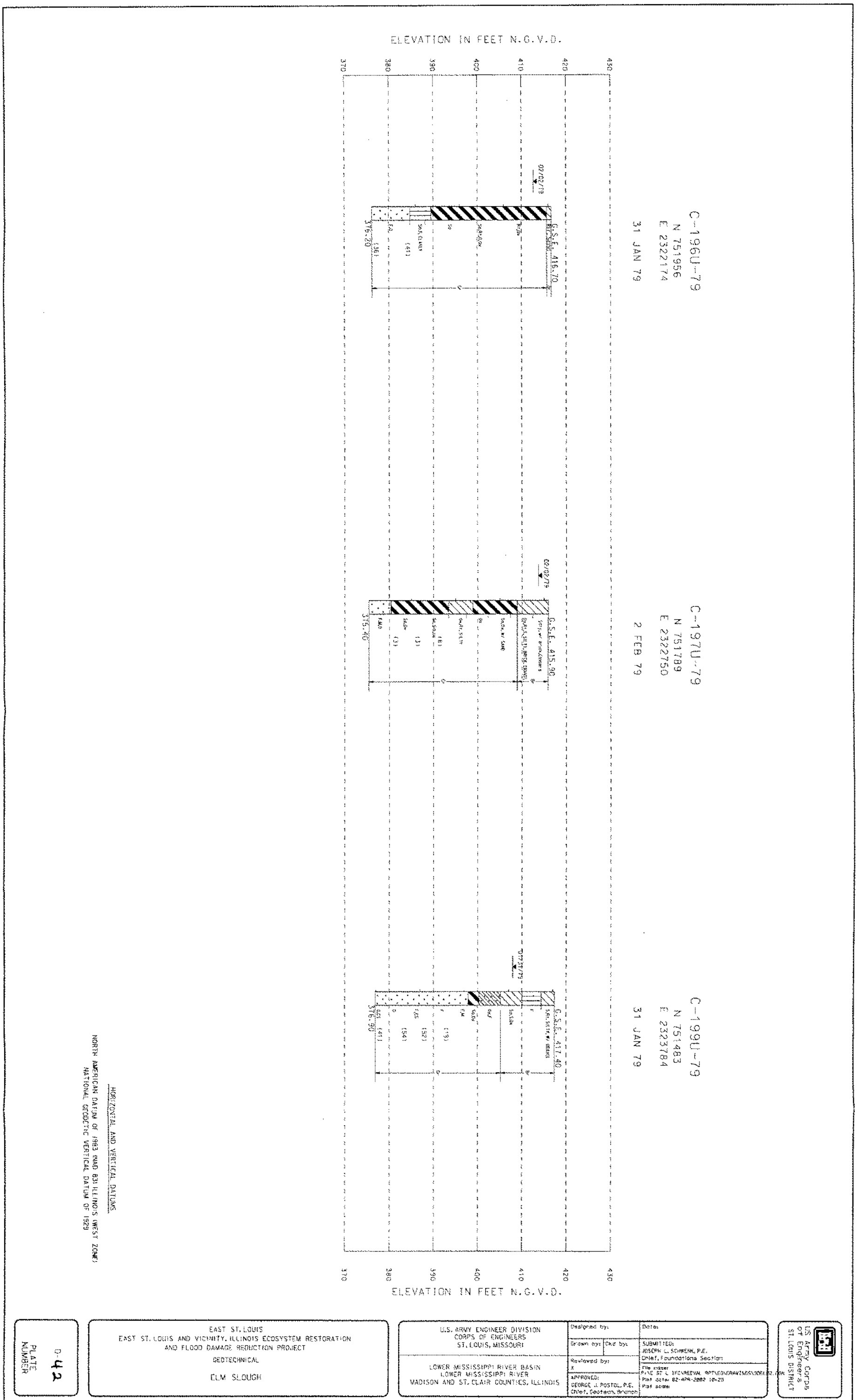
N 743841
E 2324300
21 MAR 79
C-164-79
N 742937
E 2335972
21 FEB 79
C-216-79
N 747308
E 2335631
19 FEB 79
C-150-79
N 747722
E 2327728
21 FEB 79
C-172-79
N 748444
E 2333135
19 FEB 79
C-171-79
N 748354
E 2335361
19 FEB 79
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
PLATE NUMBER
G-41
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
ELM SLOUGH
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
US Army Corps of Engineers
ST. LOUIS DISTRICT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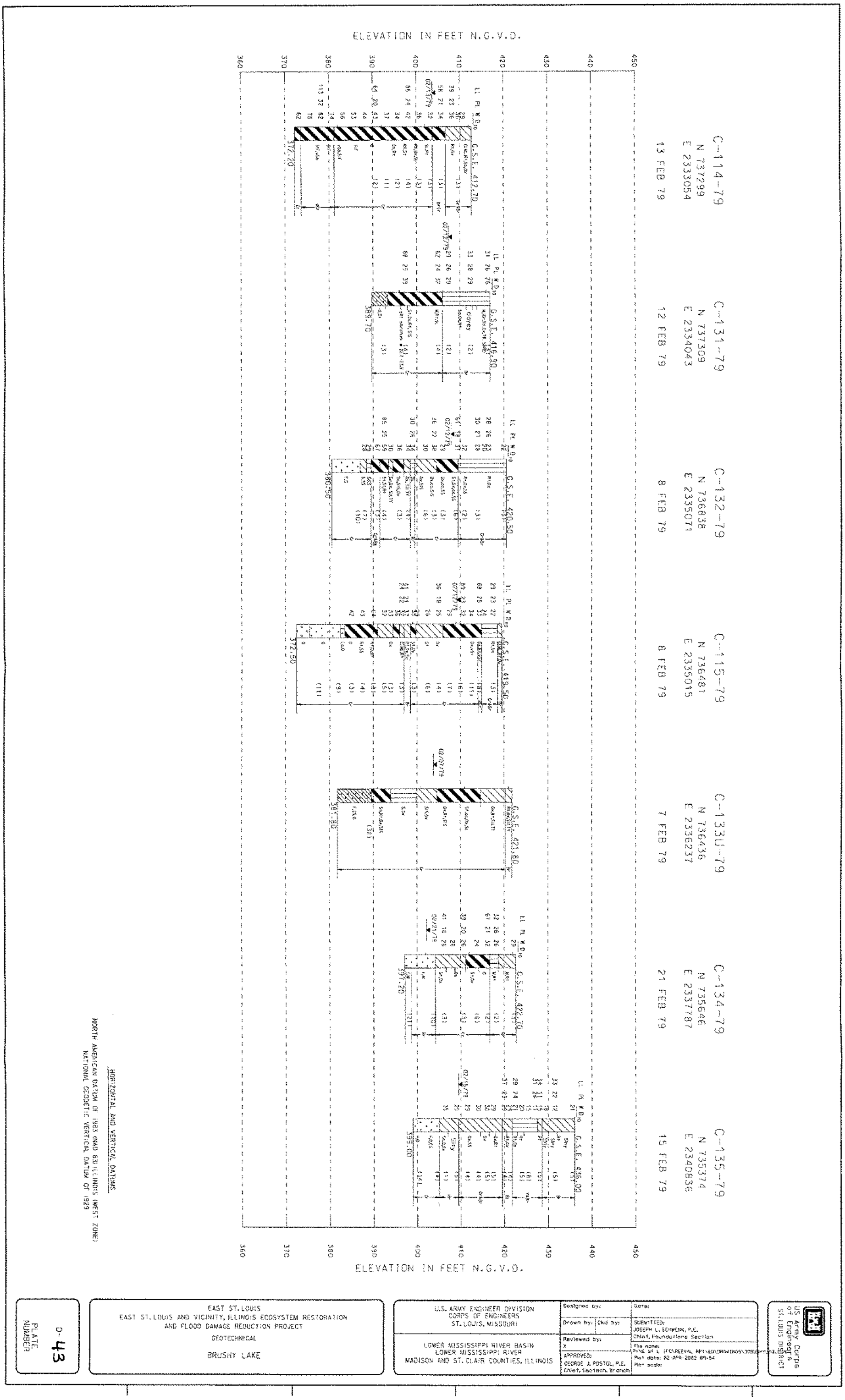
N 751789
E 2322750
2 FEB 79
G.S.E. 415.90
375.40
C-199U-79
N 751483
E 2323784
31 JAN 79
G.S.E. 417.40
376.90
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
ELM SLOUGH
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
Designed by:
Drawn by:
Ckd by:
Reviewed by:
APPROVED:
GEORGE J. POSTOL, P.E.
Chief, Geotech. Branch
Date:
SUBMITTED:
JOSEPH L. SCHRENK, P.E.
Chief, Foundations Section
File name:
Plot date: 02-APR-2002 10:20
Plot scale:
US Army Corps of Engineers ST. LOUIS DISTRICT
D-42
PLATE NUMBER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13 FEB 79
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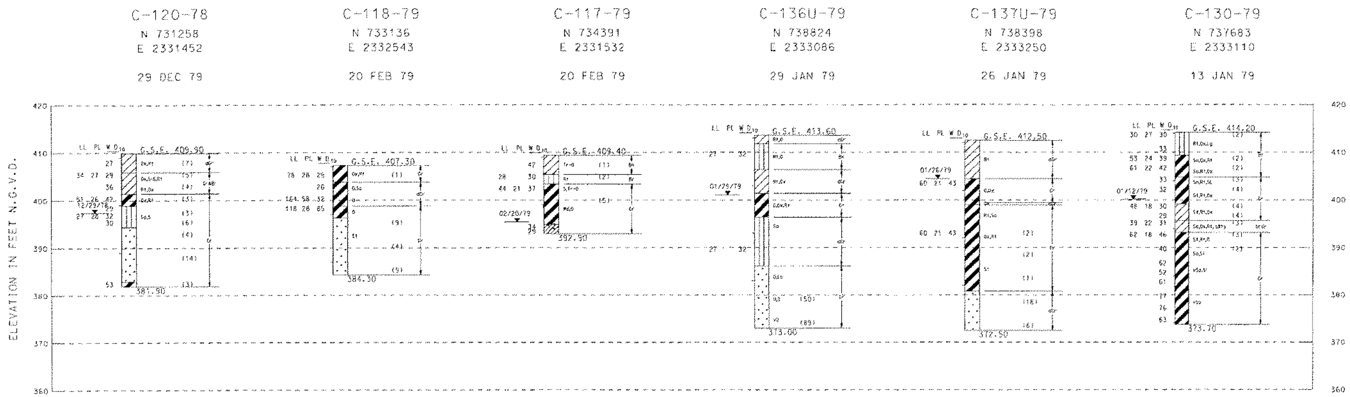
N 737309
E 2334043
12 FEB 79
C-132-79
N 736838
E 2335071
8 FEB 79
C-115-79
N 736481
E 2335015
8 FEB 79
C-133U-79
N 736436
E 2336237
7 FEB 79
C-134-79
N 735646
E 2337787
21 FEB 79
C-135-79
N 735374
E 2340836
15 FEB 79
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ELEVATION IN FEET N.G.V.D.
PLATE NUMBER
D-43
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
BRUSHY LAKE
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
Designed by:
Drawn by:
Ckd by:
Reviewed by:
X
APPROVED:
GEORGE J. POSTOL, P.E.
Chief, Geotech. Branch
Date:
SUBMITTED:
JOSEPH L. SCHWENK, P.E.
Chief, Foundations Section
File name:
Plot date: 02-APR-2002 09:04
Plot scale:
US Army Corps of Engineers
St. Louis District



HORIZONTAL AND VERTICAL DATUMS

NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929

US Army Corps of Engineers
ST. LOUIS DISTRICT

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS

Designed by: | Drawn by: | Ckd by: | Reviewed by: x | APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch

Date: | SUBMITTED: JOSEPH L. SCHEENK, P.E. Chief, Foundations Section | Plot date: 02-APR-2002 09:52 | Plot scale:

EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
BRUSHY LAKE

D-44
PLATE NUMBER

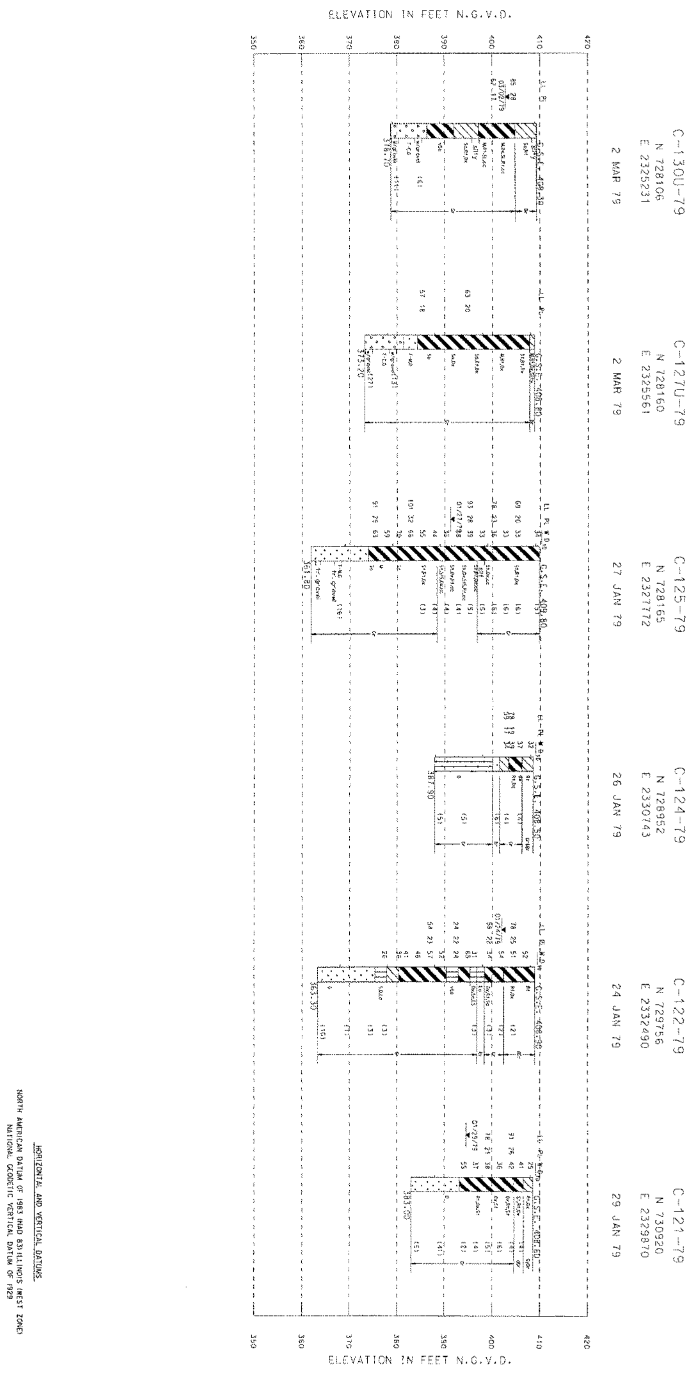


PLATE NUMBER D-45	EAST ST. LOUIS EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT GEOTECHNICAL BRUSHY LAKE	U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI LOWER MISSISSIPPI RIVER BASIN LOWER MISSISSIPPI RIVER MADISON AND ST. CLAIR COUNTIES, ILLINOIS	Designed by: Drawn by: / Ckd by: Reviewed by: X APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch	Date: SUBMITTED: JOSEPH L. SCHWENK, P.E. Chief, Foundations Section File name: Plot date: 02-APR-2004 Plot scale:

US Army Corps of Engineers St. Louis District

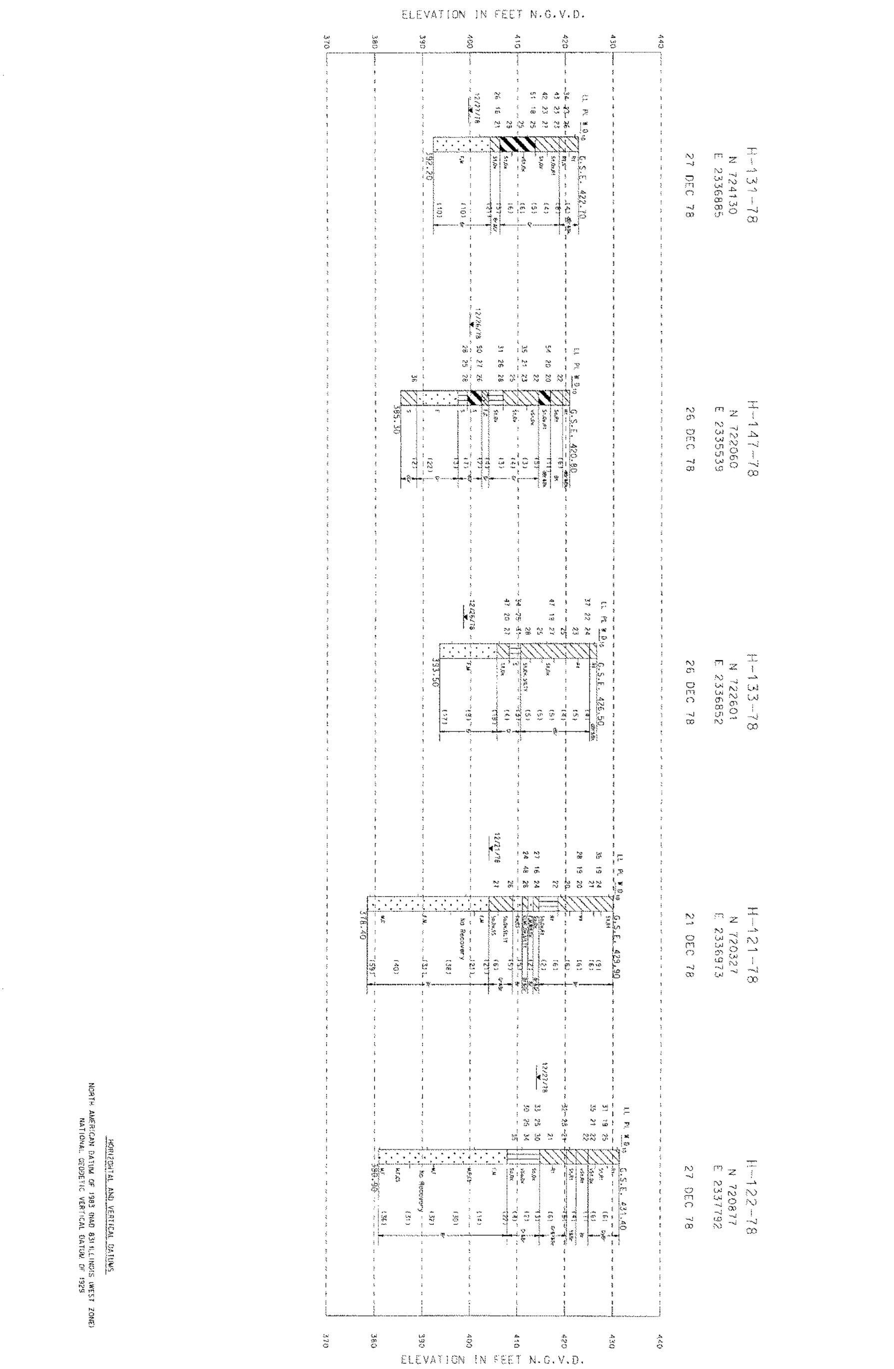


PLATE NUMBER D-46

EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL

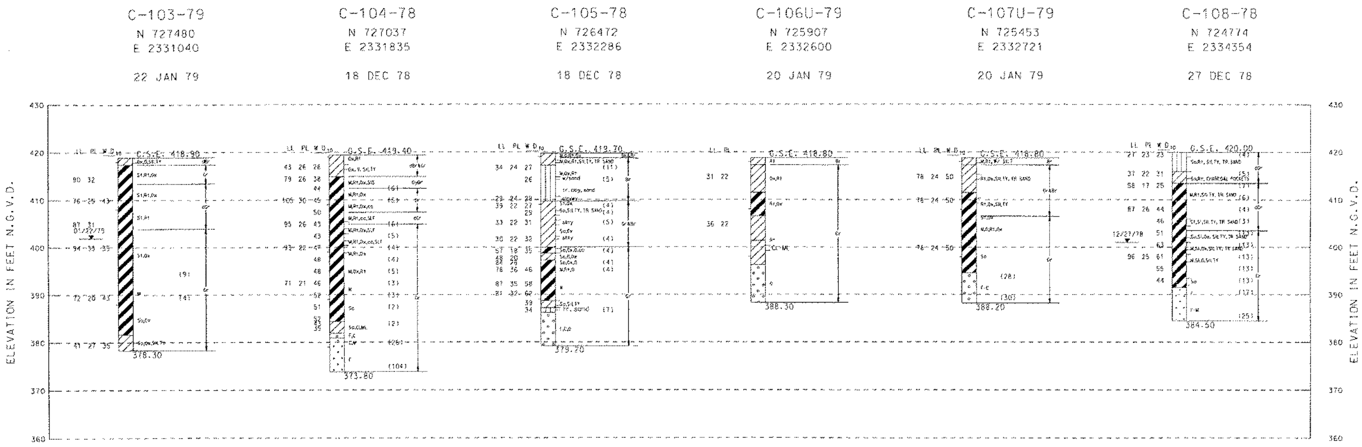
STATE PARK PLACE

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS

Designed by:	Date:
Drawn by: Ckd by:	SUBMITTED: JOSEPH L. SCHWENK, P.E. Chief, Foundations Section
Reviewed by: X	File name: P:\E ST L ECO\REEVAL RPT\EO\DRAWINGS\... Plot date: 02-APR-2002 11:05 Plot scale:
APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch	

US Army Corps of Engineers
St. Louis District



HORIZONTAL AND VERTICAL DATUMS

NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929

US Army Corps of Engineers
ST. LOUIS DISTRICT

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS

Designed by: | Drawn by: | Ckd by: | Reviewed by: X

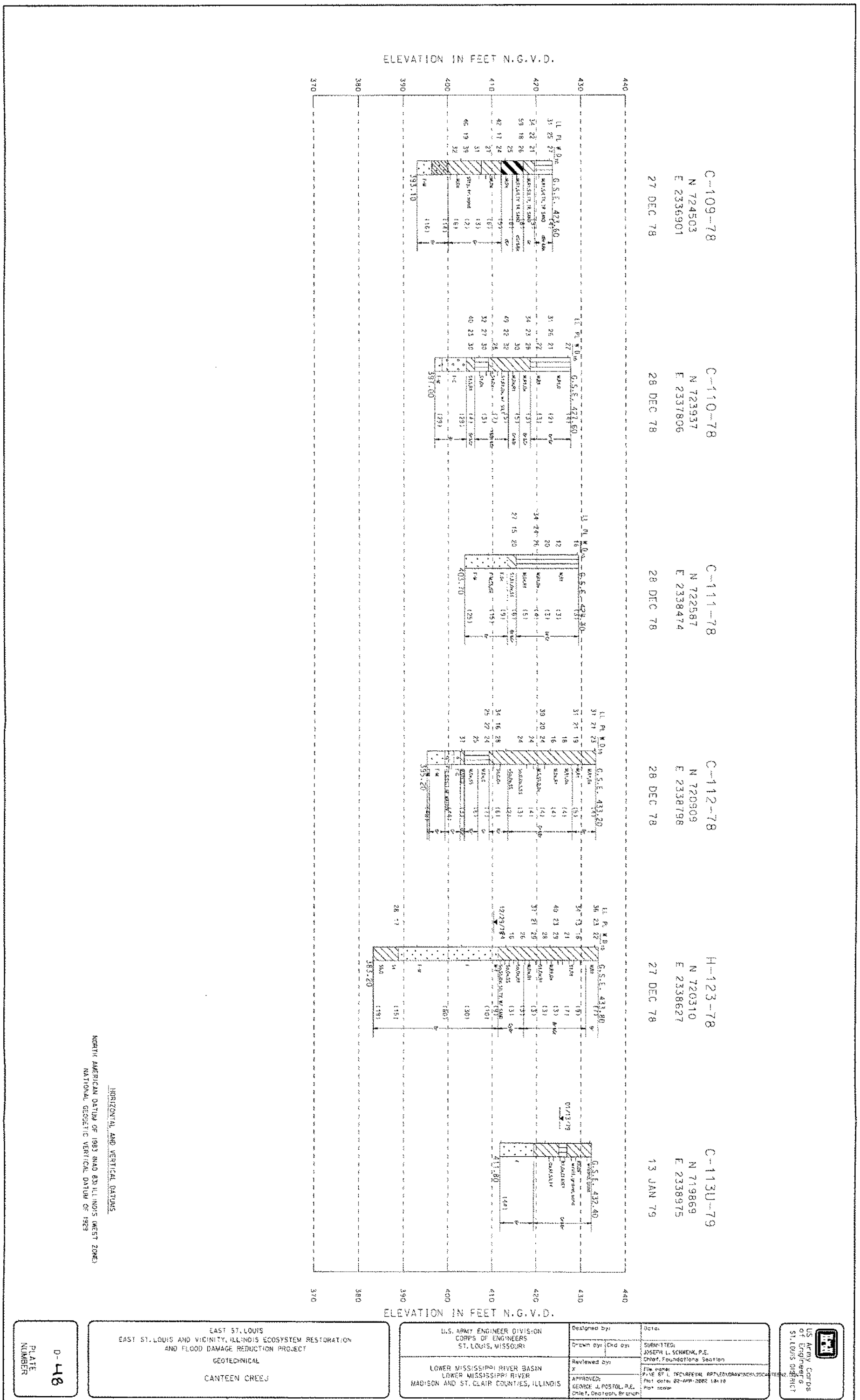
APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch

Date: SUBMITTED: JOSEPH L. SCHWENK, P.E. Chief, Foundations Section

Plot date: 02-APR-2002 10:17

EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
CANTEEN CREEK

D-47
PLATE NUMBER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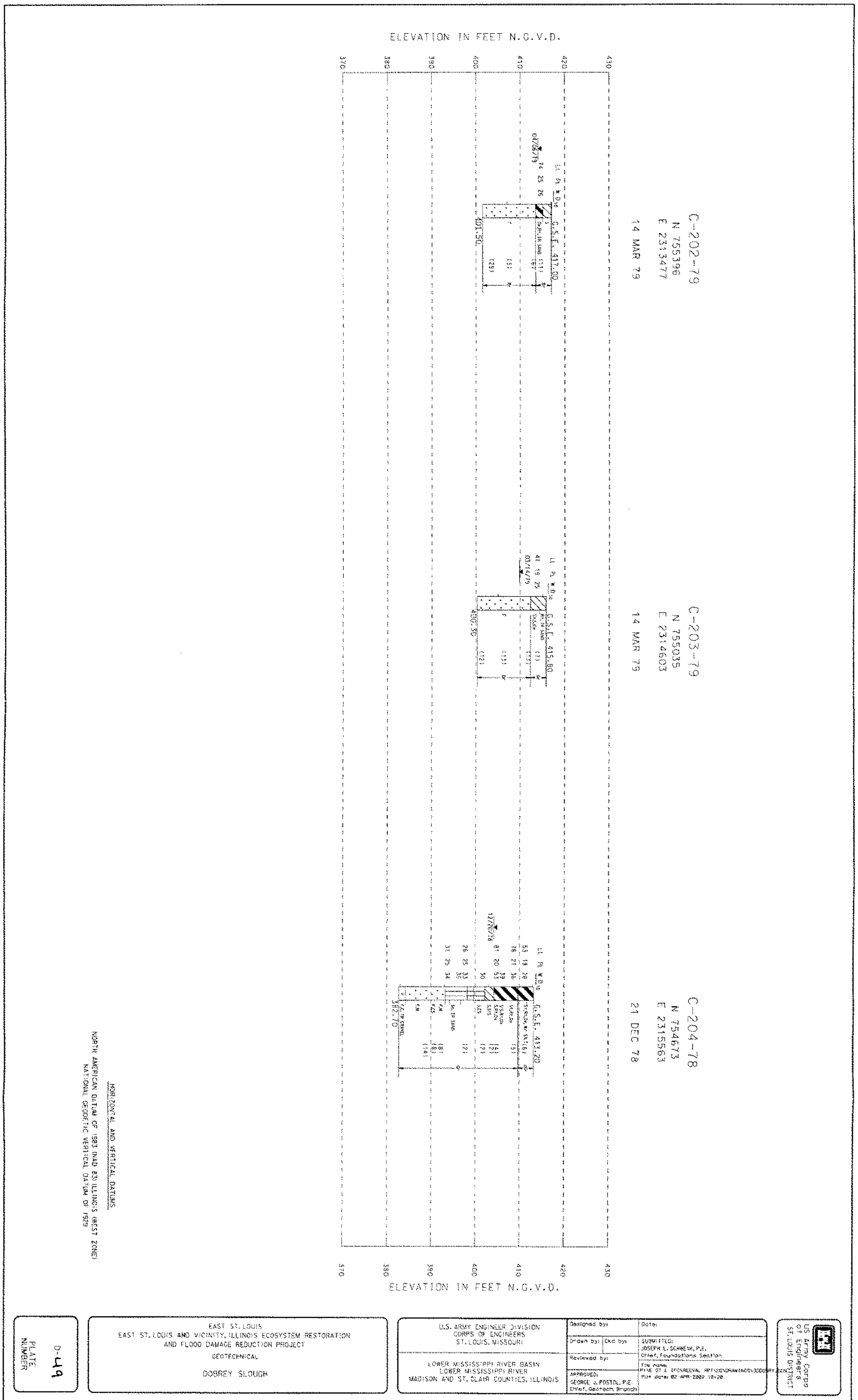
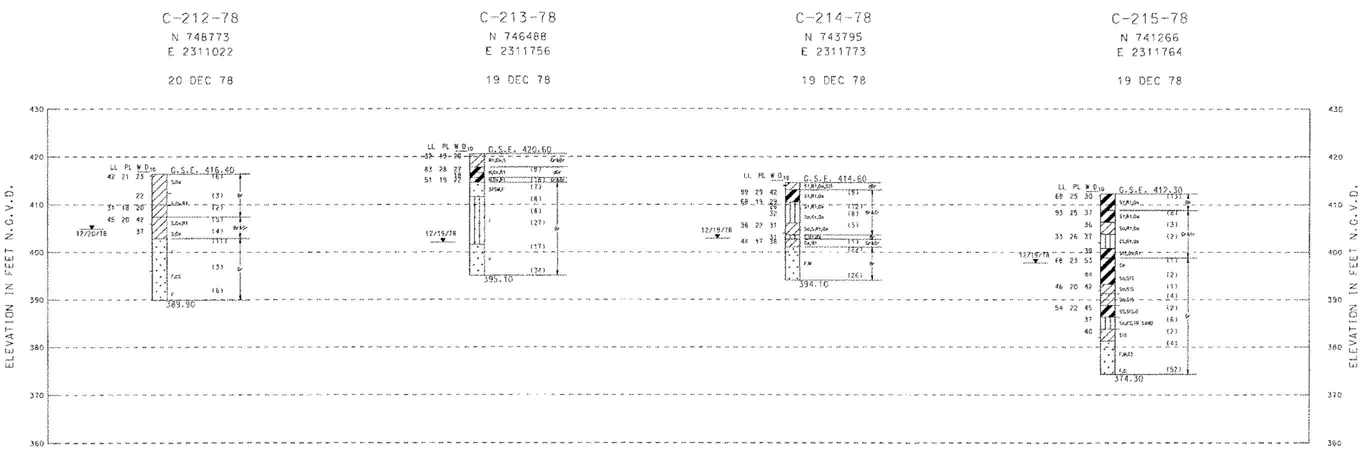
C-109-78
N 724503
E 2336901
27 DEC 78
G.S.E. 423.60
393.10
C-110-78
N 723937
E 2337806
28 DEC 78
G.S.E. 427.60
397.60
C-111-78
N 722587
E 2338474
28 DEC 78
G.S.E. 429.30
403.70
C-112-78
N 720909
E 2338798
28 DEC 78
G.S.E. 433.20
395.20
H-123-78
N 720310
E 2338627
27 DEC 78
G.S.E. 433.80
383.20
C-113U-79
N 719869
E 2338975
13 JAN 79
G.S.E. 432.40
411.80
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
US Army Corps of Engineers
ST. LOUIS DISTRICT
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
SUBMITTED:
JOSEPH L. SCHWENK, P.E.
Chief, Foundations Section
APPROVED:
GEORGE J. POSTOL, P.E.
Chief, Geotech Branch
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
CANTEEN CREEJ
D-48
PLATE NUMBER


ELEVATION IN FEET N.G.V.D.
C-202-79
N 755396
E 2313477
14 MAR 79
G.S.E. 417.00
401.50
C-203-79
N 755035
E 2314603
14 MAR 79
G.S.E. 415.80
400.30
C-204-78
N 754673
E 2315563
21 DEC 78
G.S.E. 413.20
382.70
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
US Army Corps of Engineers
ST. LOUIS DISTRICT
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
DOBREY SLOUGH
SUBMITTED:
JOSEPH L. SCHREIK, P.E.
Chief, Foundations Section
APPROVED:
GEORGE J. POSTOL, P.E.
Chief, Geotech Branch
D-49
PLATE NUMBER



HORIZONTAL AND VERTICAL DATUMS

NORTH AMERICAN DATUM OF 1983 (NAD 83) (ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929

US Army Corps of Engineers
ST. LOUIS DISTRICT

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS

Designed by: | Date:
Drawn by: | Ckd by:
Reviewed by:
APPROVED:
GEORGE J. POSTOL, P.E.
Chief, Geotech. Branch

SUBMITTED:
JOSEPH L. SCHWENK, P.E.
Chief, Foundations Section

EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
NAMEOKI DITCH

0- 50
PLATE
NUMBER

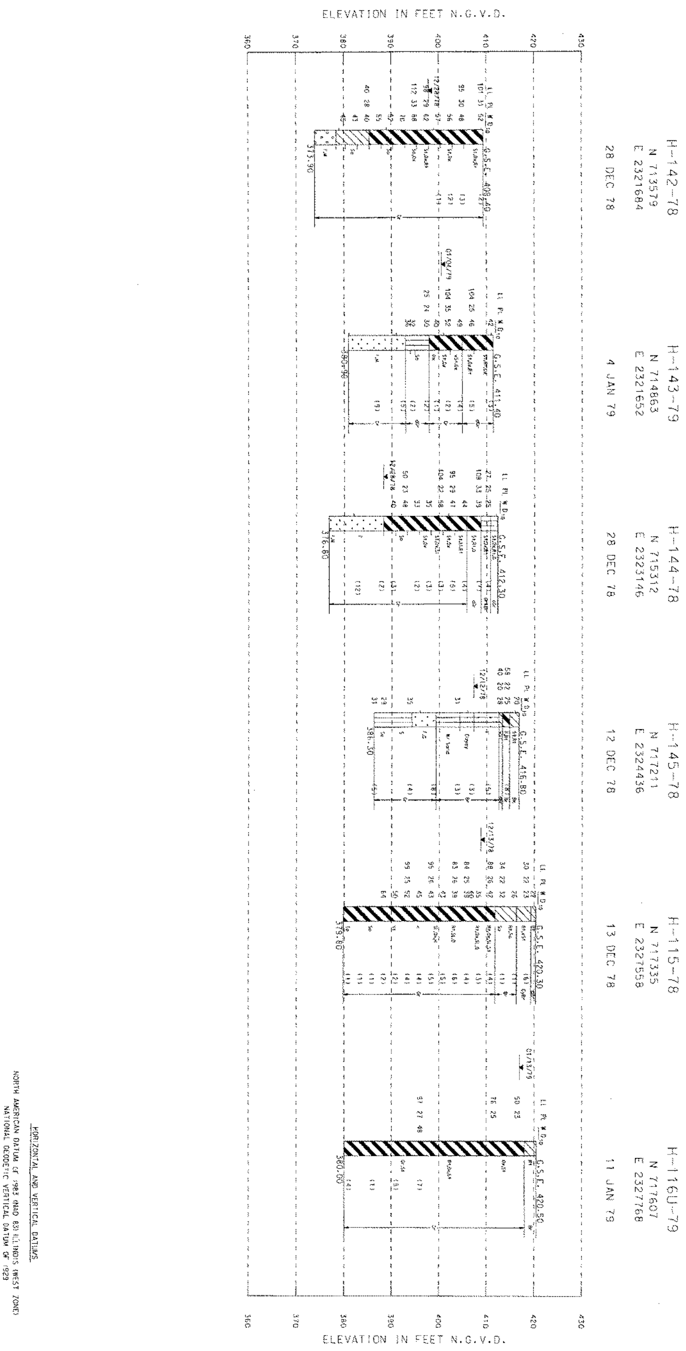


PLATE NUMBER D-51

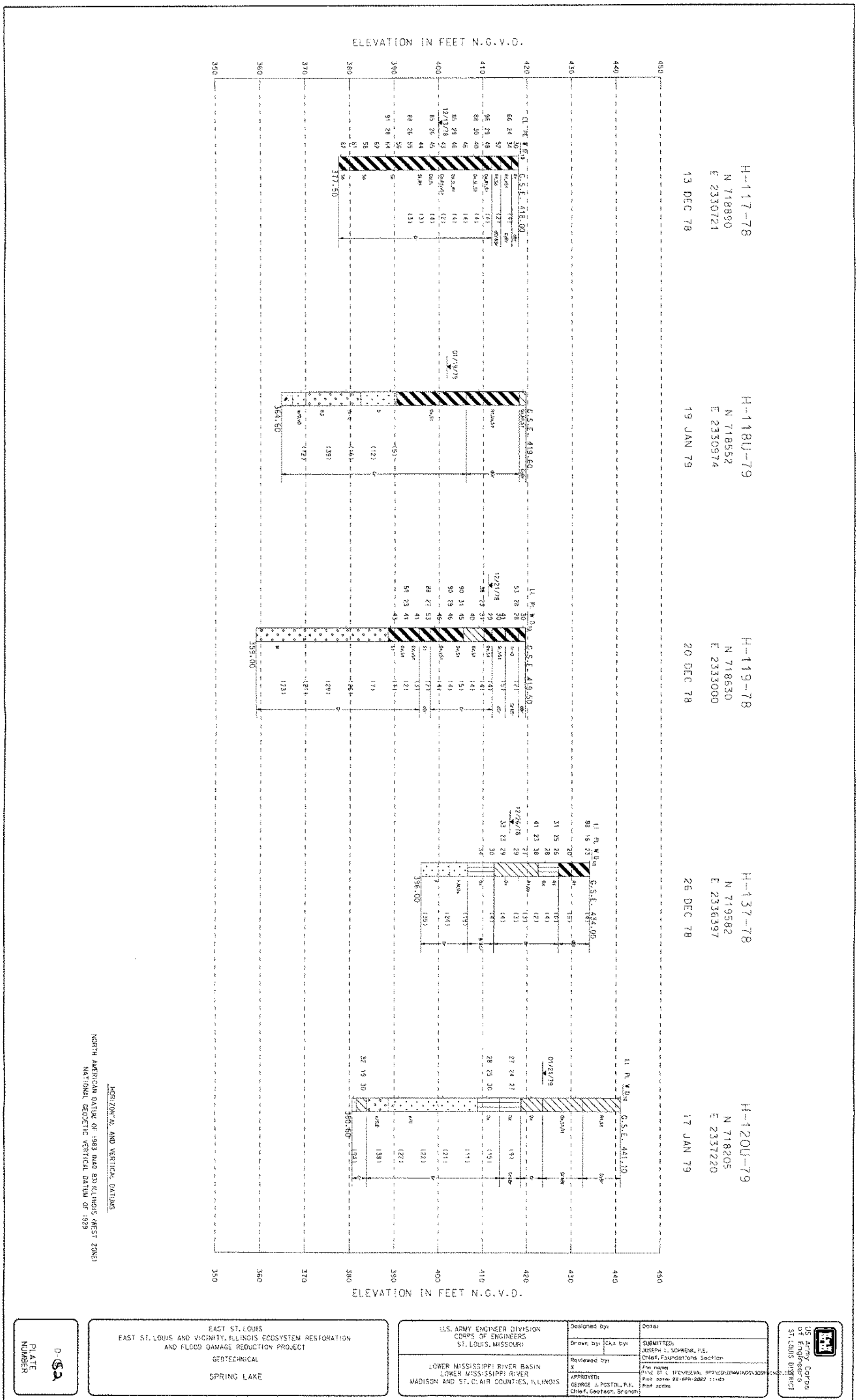
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
SPRING LAKE

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS

Designed by: | Date:
Drawn by: | Ckd by:
Reviewed by: X
SUBMITTED: JOSEPH L. SCHWENK, P.E. Chief, Foundations Section
APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch
Plot date: 02-APR-2002
Plot scale:

US Army Corps of Engineers
ST. LOUIS DISTRICT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H-117-78
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E 2330721
13 DEC 78
H-118U-79
N 718552
E 2330974
19 JAN 79
H-119-78
N 718630
E 2333000
20 DEC 78
H-137-78
N 719562
E 2336397
26 DEC 78
H-120U-79
N 718205
E 2337220
17 JAN 79
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
SPRING LAKE
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
PLATE NUMBER
US Army Corps of Engineers
St. Louis District

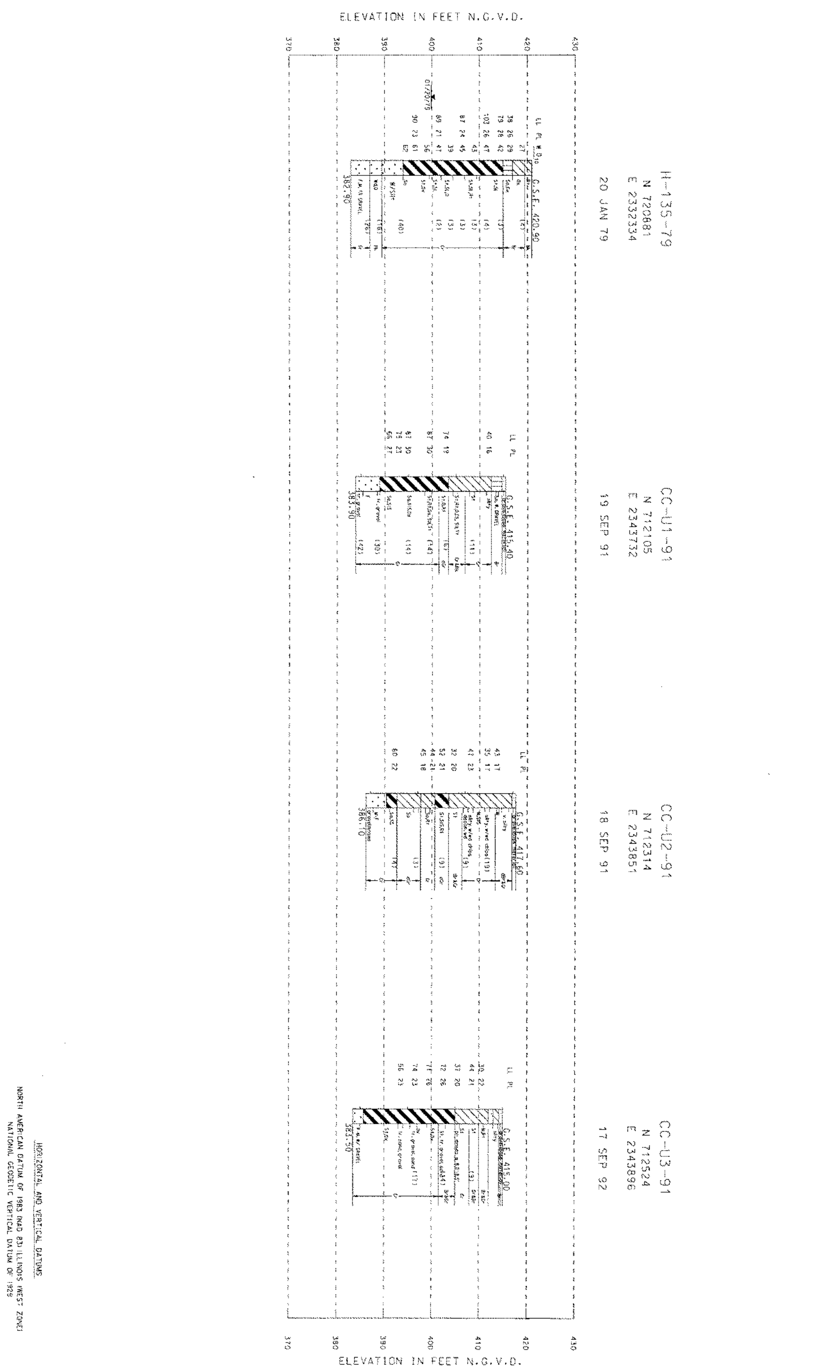
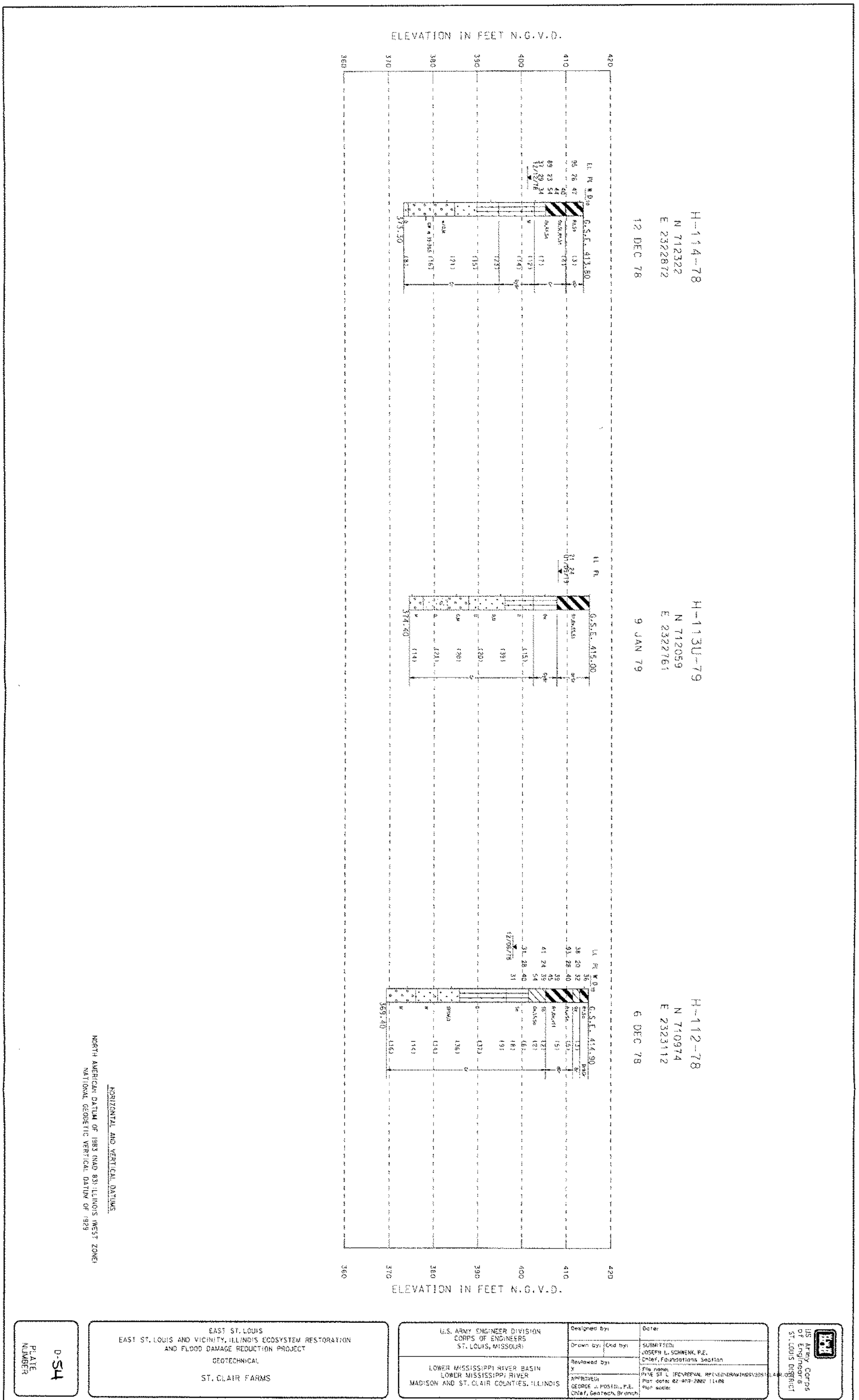


PLATE NUMBER D-53	EAST ST. LOUIS EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT GEOTECHNICAL SPRING LAKE	U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI LOWER MISSISSIPPI RIVER BASIN LOWER MISSISSIPPI RIVER MADISON AND ST. CLAIR COUNTIES, ILLINOIS	US Army Corps of Engineers ST. LOUIS DISTRICT

Designed by:	Date:
Drawn by: / Ckd by:	SUBMITTED: JOSEPH L. SCHWENK, P.E. Chief, Foundations Section
Reviewed by: X	File name:
APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch	Plot date: 02-APR-2002 13:05 Plot scale:


ELEVATION IN FEET N.G.V.D.
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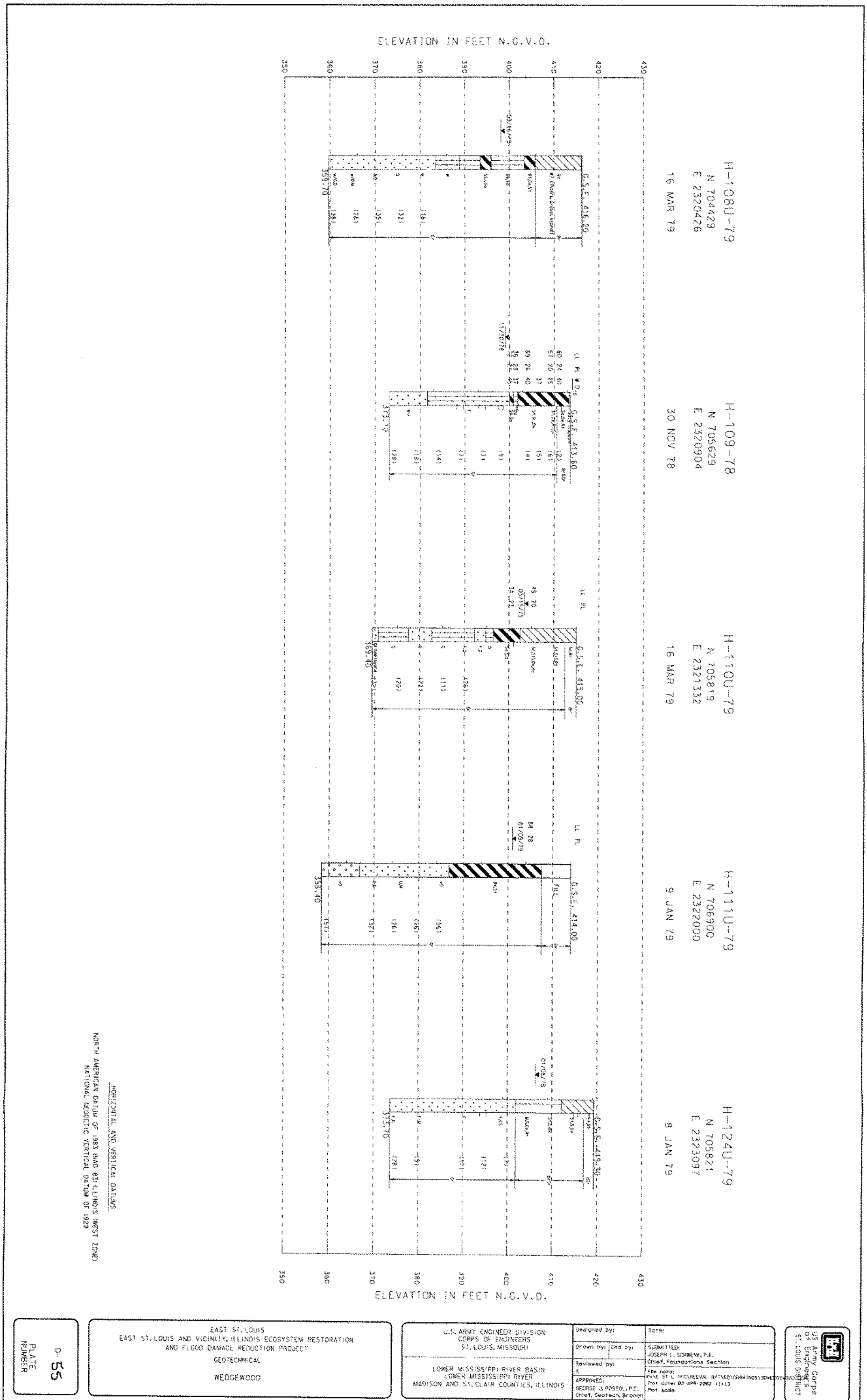
N 712322
E 2322872
12 DEC 78
G.S.E. 413.80
373.30
H-113U-79
N 712059
E 2322761
9 JAN 79
G.S.E. 415.00
374.40
H-112-78
N 710974
E 2323112
6 DEC 78
G.S.E. 414.90
369.40
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
US Army Corps of Engineers
ST. LOUIS DISTRICT
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
SUBMITTED:
JOSEPH L. SCHWENK, P.E.
Chief, Foundations Section
APPROVED:
GEORGE J. POSTOL, P.E.
Chief, Geotech. Branch
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
ST. CLAIR FARMS
D-54
PLATE NUMBER


ELEVATION IN FEET N.G.V.D.
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N 704429
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16 MAR 79
G.S.E. 416.20
359.70
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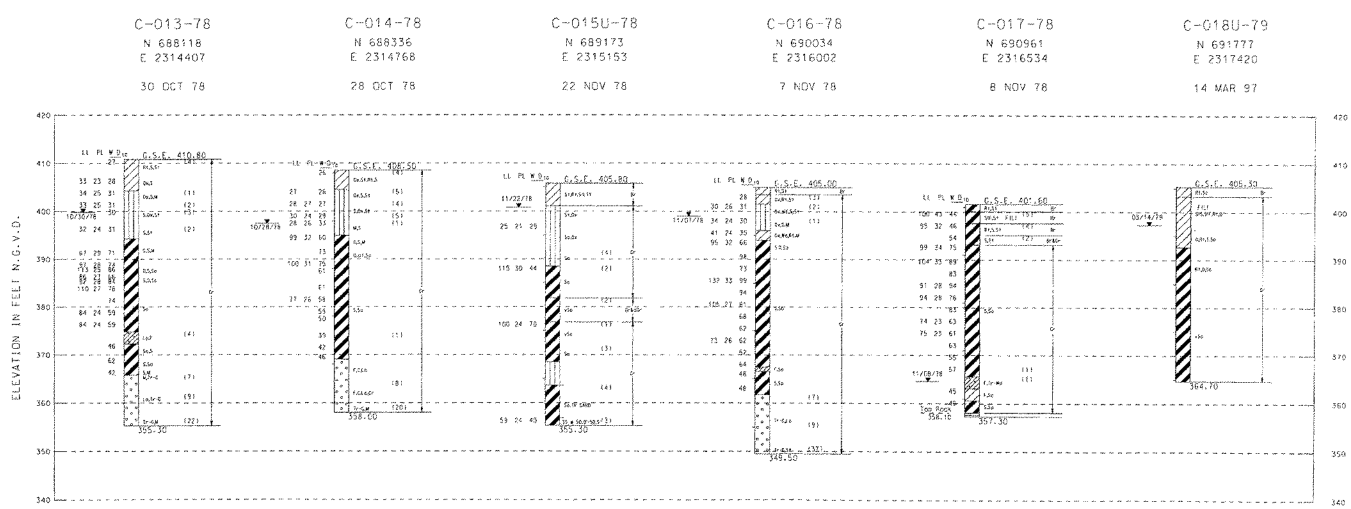
N 705629
E 2320904
30 NOV 78
G.S.E. 413.60
H-110U-79
N 705819
E 2321332
16 MAR 79
G.S.E. 415.00
369.40
H-111U-79
N 706900
E 2322000
9 JAN 79
G.S.E. 414.00
358.40
H-124U-79
N 705821
E 2323097
8 JAN 79
G.S.E. 419.30
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
WEDGEWOOD
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
GEORGE J. POSTOL, P.E.
Chief, Geotech. Branch
JOSEPH L. SCHMENK, P.E.
Chief, Foundations Section
US Army Corps of Engineers
ST. LOUIS DISTRICT
PLATE NUMBER
D-55



HORIZONTAL AND VERTICAL DATUMS

NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1925

US Army Corps of Engineers
ST. LOUIS DISTRICT

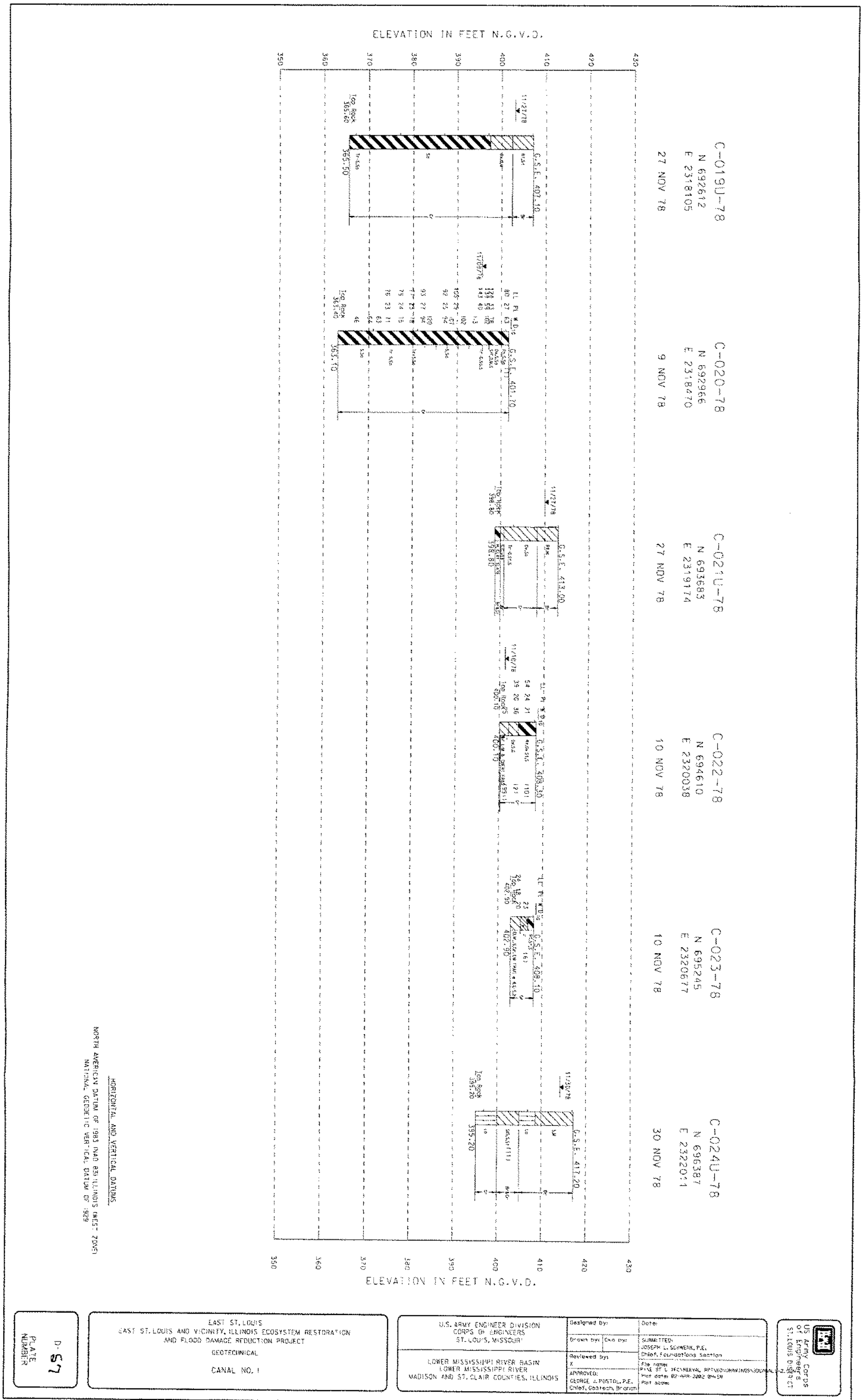
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

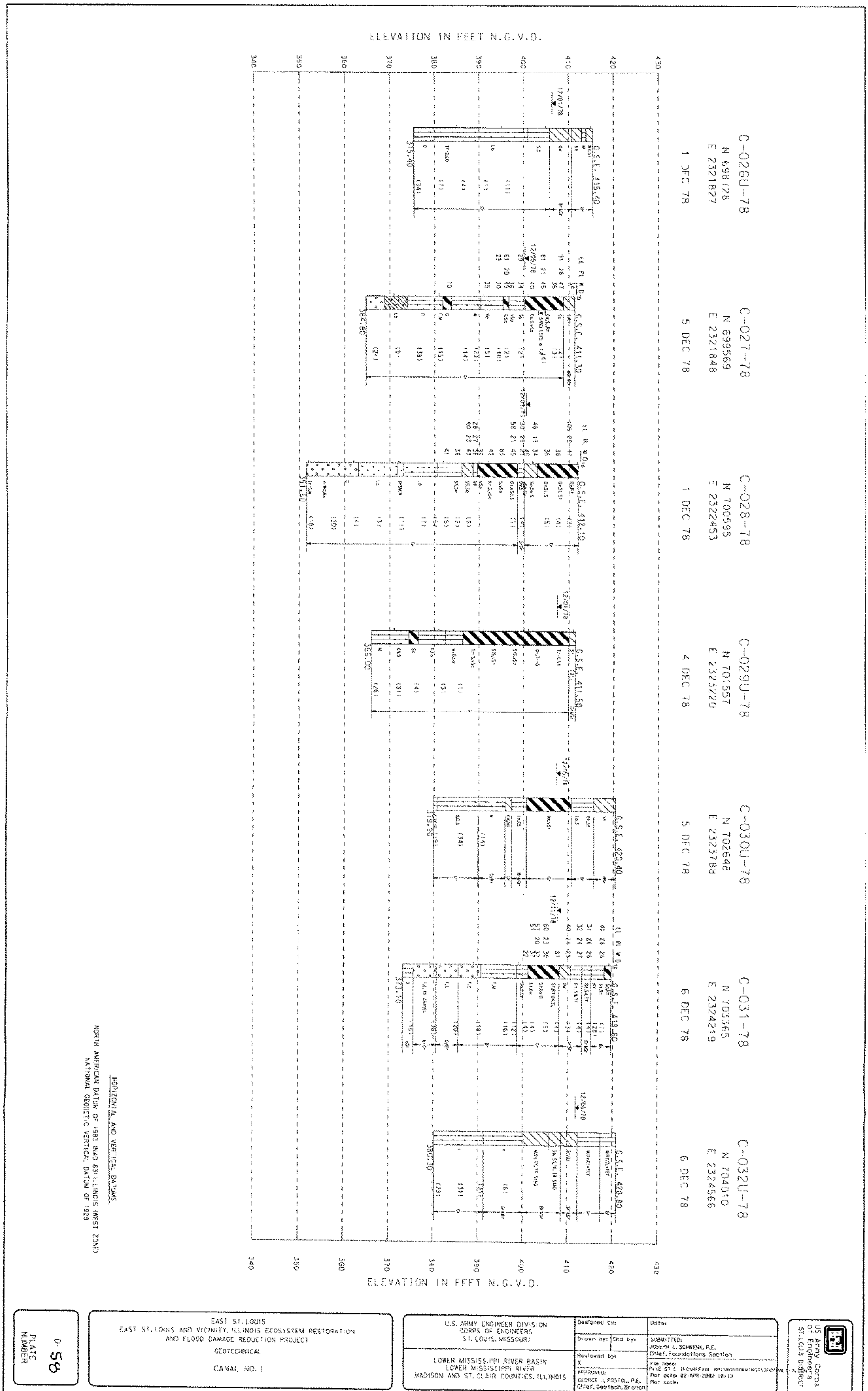
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS

Designed by: | Date:
Drawn by: | Ckd by:
Reviewed by:
SUBMITTED: JOSEPH L. SCHWENK, P.E. Chief, Foundations Section
APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch

EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
CANAL NO. 1

D-56
PLATE NUMBER


ELEVATION IN FEET N.G.V.D.
C-019U-78
N 692612
E 2318105
27 NOV 78
C-020-78
N 692966
E 2318470
9 NOV 78
C-021U-78
N 693683
E 2319174
27 NOV 78
C-022-78
N 694610
E 2320038
10 NOV 78
C-023-78
N 695245
E 2320677
10 NOV 78
C-024U-78
N 696387
E 2322011
30 NOV 78
G.S.E. 407.10
Top Rock 365.60
365.50
G.S.E. 401.10
Top Rock 363.40
363.10
G.S.E. 413.00
Top Rock 398.80
398.80
G.S.E. 408.30
Top Rock 400.10
400.10
G.S.E. 408.10
Top Rock 402.90
402.90
G.S.E. 417.20
Top Rock 395.20
395.20
HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
US Army Corps of Engineers
ST. LOUIS DISTRICT
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
Designed by:
Drawn by:
Chk by:
Reviewed by:
APPROVED:
GEORGE J. POSTOL, P.E.
Chief, Geotech Branch
Date:
SUBMITTED:
JOSEPH L. SCHMENK, P.E.
Chief, Foundations Section
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
CANAL NO. 1
D-57
PLATE NUMBER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375.40
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E 2321848
5 DEC 78
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E 2324219
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NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
PLATE NUMBER
D-58
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
CANAL NO. 1
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
Designed by:
Date:
Drawn by:
Chkd by:
SUBMITTED:
JOSEPH L. SCHWENK, P.E.
Chief, Foundations Section
Reviewed by:
APPROVED:
GEORGE J. POSTOL, P.E.
Chief, Geotech. Branch
US Army Corps of Engineers
St. Louis District

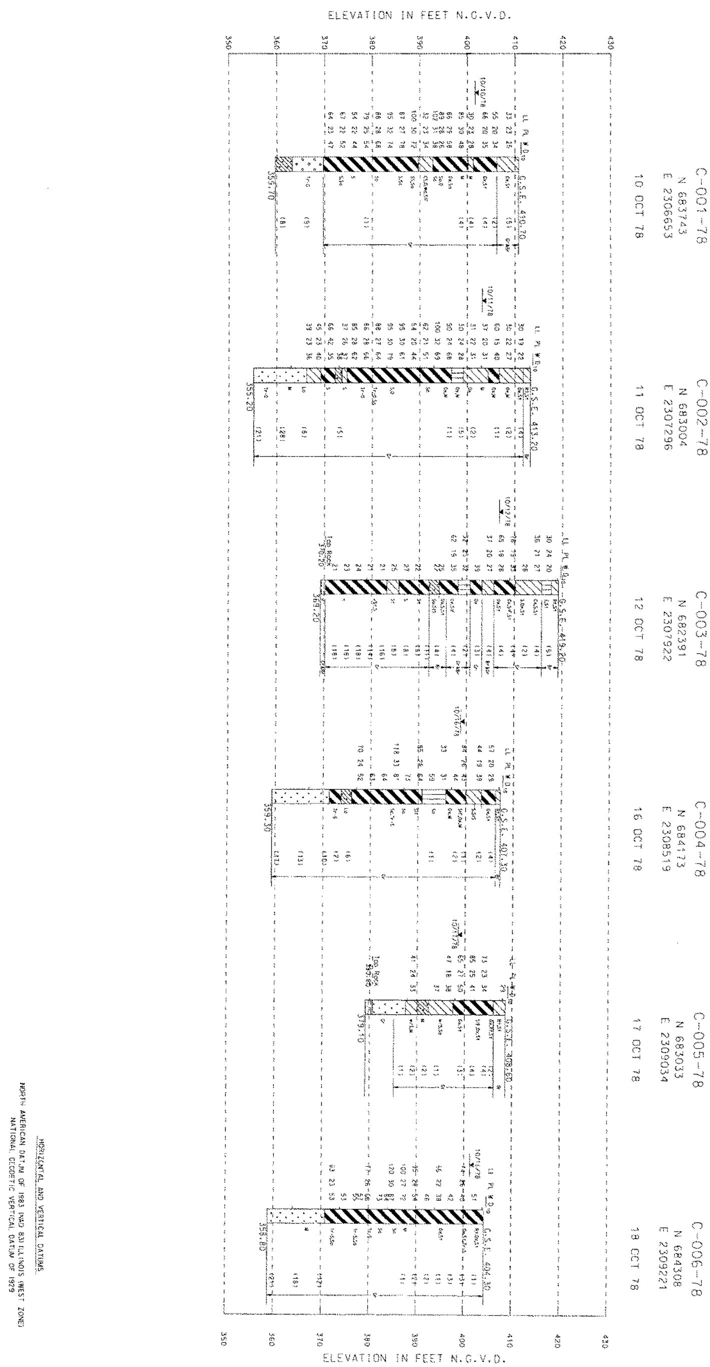


PLATE NUMBER D-54

EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
MULLIN SLOUGH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS

Designed by:
Drawn by: | Ckd by:
Reviewed by: x
APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch
Date:
SUBMITTED: JOSEPH L. SCHWENK, P.E. Chief, Foundations Section
File name:
Plot date: 02-APR-2002
Plot scale:

US Army Corps of Engineers
St. Louis District

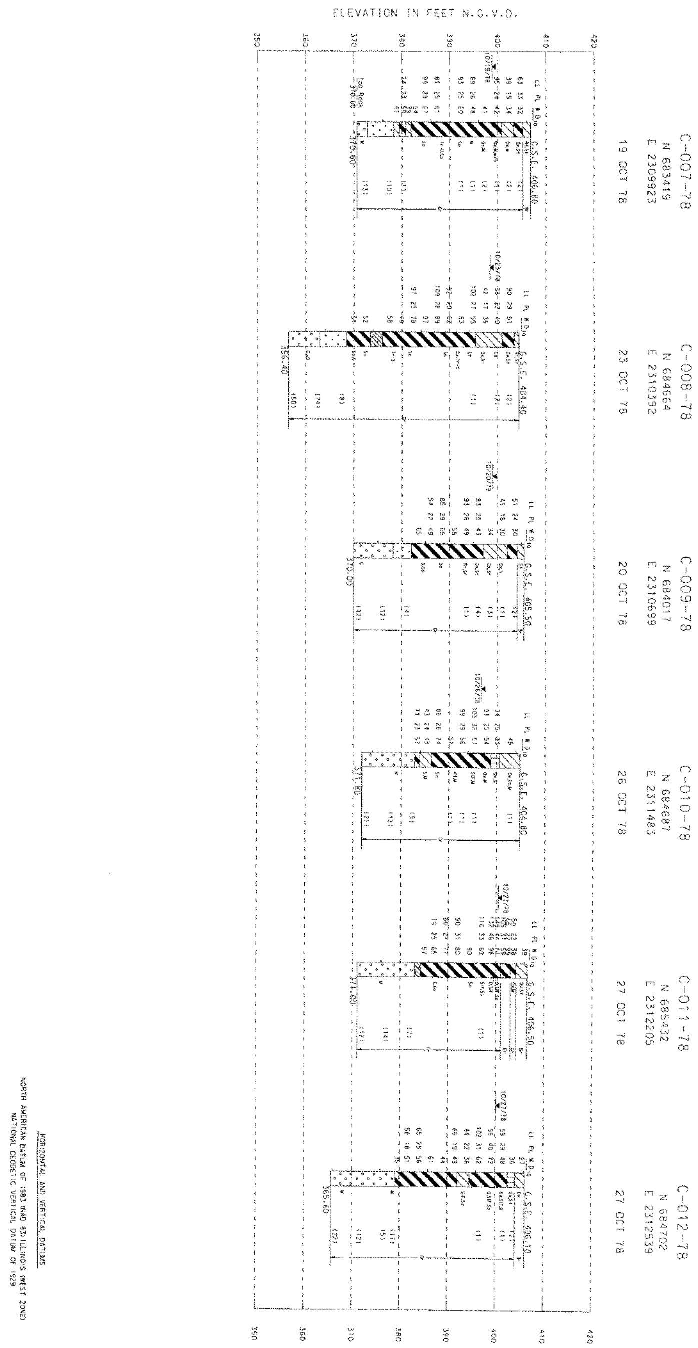
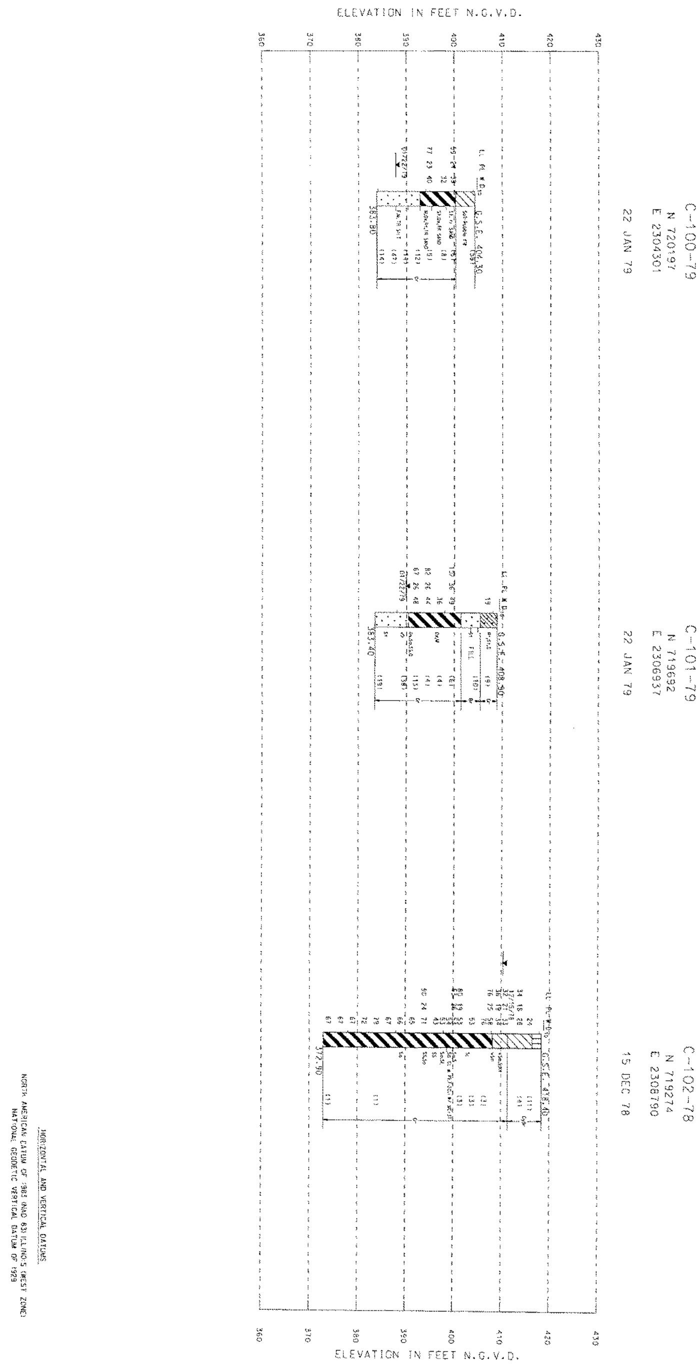


PLATE NUMBER D-60	EAST ST. LOUIS EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT GEOTECHNICAL MULLIN SLOUGH	U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI LOWER MISSISSIPPI RIVER BASIN LOWER MISSISSIPPI RIVER MADISON AND ST. CLAIR COUNTIES, ILLINOIS	Designed by: / Date: Drawn by: / Ckd by: SUBMITTED: JOSEPH L. SCHRENK, P.E. Chief, Foundations Section Reviewed by: APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch Plot date: 02-APR-2002 10:50 Plot scale:
			US Army Corps of Engineers St. Louis District



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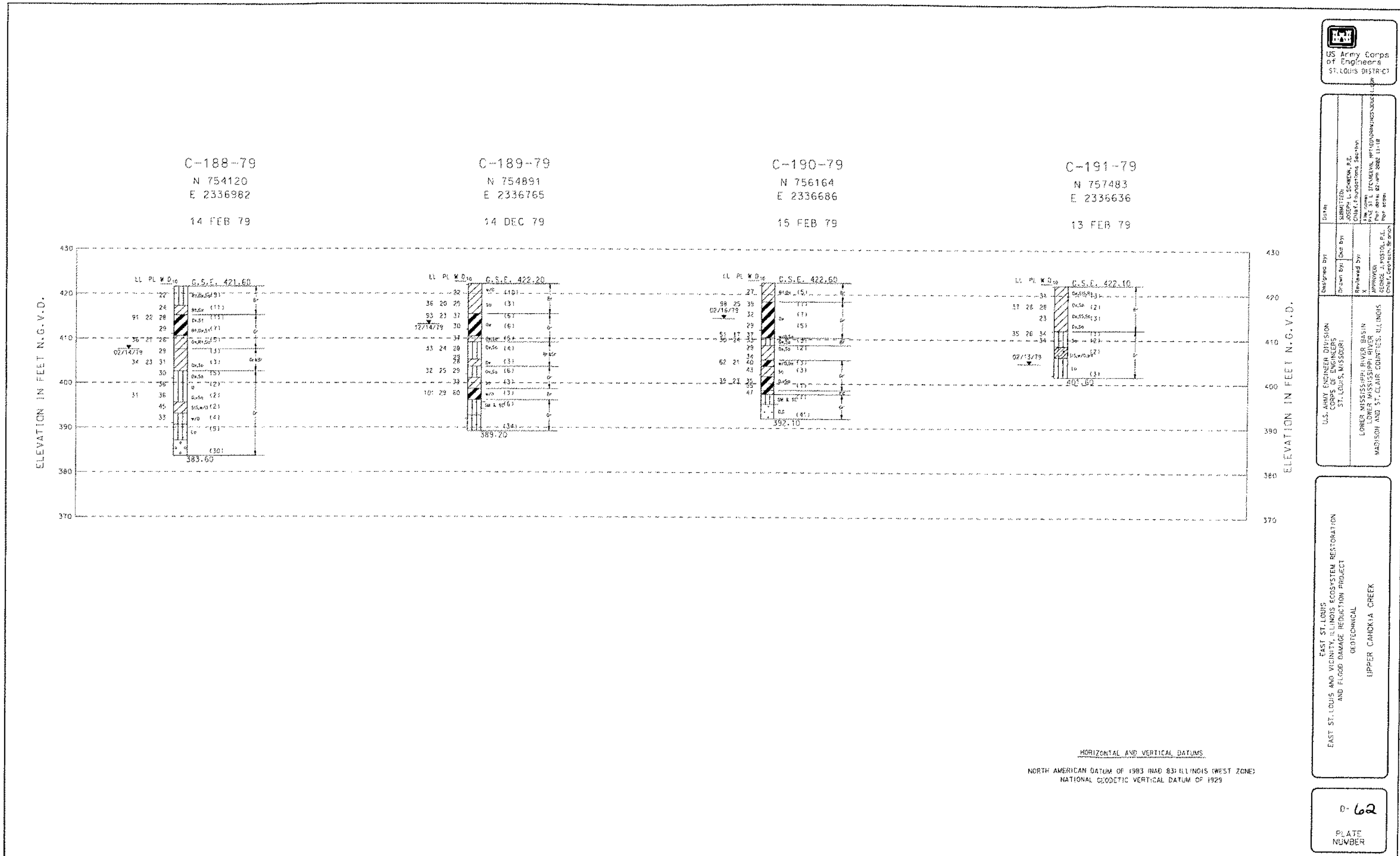
Designed by:	Date:
Drawn by: / Ckd by:	SUBMITTED: JOSEPH L. SCHWENK, P.E. Chief, Foundations Section
Reviewed by: X	File name:
APPROVED: GEORGE J. FISTOL, P.E. Chief, Geotech. Branch	Plot date: 22-APR-2002 10:27 Plot scale: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G.S.E. 422.20
389.20
C-190-79
N 756164
E 2336686
15 FEB 79
G.S.E. 422.60
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C-191-79
N 757483
E 2336636
13 FEB 79
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HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
US Army Corps of Engineers
ST. LOUIS DISTRICT
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
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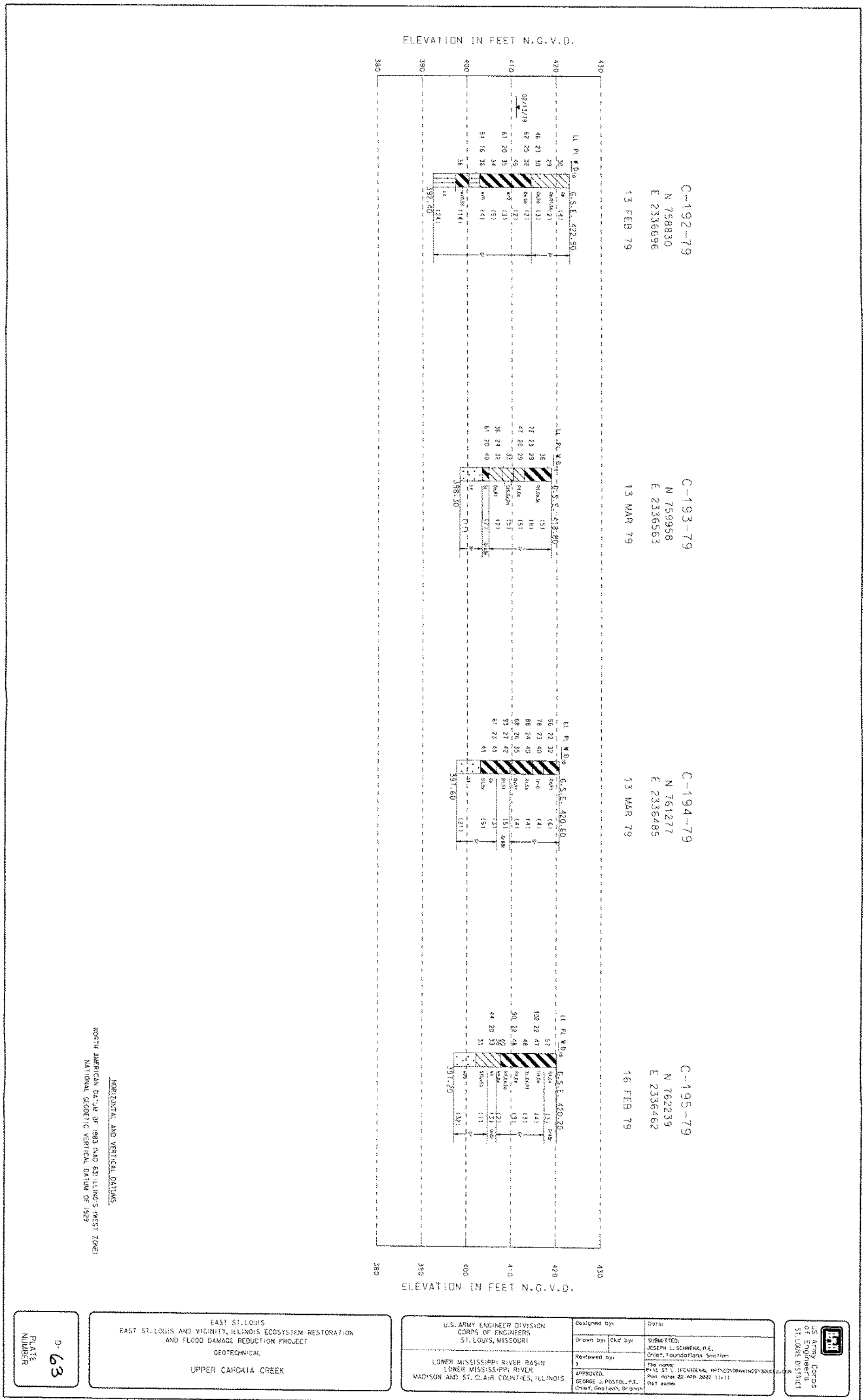
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
UPPER CANOKIA CREEK
D-62
PLATE NUMBER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410
420
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G.S.E. 418.80
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G.S.E. 420.20
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HORIZONTAL AND VERTICAL DATUMS
NORTH AMERICAN DATUM OF 1983 (NAD 83) ILLINOIS (WEST ZONE)
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ELEVATION IN FEET N.G.V.D.
PLATE NUMBER
D-63
EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION
AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
UPPER CAHOKIA CREEK
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS
Designed by:
Drawn by:
Ckd by:
Reviewed by:
APPROVED:
GEORGE J. POSTOL, P.E.
Chief, Geotech. Branch
Date:
SUBMITTED:
JOSEPH L. SCHWENK, P.E.
Chief, Foundations Section
File name:
Plot date: 02-APR-2002
US Army Corps of Engineers
ST. LOUIS DISTRICT

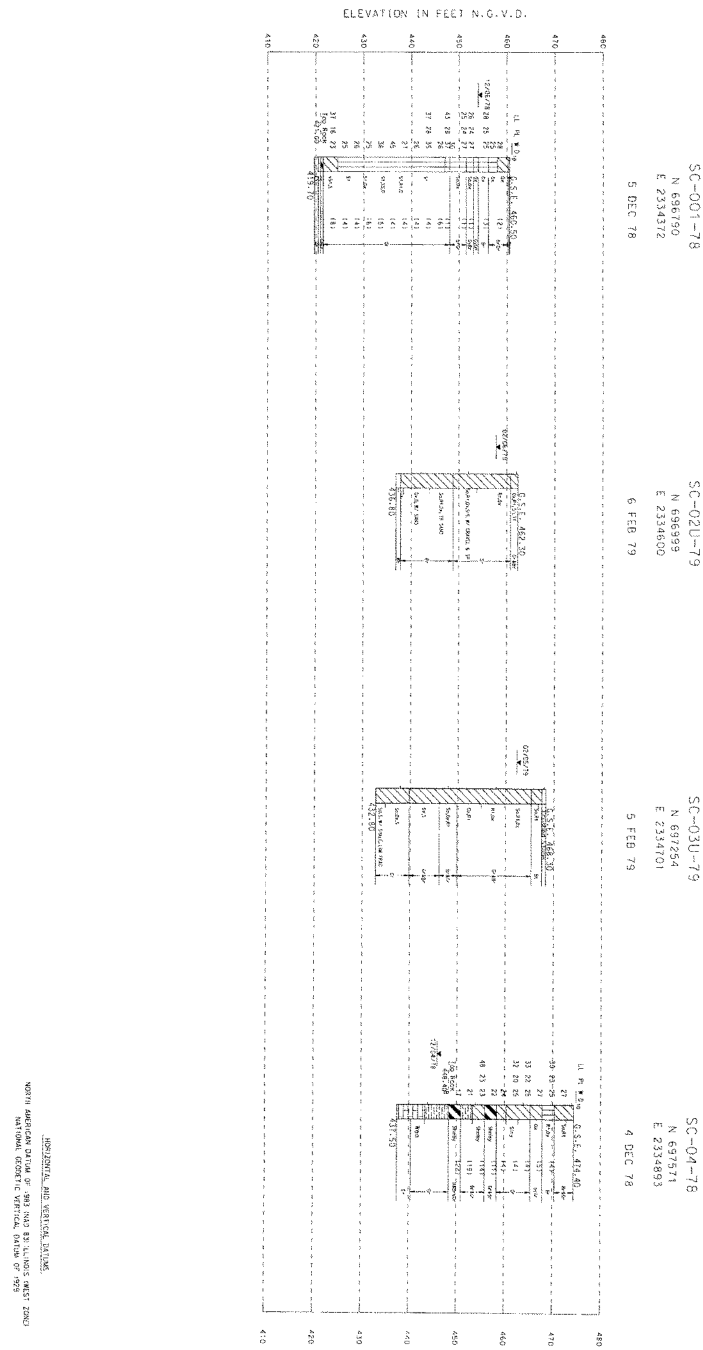

PLATE NUMBER D-64

EAST ST. LOUIS
EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT
GEOTECHNICAL
SCHOENBERGER CREEK

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

LOWER MISSISSIPPI RIVER BASIN
LOWER MISSISSIPPI RIVER
MADISON AND ST. CLAIR COUNTIES, ILLINOIS

Designed by: | Date:
Drawn by: | Ckd by: | SUBMITTED: JOSEPH L. SCHWENK, P.E. Chief, Foundations Section
Reviewed by: X
APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch
Plot date: 02-APR-2002

US Army Corps of Engineers
St. Louis District

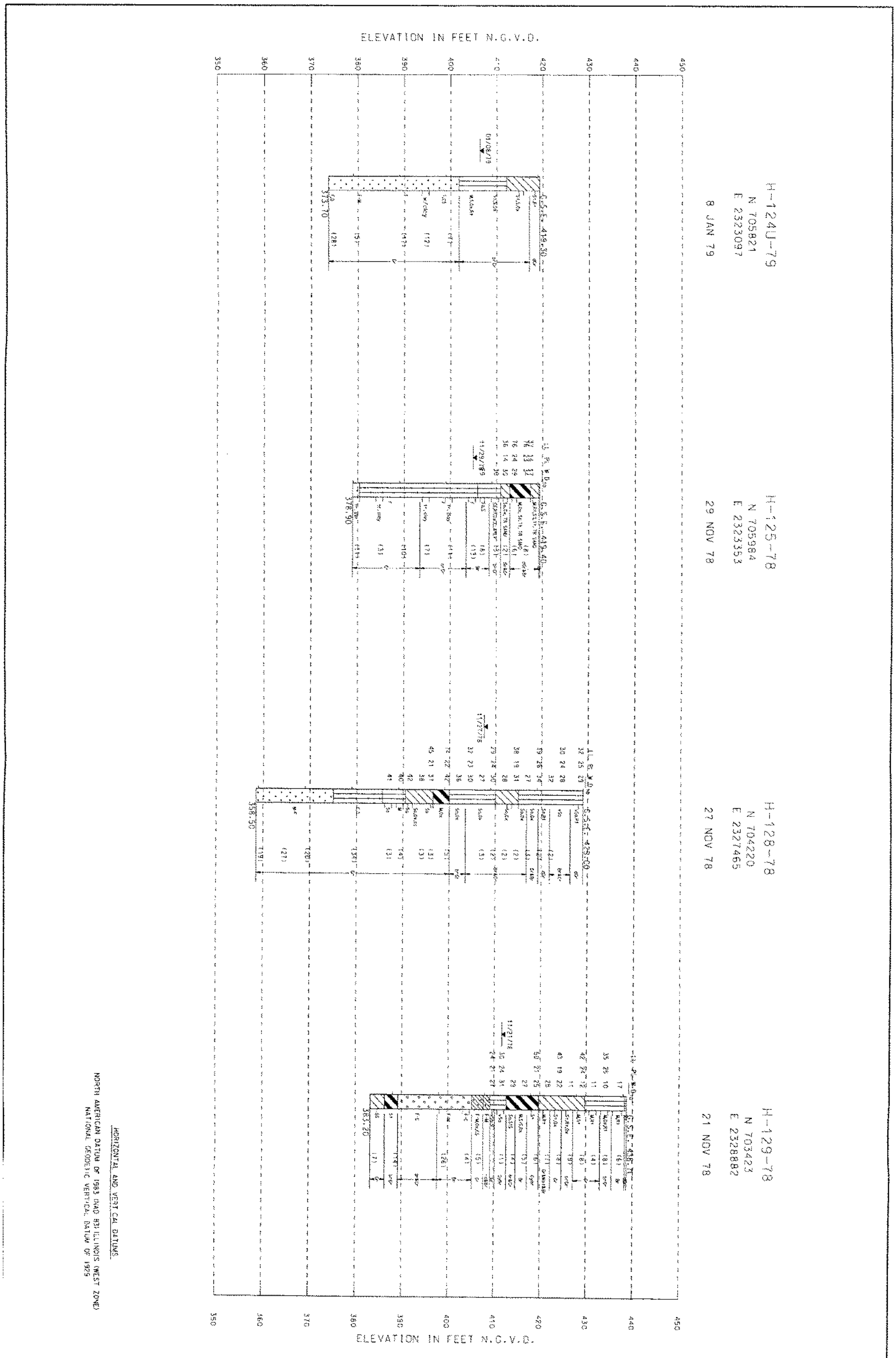

PLATE NUMBER D-65	EAST ST. LOUIS EAST ST. LOUIS AND VICINITY, ILLINOIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT GEOTECHNICAL SCHOENBERGER CREEK	U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI LOWER MISSISSIPPI RIVER BASIN LOWER MISSISSIPPI RIVER MADISON AND ST. CLAIR COUNTIES, ILLINOIS	Designed by: / Date: Drawn by: / Ckd by: / SUBMITTED: JOSEPH I. SCHWENK, P.E. Chief, Foundations Section Reviewed by: K APPROVED: GEORGE J. POSTOL, P.E. Chief, Geotech. Branch

US Army Corps of Engineers
St. Louis District

APPENDIX E – SEDIMENT

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APPENDIX E - SEDIMENT

E.1 INTRODUCTION

This section of the report provides an overall characterization of the sediment producing features of the Project area. A significant portion of the information contained in this section of the report was prepared by the NRCS for this Project and by the USGS from work being done on the Judy's Branch Pilot Project for IDNR. This information has been used as appropriate in the development and assessment of alternative plans.

It is important to understand the soils and geology of the bluffs in order to understand how the ecosystem of the Project area functions. This information also provides key determinations that will help guide potential restoration efforts. In the bluffs there are deep loess cliffs that are highly erodible. This character makes the bluff streams vulnerable to the effects of the changing bluff hydrology, which as a result of past urbanization now produces larger, quicker runoff actions on the streams from the increasing amount of impervious surfaces. This action impacts stream quality, infrastructure stability and chokes the floodplain canal system with large sediment deposits. The challenge then is to work in concert with the natural system in order to counter balance the effects of urbanization.

The need to reconnect watershed functionality and re-introduce a flood pulse to floodplain wetlands makes the control of sediment a central issue. Under the existing system sediment is trapped within the ditch system of the floodplain and either removed manually through maintenance activities or carried through a series of storm events out to the Mississippi River. If the tributary streams are to be reconnected to floodplain wetlands in order to restore and sustain them then these restored wetlands will have to be protected from the heavy sediment loads being carried out of these streams onto the floodplain. If sediment laden waters are allowed to enter restored wetland areas these wetlands will shortly be filled and their functions lost as there would be no natural means for the sediment to be scoured out of these areas once deposited. Similarly if action is not taken in the streams to counter act the destabilization process that has begun, these important aquatic resources will continue to degrade.

E.2 NRCS EVALUATION OF STUDY AREA EROSION

In the summer of 1999, the NRCS, as a cooperative effort on the Project, conducted an inventory of bluff cropland to evaluate and recommend erosion control and sediment reduction measures for the upland cropland. As a part of the 1985 report prepared by the Corps for the Project area, this source was cited, as a major area of concern and it was believed to still be a significant source of sediment being carried out of the bluff via the tributary streams. The following is the report they provided which was used during the development and assessment of alternative plans.

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Control Project

Inventory and Evaluation for Erosion Control and Sediment Reduction in the Upland Cropland Areas of the Project Area

Inventory Conducted By:

Donna K. Beauchamp, Soil Conservationist

John M. Moore, Soil Conservation Technician

USDA - Natural Resources Conservation Service

June 1999

The following is a summary of the procedures used and the results of the cropland erosion inventory and alternative evaluation requested from the Natural Resources Conservation Service (NRCS) by the U.S. Army Corps of Engineers - St. Louis District (COE). The purpose of this inventory was to determine the land treatment needs and costs of treatment in the upland cropland areas of the East St. Louis and Vicinity Illinois - Ecosystem Restoration and Flood Control Project (Project). The result of this inventory proposes a reduction in sediment load to the drainage system and wetlands in the bottoms portion of the Project area.

The field work for this inventory was conducted by Donna K. Beauchamp, Soil Conservationist and John M. Moore, Soil Conservation Technician. Field work included determining existing landuse, cultural practices, present erosion, and practice alternatives for each field inventoried. The data entry into Microsoft Excel and Arcview, the erosion calculations, data summary, and report were completed by Donna Beauchamp. Chad Boeving, St. Clair Co. SWCD Resource Planning Technician assisted with data entry into Excel and Arcview. GIS assistance and training was provided by Paul Kremmel, Resource Analyst (GIS). Karri Greten, St. Clair Co. SWCD Resource Conservationist and Ann Dillow, St. Clair Co. SWCD Administrative Coordinator also provided training and data entry assistance for Excel and Arcview. Project coordination was provided by Leslie Michael and John Harryman, District Conservationists for Madison and St. Clair Co., respectively.

Inventory Extent

A 100 percent inventory was conducted on all of the cropland in the upland area of the COE Project area. Cropland was identified to be those areas shown as cropland on USDA - Farm Service Agency (FSA) aerial photography. This photography was also used to determine the location and extent of proposed practice needs. Present (existing) landuse, cultural practices, eroding areas, and treatment needs were determined by onsite field visits and the use of March 1998 aerial photography.

There were 925 fields inventoried. Several fields have had landuse changes and are no longer in agricultural production. Those fields are included in this inventory. This inventory also includes other areas in agricultural production observed during the field portion of the inventory. Due to the amount of erosion and subsequent sediment load from developing sites, those areas observed to be presently under development, were also included in this inventory. The majority of the developing sites were observed on land shown as cropland on FSA photographs.

Approximately 42 percent of the upland watershed acreage was included in this inventory. Most of the rest of the watershed area is either in urban uses or woodland. There is no cropland located in the Bluff Area 3 sub-watershed.

Soil Erosion and Sediment Load Determination

Soil loss was calculated from the following erosion sources: sheet and rill (S&R) erosion, ephemeral erosion and classic gully erosion. The S&R and ephemeral erosion types occur within the fields inventoried. The majority of the gully erosion inventoried was found to be at the edge of the fields, usually where the field is bordered by woodland. In these cases, the woodland is usually quite steep in comparison to the adjacent field.

The Universal Soil Loss Equation (USLE) was used to make all erosion calculations for this inventory. The sediment delivery rates for existing conditions, the sediment transport factor (STF), and the sediment reduction percentage from existing basins within each sub-watershed are the same as those figured in the October 198 Erosion and Sediment Report for the Metro-East Re-Evaluation Study conducted by NRCS. Practices which are used for water and/or sediment management have an 85-95% sediment rapping efficiency rate. For this study, fields with Water/Sediment management practices planned were given a 10% sediment delivery rate for S&R erosion. The planned sediment delivery rate for ephemeral and gully erosion is the same as the present rate. The gross erosion rates for these erosion types were reduced by the planned practices.

The land management, ephemeral and gully erosion information was entered into a Microsoft Excel spreadsheet for each field inventoried. The soils for St. Clair Co. have been digitized and are a layer in the St. Clair Co. NRCS Field Office Geographic Information System (GIS). The soils for Madison Co. within the Project area have also been digitized. In order to complete this inventory in a more efficient manner, the digital soils were used rather than calculating the soil acreages and soil loss information by hand for each field. To use the soils information, the watershed and field boundaries also had to be digitized. This was completed as part of this inventory. Once all of the data and boundaries were in the computer system, the GIS information and Excel spreadsheet were joined to complete the soil loss calculations and determine planned practice totals. Most of the necessary calculations were completed in Arcview.

Planned Practice and Cost Determination

Since runoff volume is also a concern in the COE Project, this inventory focused practice alternatives on those types of practices which would not only reduce erosion rates, but also reduce runoff rates. Therefore, the majority of the planned practices are terraces or water-and-sediment-control-basins (WASOB) to control S&R and ephemeral erosion. Minimum tillage and no-till are also planned in conjunction with the mechanical practices to further reduce S&R erosion. Where terraces or WASCOB's were not feasible due to the lay of the land, grass waterways or critical area planting are planned instead.

Dry dam types of grade control structures are planned to control gully erosion. Occasionally, the dry dams are used in conjunction with a diversion to reduce the number of structures needed. There are tow types of dry dams planned, small and large. Small dry dams generally have a drainage area of about 5 acres, but no more than 10 acres. These structures consist of a 4 ft. high berm with a pipe and riser. the large dry dams have a drainage area of no more than 20 acres. The large dry dams have a 6-8 ft. high berm with a pipe and riser. The pipe used in the dry dams is only used to facilitate drainage of the sediment storage basin.

Costs of the planned practices were determined by using the January 1999 average cost list for conservation practices for both Madison and St. Clair Counties. These cost lists are developed annually based on the actual cost of practices installed during the previous year in each county.

Summary

The results of this inventory are shown on the following maps and table by sub-watershed. With the implementation of the planned practices, there will be a 71% annual reduction in sediment reaching the bottoms from the land inventoried. The estimated cost to install the planned mechanical practices is $3.9 million.

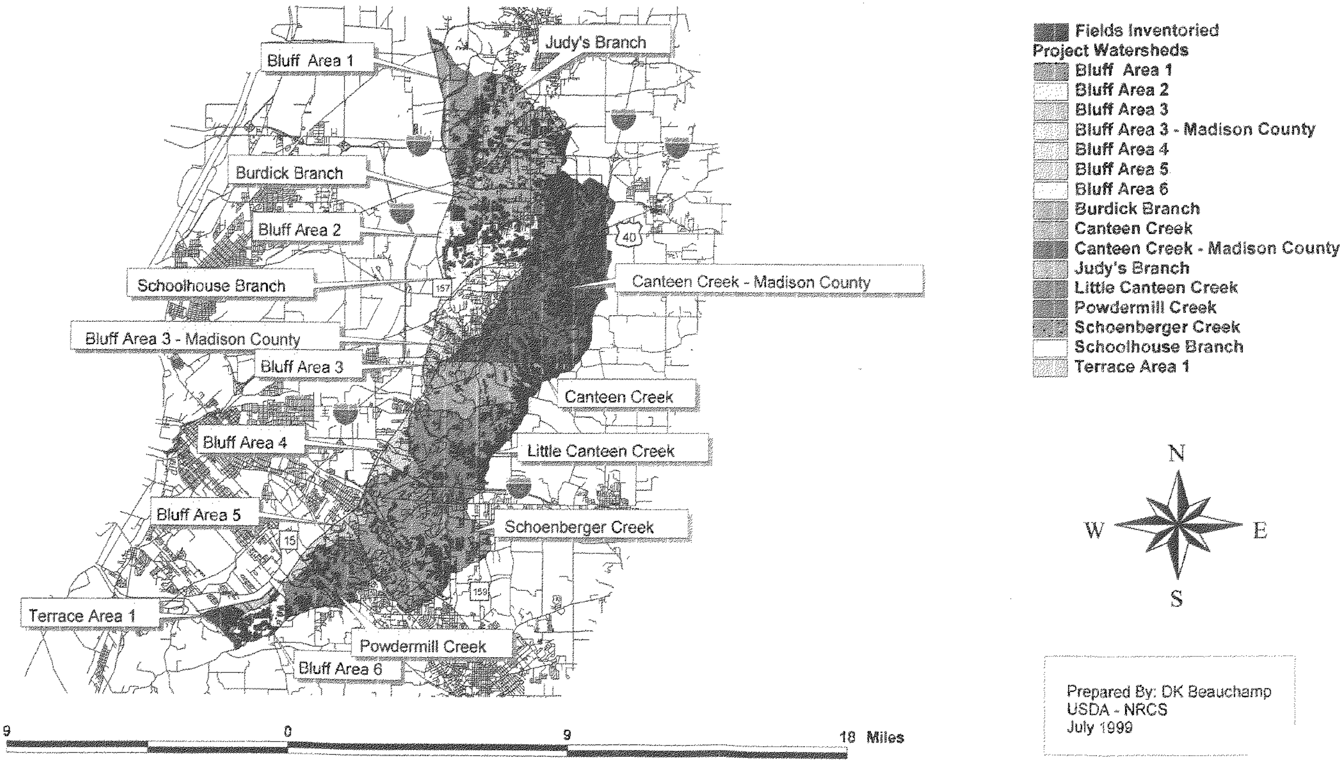
The last sheet of maps shows future erosion and sediment delivery. The future is based on all of the cropland being converted to urban/residential uses. The length of time for this to occur was not estimated in this study.

The Excel and Arcview data files have also been provided to the COE for this inventory. The Arcview data and maps are projected in State Plane 1983 - Illinois West. The units shown are in feet.

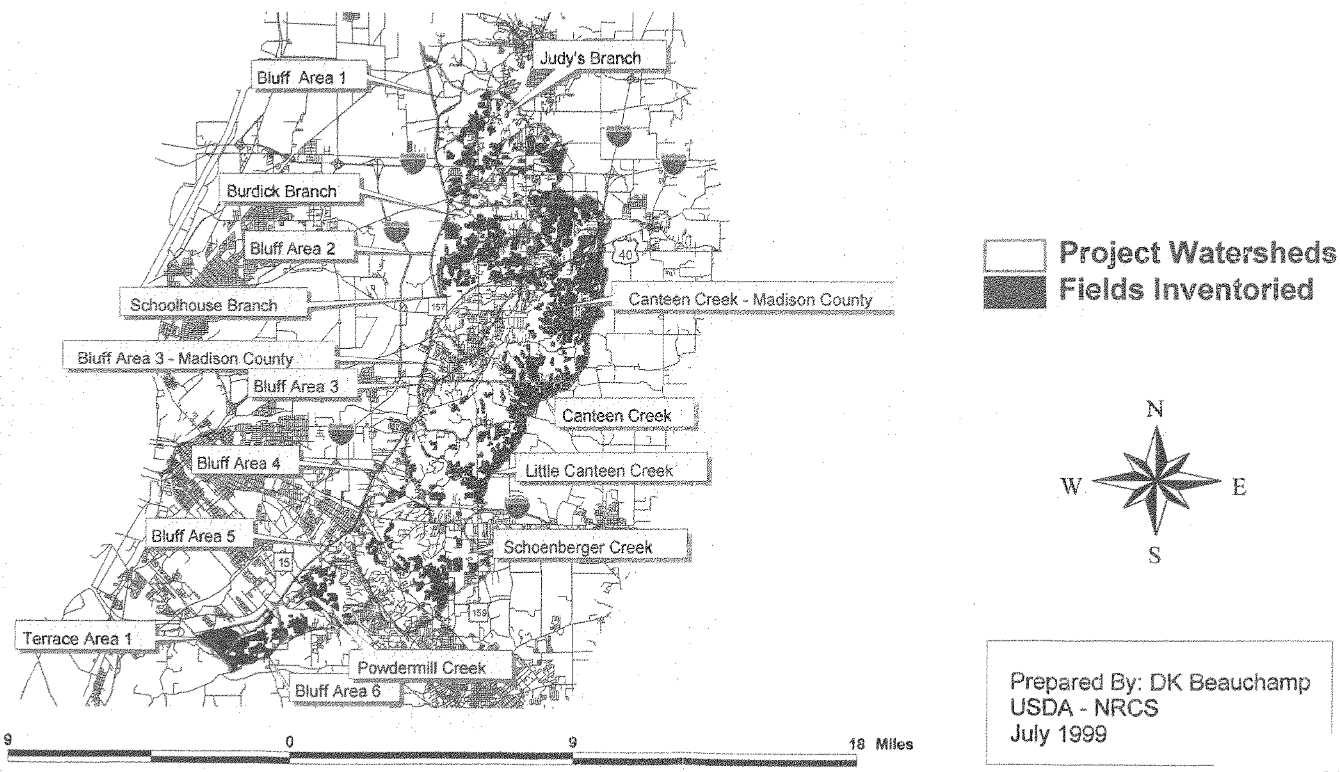
3

The following maps display graphically the results of the analysis conducted.

COE Cropland Erosion Inventory

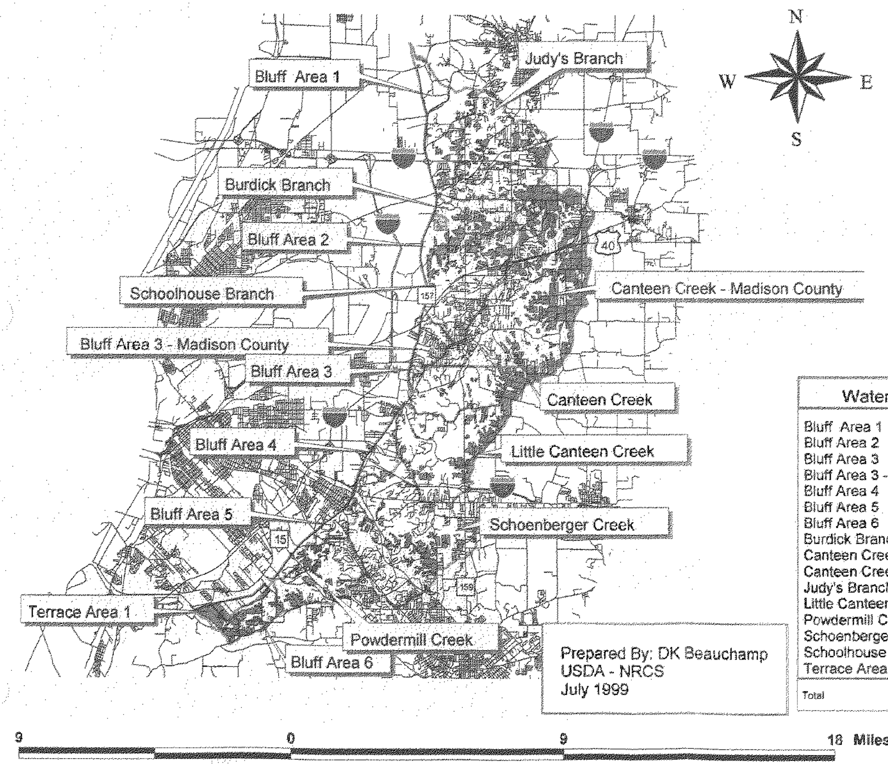


COE Project: Cropland Inventory



Prepared By: DK Beauchamp
USDA - NRCS
July 1999

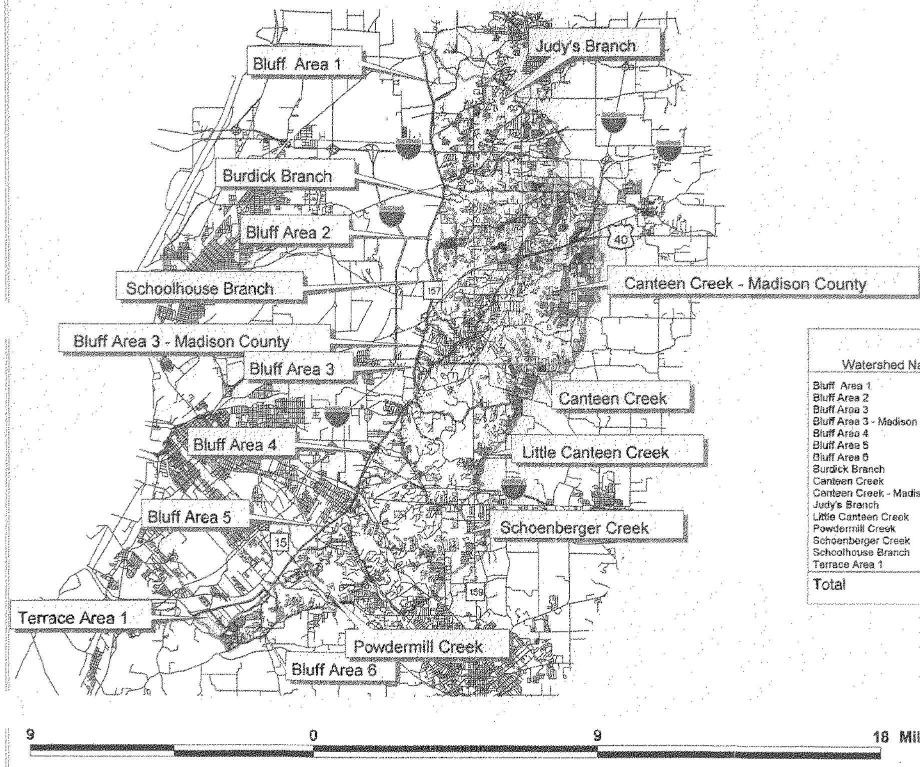
COE Project: Cropland Inventory



Prepared By: DK Beauchamp
USDA - NRCS
July 1999

Watershed Name	Watershed Acreage	Acreage Inventoried
Bluff Area 1	2866	372.9
Bluff Area 2	683	191.1
Bluff Area 3	127	
Bluff Area 3 - Madison County	919	
Bluff Area 4	951	65.2
Bluff Area 5	975	39.0
Bluff Area 6	1158	527.2
Burdick Branch	1794	366.9
Canteen Creek	3477	684.9
Canteen Creek - Madison County	10951	3918.9
Judy's Branch	5411	1007.6
Little Canteen Creek	5040	1133.5
Powdermill Creek	2896	463.1
Schoenberger Creek	7756	875.1
Schoolhouse Branch	4527	843.0
Terrace Area 1	709	385.1
Total	50,240	10,873.5

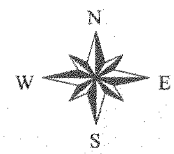
Existing Ephemeral & Gully Erosion



Project Watersheds

Existing Gross Ephemeral & Gully Erosion (Tons/Yr.)

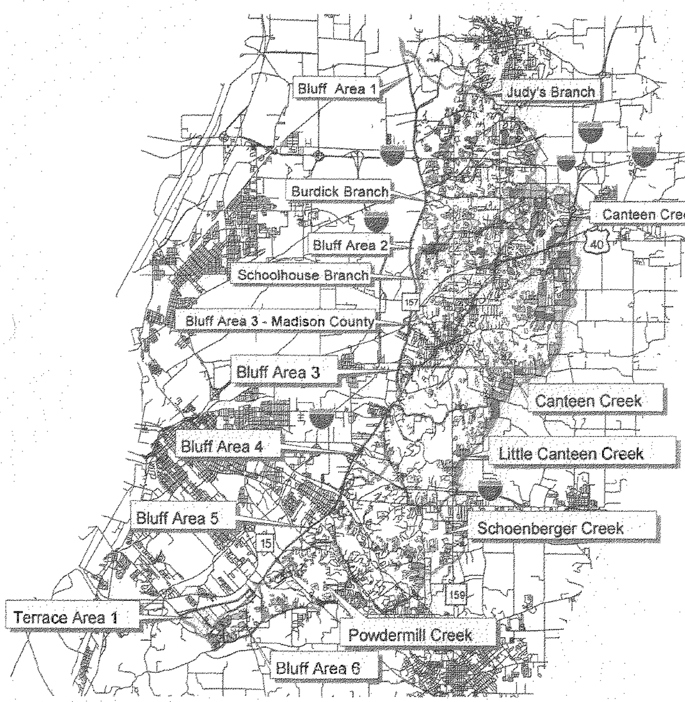
- 0 - 50
- 50.1 - 125
- 125.1 - 275
- 275.1 - 600
- 600.1 - 1370



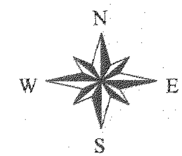
Watershed Name	Existing Gross Sheet & Rill Erosion (Tons/Yr.)	Existing Gross Ephemeral Erosion (Tons/Yr.)	Existing Gross Gully Erosion (Tons/Yr.)	Total Existing Gross Erosion (Tons/Yr.)
Bluff Area 1	7632	1775	184	9591
Bluff Area 2	2747	1367	0	4114
Bluff Area 3				
Bluff Area 3 - Madison County				
Bluff Area 4	1339	140	0	1479
Bluff Area 5	1529	53	0	1582
Bluff Area 6	12980	1549	144	14673
Burdick Branch	5297	347	16	5660
Canteen Creek	8542	3187	64	11793
Canteen Creek - Madison County	37958	14359	336	52653
Judy's Branch	13747	5249	272	19268
Little Canteen Creek	14011	3750	0	17761
Powdermill Creek	10363	422	40	10825
Schoenberger Creek	18636	2458	0	21094
Schoolhouse Branch	26877	3574	56	30507
Terrace Area 1	1412	280	0	1692
Total	163,070	38,510	1,112	202,692

Prepared By: DK Beauchamp
USDA - NRCS
July 1999

Existing Ephemeral & Gully Sediment

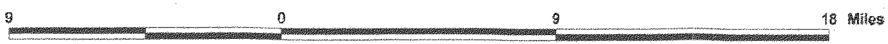


Project Watersheds
Existing Ephemeral & Gully Sediment (Tons/Yr.)
- 0 - 40
- 41 - 130
- 131 - 320
- 321 - 725
- 726 - 1162

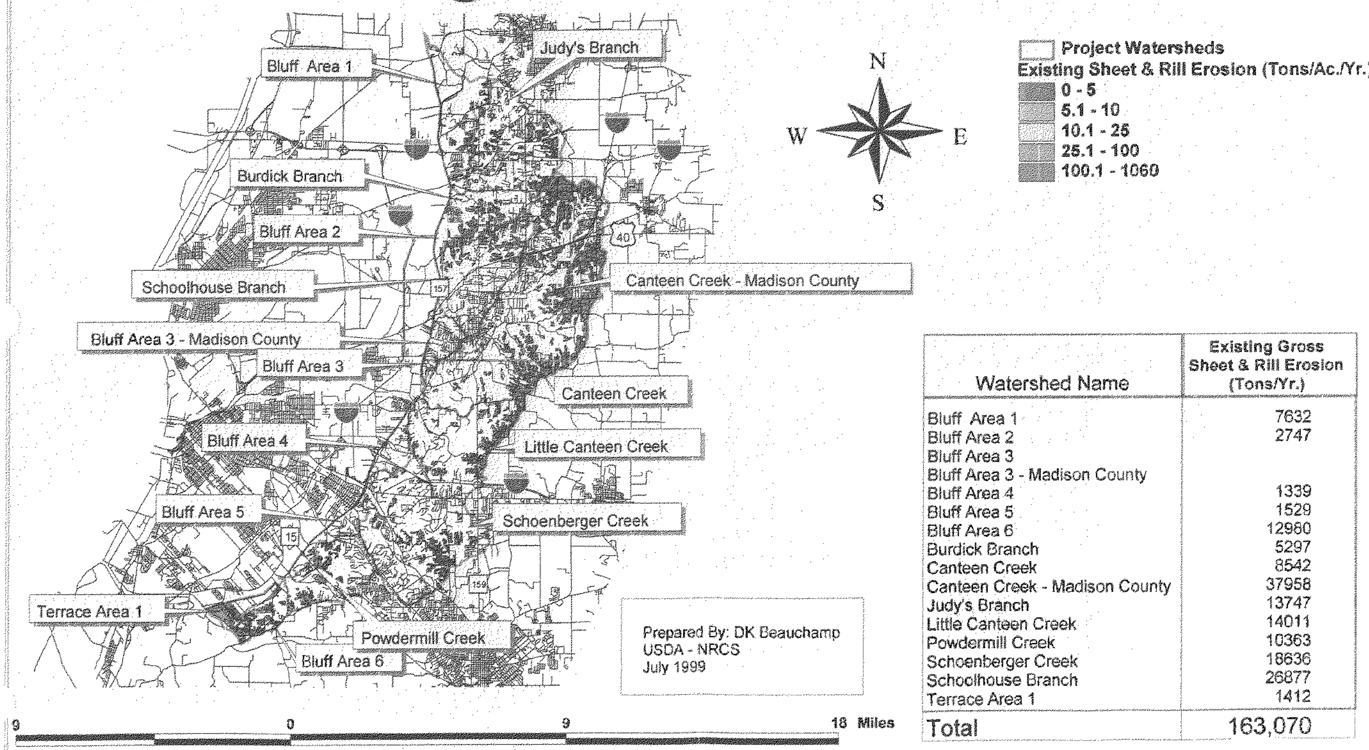


Prepared By: DK Beauchamp
USDA - NRCS
July 1999

Watershed Name	Existing Sheet & Rill Erosion Sediment Yield (Tons/Yr.)	Existing Ephemeral Erosion Sediment Yield (Tons/Yr.)	Existing Gully Erosion Sediment Yield (Tons/Yr.)	Total Existing Sediment Yield (Tons/Yr.)	Existing Sediment Delivered To Hwy. 157 (Tons/Yr.)
Bluff Area 1	5724	1901	182	7807	5465
Bluff Area 2	2060	1162	0	3222	2771
Bluff Area 3					
Bluff Area 3 - Madison County					
Bluff Area 4	1005	119	0	1124	967
Bluff Area 5	1147	45	0	1192	1025
Bluff Area 6	9735	1317	137	11189	9623
Burdick Branch	3973	295	15	4283	2998
Canteen Creek	6406	2390	58	8854	5313
Canteen Creek - Madison County	28469	10769	302	39540	23724
Judy's Branch	10311	4462	258	15031	9770
Little Canteen Creek	10508	3000	0	13508	10131
Powdermill Creek	7772	359	38	8169	8127
Schoenberger Creek	13977	1966	0	15943	9247
Schoolhouse Branch	20158	3038	53	23249	17437
Terrace Area 1	706	196	0	902	388
Total	**121,951**	**31,019**	**1,043**	**154,013**	**104,986**

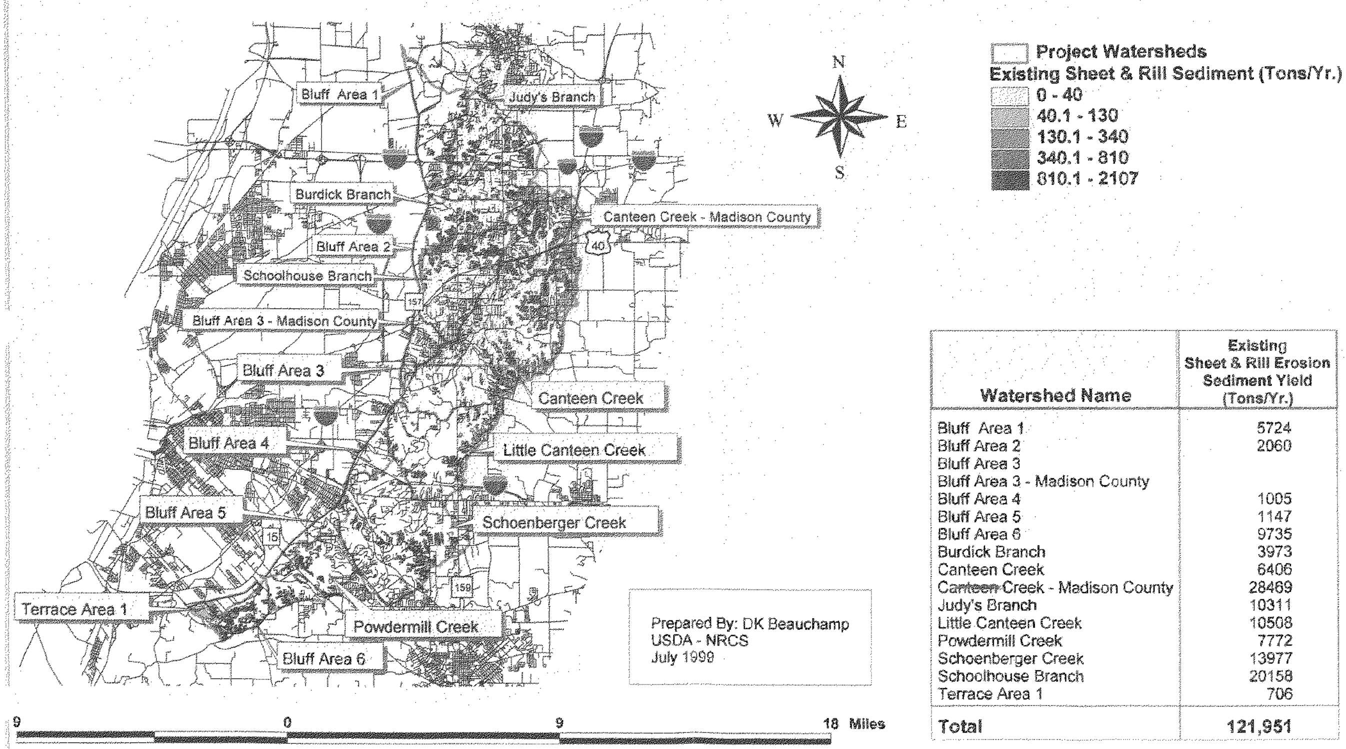


Existing Sheet & Rill Erosion



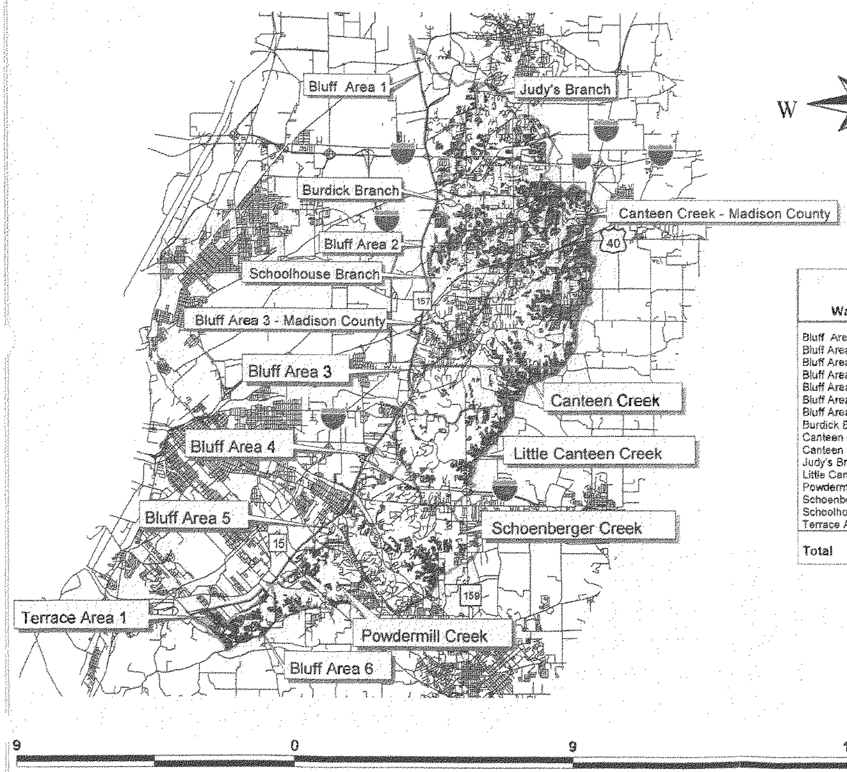
Watershed Name	Existing Gross Sheet & Rill Erosion (Tons/Yr.)
Bluff Area 1	7632
Bluff Area 2	2747
Bluff Area 3	
Bluff Area 3 - Madison County	
Bluff Area 4	1339
Bluff Area 5	1529
Bluff Area 6	12980
Burdick Branch	5297
Canteen Creek	8542
Canteen Creek - Madison County	37958
Judy's Branch	13747
Little Canteen Creek	14011
Powdermill Creek	10363
Schoenberger Creek	18636
Schoolhouse Branch	26877
Terrace Area 1	1412
Total	163,070

Existing Sheet & Rill Sediment



Watershed Name	Existing Sheet & Rill Erosion Sediment Yield (Tons/Yr.)
Bluff Area 1	5724
Bluff Area 2	2060
Bluff Area 3	
Bluff Area 3 - Madison County	
Bluff Area 4	1005
Bluff Area 5	1147
Bluff Area 6	9735
Burdick Branch	3973
Canteen Creek	6406
~~Canteen~~ Creek - Madison County	28469
Judy's Branch	10311
Little Canteen Creek	10508
Powdermill Creek	7772
Schoenberger Creek	13977
Schoolhouse Branch	20158
Terrace Area 1	706
Total	**121,951**

Future Erosion Conditions



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W E
S

Project Watersheds
Future Sheet & Rill Erosion (Tons/Yr.)
0 - 1
1.1 - 5
5.1 - 10
10.1 - 15
15.1 - 32

Watershed Name	Total Future Erosion (Tons/Yr.)	Total Future Sediment Yield (Tons/Yr.)	Future Sediment Delivered To Hwy. 157 (Tons/Yr.)
Bluff Area 1	156	90	62
Bluff Area 2	121	85	73
Bluff Area 3			
Bluff Area 3 - Madison County			
Bluff Area 4	34	21	18
Bluff Area 5	29	21	18
Bluff Area 6	359	239	206
Burdick Branch	136	97	68
Canteen Creek	222	135	76
Canteen Creek - Madison County	1036	607	338
Judy's Branch	363	215	134
Little Canteen Creek	377	225	169
Powdermill Creek	325	226	170
Schoenberger Creek	400	244	132
Schoolhouse Branch	307	207	155
Terrace Area 1	20	8	3
Total	**3,687**	**2,420**	**1,622**

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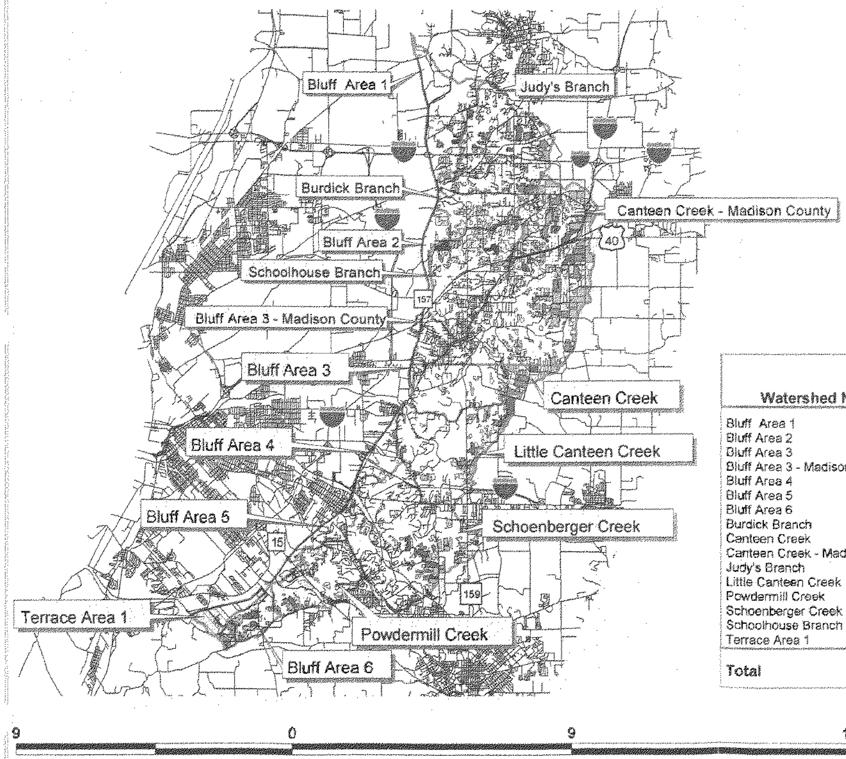
July 1999

Planned Ephemeral & Gully Erosion



Project Watersheds
Existing Ephemeral & Gully Sediment (Tons/Yr.)
0 - 1
2 - 3
4 - 5
6 - 8
9 - 13

N W E S

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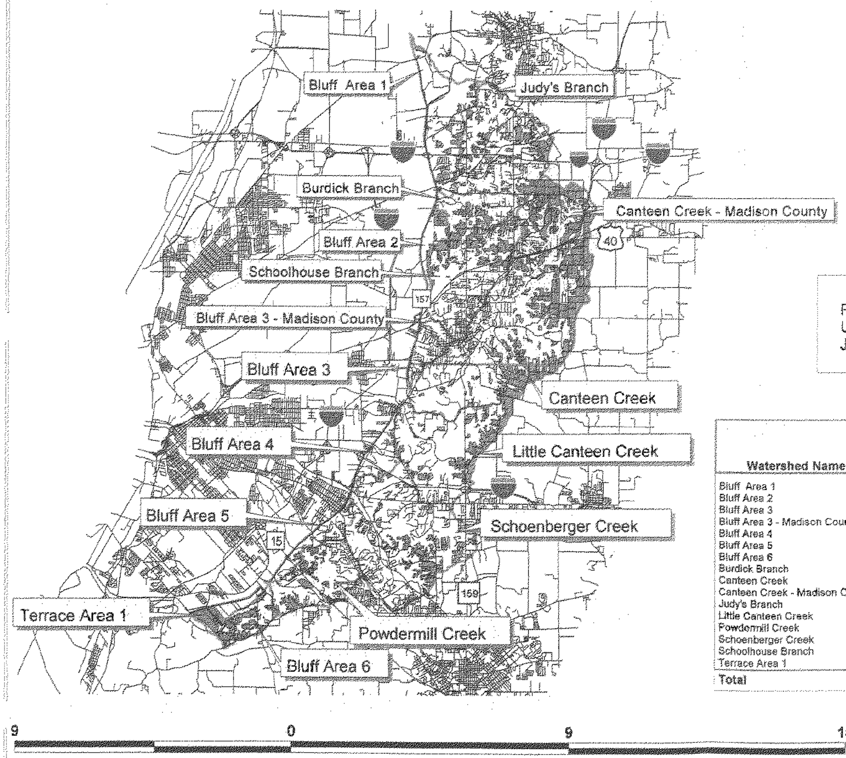
Watershed Name	Planned Gross Sheet & Rill Erosion (Tons/Yr.)	Planned Gross Ephemeral Erosion (Tons/Yr.)	Planned Gross Gully Erosion (Tons/Yr.)	Total Planned Gross Erosion (Tons/Yr.)
Bluff Area 1	2162	33.0	12	2207
Bluff Area 2	272	9.0	0	281
Bluff Area 3				
Bluff Area 3 - Madison County				
Bluff Area 4	589	7.0	0	596
Bluff Area 5	468	1.0	0	469
Bluff Area 6	6812	37.0	9	6858
Burdick Branch	1826	7.0	1	1834
Canteen Creek	3301	45.0	4	3350
Canteen Creek - Madison County	19126	241.0	21	19388
Judy's Branch	5064	72.6	17	5154
Little Canteen Creek	4893	90.0	0	4983
Powdermill Creek	4361	24.0	3	4388
Schoenberger Creek	6535	89.0	0	6624
Schoolhouse Branch	3913	33.0	4	3950
Terrace Area 1	970	4.0	0	974
Total	**60,292**	**692.6**	**71**	**61,056**

Planned Ephemeral & Gully Sediment



Project Watersheds

Planned Ephemeral & Gully Sediment (Tons/Yr.)

0

1

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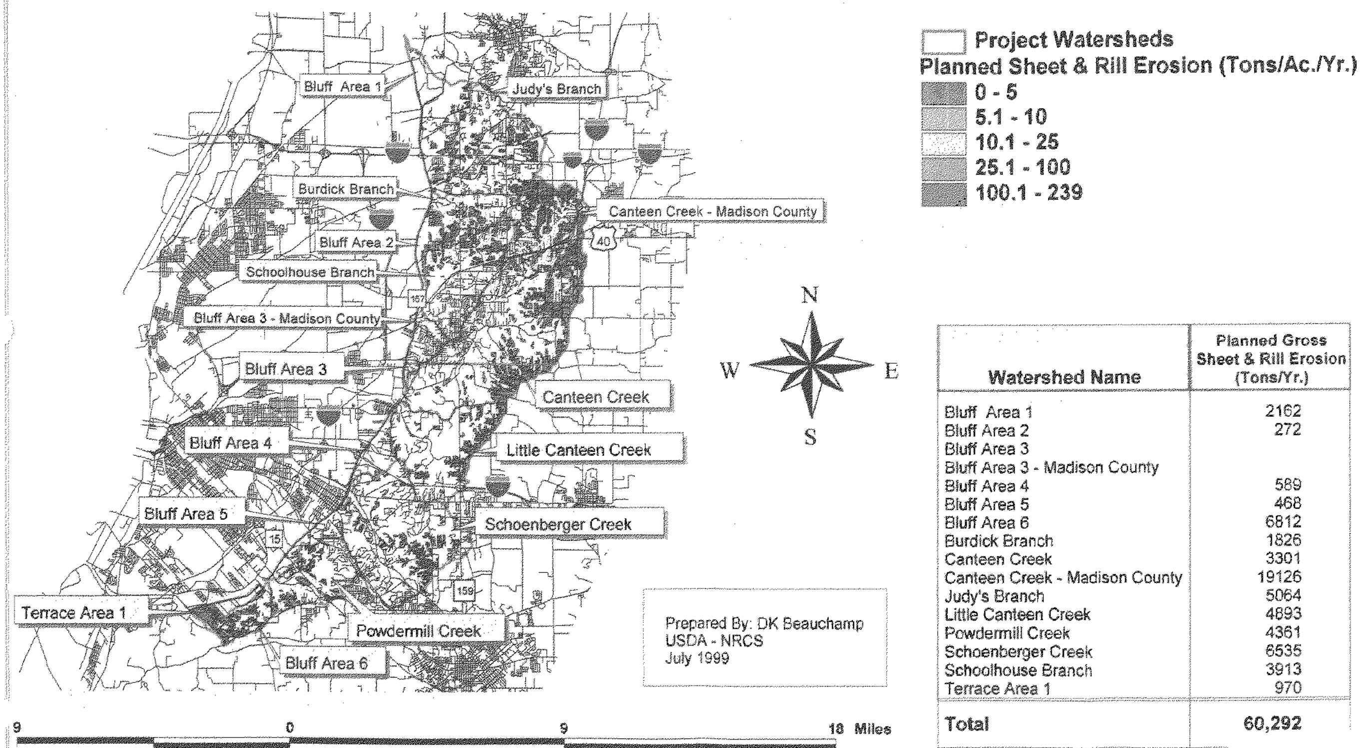
July 1999

N W E S

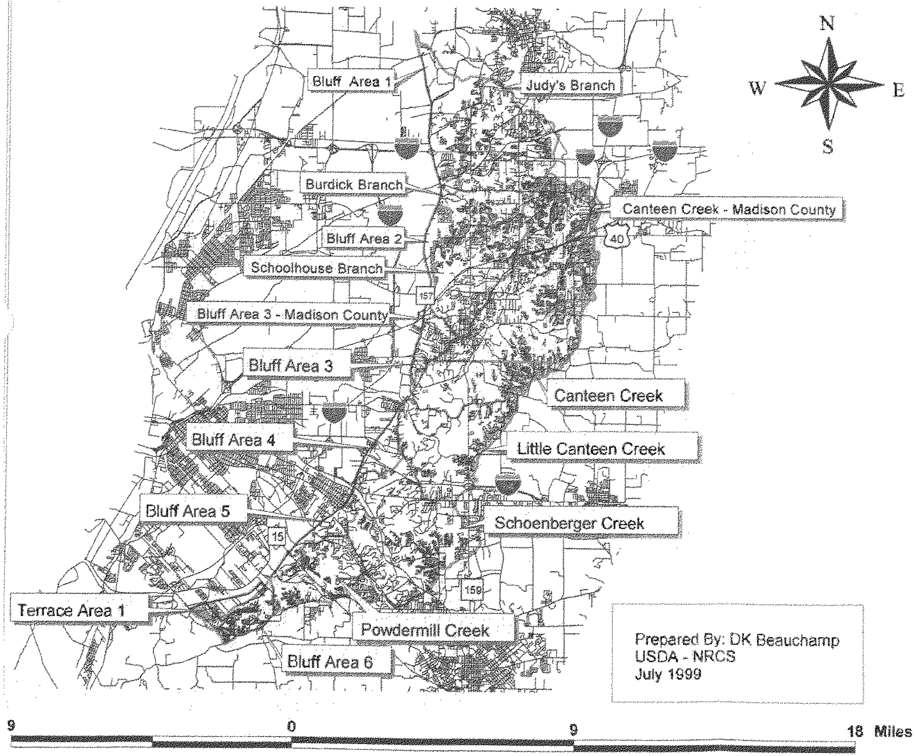
Watershed Name	Planned Sheet & Rill Erosion Sediment Yield (Tons/Yr.)	Planned Ephemeral Erosion Sediment Yield (Tons/Yr.)	Planned Gully Erosion Sediment Yield (Tons/Yr.)	Total Planned Sediment Yield (Tons/Yr.)	Planned Sediment Delivered to Hwy. 157 (Tons/Yr.)
Bluff Area 1	1622	3.3	1.2	1627	1139
Bluff Area 2	204	0.9	0.0	205	176
Bluff Area 3					
Bluff Area 3 - Madison County					
Bluff Area 4	442	0.7	0.0	443	381
Bluff Area 5	351	0.1	0.0	351	302
Bluff Area 6	5109	3.7	0.9	5114	4396
Burdick Branch	1369	0.7	0.1	1370	959
Canteen Creek	2476	4.5	0.4	2481	1489
Canteen Creek - Madison County	14345	24.1	2.1	14371	8622
Judy's Branch	3798	8.7	1.7	3808	2475
Little Canteen Creek	3670	9.0	0.0	3679	2759
Powdermill Creek	3271	2.4	0.3	3274	2456
Schoenberger Creek	4902	10.3	0.0	4912	2849
Schoolhouse Branch	2935	4.0	0.3	2939	2204
Terrace Area 1	485	0.4	0.0	485	209
Total	**44,979**	**72.8**	**7.0**	**45,059**	**30,418**

Planned Sheet & Rill Erosion



Watershed Name	Planned Gross Sheet & Rill Erosion (Tons/Yr.)
Bluff Area 1	2162
Bluff Area 2	272
Bluff Area 3	
Bluff Area 3 - Madison County	
Bluff Area 4	589
Bluff Area 5	468
Bluff Area 6	6812
Burdick Branch	1826
Canteen Creek	3301
Canteen Creek - Madison County	19126
Judy's Branch	5064
Little Canteen Creek	4893
Powdermill Creek	4361
Schoenberger Creek	6535
Schoolhouse Branch	3913
Terrace Area 1	970
Total	**60,292**

Planned Sheet & Rill Sediment



Project Watersheds

Planned Sheet & Rill Sediment (Tons/Yr.)

- 0 - 20
- 20.1 - 55
- 55.1 - 125
- 125.1 - 275
- 275.1 - 520

Watershed Name	Planned Sheet & Rill Erosion Sediment Yield (Tons/Yr.)
Bluff Area 1	1622
Bluff Area 2	204
Bluff Area 3	
Bluff Area 3 - Madison County	
Bluff Area 4	442
Bluff Area 5	351
Bluff Area 6	5109
Burdick Branch	1369
Canteen Creek	2476
Canteen Creek - Madison County	14345
Judy's Branch	3798
Little Canteen Creek	3670
Powdermill Creek	3271
Schoenberger Creek	4902
Schoolhouse Branch	2935
Terrace Area 1	485
Total	**44,979**

Summary of Planned BMP's

Watershed Name	Small Dry Dams (No.)	Terraces (Ft.)	Underground Outlet & Subsurface Drain (Tile) (Ft.)	Water-and-Sediment-Control-Basins WASCOB) (No.)	Large Dry Dams (No.)	Critical Area Planting (Ac.)	Diversions (Ft.)	Filter Strips (Ft.)	Grass Waterways (Ft.)
Bluff Area 1	21	10800	14700	54	0	0.0	400	0	0
Bluff Area 2	0	0	5650	38	0	0.0	0	0	0
Bluff Area 3									
Bluff Area 3 - Madison County									
Bluff Area 4	6	4550	2650	5	1	0.0	0	0	0
Bluff Area 5	7	0	700	4	0	0.0	0	0	0
Bluff Area 6	26	26750	24000	54	1	1.0	1450	0	1150
Burdick Branch	2	450	2450	17	0	0.0	0	0	0
Canteen Creek	66	76800	34520	61	3	2.0	4150	0	750
Canteen Creek - Madison County	46	44100	128075	739	1	0.0	0	0	2000
Judy's Branch	29	56150	34900	88	0	0.0	400	0	4250
Little Canteen Creek	100	89850	42050	25	7	2.0	2250	1650	0
Powdermill Creek	52	3500	10425	41	1	0.0	200	0	0
Schoenberger Creek	124	42100	35750	79	8	17.0	950	0	0
Schoolhouse Branch	6	3250	17600	116	1	0.0	0	0	300
Terrace Area 1	4	0	2400	13	0	0.0	0	0	400
Total	489	358,300	355,870	1,334	23	22.0	9,800	1,650	8,850

Watershed Name	Planned Small Dry Dams Cost ($)	Planned Terrace Cost ($)	Planned Tile Cost ($)	Planned WASCOB Cost ($)	Planned Large Dry Dams Cost ($)	Planned Critical Area Planting Cost ($)	Planned Diversion Cost ($)	Planned Filter Strip Cost ($)	Planned Waterway Cost ($)	Planned Best Management Practice's Total Estimated Cost ($)
Bluff Area 1	27300	27400	50900	31850	0	0	1200	0	0	138650
Bluff Area 2	0	0	22200	30700	0	0	0	0	0	52900
Bluff Area 3										
Bluff Area 3 - Madison County										
Bluff Area 4	7800	8400	10700	2300	3000	200	0	0	0	32400
Bluff Area 5	9100	0	3400	1900	0	0	0	0	0	14400
Bluff Area 6	33800	47800	114400	24500	1600	800	2800	0	4200	229900
Burdick Branch	2600	1300	9400	10100	0	0	0	0	0	23400
Canteen Creek	85800	144900	207400	38500	4800	2050	7700	0	1800	492950
Canteen Creek - Madison County	59800	105900	492800	479800	1600	0	0	0	3800	1143700
Judy's Branch	37700	142225	128900	57500	0	0	1200	0	6000	373525
Little Canteen Creek	130000	161900	272300	9700	15400	1600	4600	900	0	596400
Powdermill Creek	67800	8400	42900	19900	2000	300	500	0	0	139800
Schoenberger Creek	161200	76550	156700	39250	17000	12300	2200	0	0	465200
Schoolhouse Branch	7800	8300	66000	81800	1600	0	0	0	600	166100
Terrace Area 1	5200	0	9800	7000	0	0	0	0	1500	23500
Total Estimated Cost	$635,900	$731,075	$1,587,800	$834,800	$47,000	$17,250	$20,200	$900	$17,900	$3,892,825

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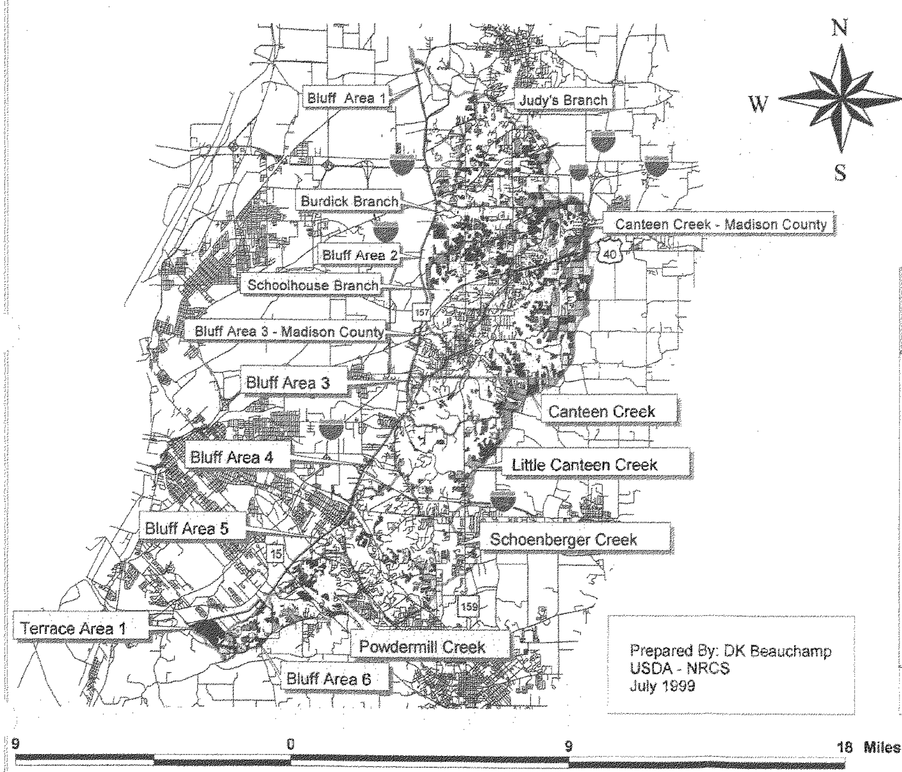
July 1999

Total Cost of Planned BMP's



Project Watersheds

Total Cost of Planned BMP's ($)

- 0 - 5000
- 5001 - 10000
- 10001 - 20000
- 20001 - 40000
- 40001 - 83100

Watershed Name	Planned Best Management Practice's Total Estimated Cost ($)
Bluff Area 1	138650
Bluff Area 2	52900
Bluff Area 3	
Bluff Area 3 - Madison County	
Bluff Area 4	32400
Bluff Area 5	14400
Bluff Area 6	229900
Burdick Branch	23400
Canteen Creek	492950
Canteen Creek - Madison County	1143700
Judy's Branch	373525
Little Canteen Creek	596400
Powdermill Creek	139800
Schoenberger Creek	465200
Schoolhouse Branch	166100
Terrace Area 1	23500
Total Estimated Cost	**$3,892,825**

Upland Cropland Erosion Inventory Summary

Existing Erosion and Sediment Yield

Watershed Name	Watershed Acreage	Acreage Inventoried	Existing Gross Sheet & Rill Erosion (Tons/Yr.)	Existing Gross Ephemeral Erosion (Tons/Yr.)	Existing Gross Gully Erosion (Tons/Yr.)	Total Existing Gross Erosion (Tons/Yr.)
Bluff Area 1	2866	372.9	7632	1775	184	9591
Bluff Area 2	683	191.1	2747	1367	0	4114
Bluff Area 3	127					
Bluff Area 3 - Madison County	919					
Bluff Area 4	951	66.2	1339	140	0	1479
Bluff Area 5	975	39.0	1529	53	0	1582
Bluff Area 6	1158	527.2	12980	1549	144	14673
Burdick Branch	1794	365.9	5297	347	16	5660
Canteen Creek	3477	684.9	8542	3187	64	11793
Canteen Creek - Madison County	10951	3918.9	37958	14359	336	52653
Judy's Branch	5411	1007.6	13747	5249	272	19268
Little Canteen Creek	5040	1133.5	14011	3750	0	17761
Powdermill Creek	2896	463.1	10363	422	40	10825
Schoenberger Creek	7756	875.1	18636	2458	0	21094
Schoolhouse Branch	4527	843.0	26877	3574	56	30507
Terrace Area 1	709	385.1	1412	280	0	1692
Total	**50,240**	**10,873.5**	**163,070**	**38,510**	**1,112**	**202,692**

Watershed Name	Existing Sheet & Rill Erosion Sediment Yield (Tons/Yr.)	Existing Ephemeral Erosion Sediment Yield (Tons/Yr.)	Existing Gully Erosion Sediment Yield (Tons/Yr.)	Total Existing Sediment Yield (Tons/Yr.)	Existing Sediment Delivered To Hwy. 157 (Tons/Yr.)
Bluff Area 1	5724	1901	182	7807	5465
Bluff Area 2	2060	1162	0	3222	2771
Bluff Area 3					
Bluff Area 3 - Madison County					
Bluff Area 4	1005	119	0	1124	967
Bluff Area 5	1147	45	0	1192	1025
Bluff Area 6	9735	1317	137	11189	9623
Burdick Branch	3973	295	15	4283	2998
Canteen Creek	6406	2390	58	8854	5313
Canteen Creek - Madison County	28469	10769	302	39540	23724
Judy's Branch	10311	4462	258	15031	9770
Little Canteen Creek	10508	3000	0	13508	10131
Powdermill Creek	7772	359	38	8169	6127
Schoenberger Creek	13977	1966	0	15943	9247
Schoolhouse Branch	20158	3038	53	23249	17437
Terrace Area 1	706	196	0	902	388
Total	**121,951**	**31,019**	**1,043**	**154,013**	**104,988**

Prepared By: DK Beauchamp
USDA - NRCS
July 1999

Upland Cropland Erosion Inventory Summary

Planned Erosion and Sediment Yield

Watershed Name	Watershed Acreage	Acreage Inventoried	Planned Gross Sheet & Rill Erosion (Tons/Yr.)	Planned Gross Ephemeral Erosion (Tons/Yr.)	Planned Gross Gully Erosion (Tons/Yr.)	Total Planned Gross Erosion (Tons/Yr.)
Bluff Area 1	2866	372.9	2162	33.0	12	2207
Bluff Area 2	683	191.1	272	9.0	0	281
Bluff Area 3	127					
Bluff Area 3 - Madison County	919					
Bluff Area 4	951	65.2	589	7.0	0	596
Bluff Area 5	975	39.0	468	1.0	0	469
Bluff Area 6	1158	527.2	6812	37.0	9	6858
Burdick Branch	1794	366.9	1826	7.0	1	1834
Canteen Creek	3477	684.9	3301	45.0	4	3350
Canteen Creek - Madison County	10951	3918.9	19126	241.0	21	19388
Judy's Branch	5411	1007.6	5064	72.6	17	5154
Little Canteen Creek	5040	1133.5	4893	90.0	0	4983
Powdermill Creek	2896	463.1	4361	24.0	3	4388
Schoenberger Creek	7756	875.1	6535	89.0	0	6624
Schoolhouse Branch	4527	843.0	3913	33.0	4	3950
Terrace Area 1	709	385.1	970	4.0	0	974
Total	**50,240**	**10,873.5**	**60,292**	**692.6**	**71**	**61,056**

Watershed Name	Planned Sheet & Rill Erosion Sediment Yield (Tons/Yr.)	Planned Ephemeral Erosion Sediment Yield (Tons/Yr.)	Planned Gully Erosion Sediment Yield (Tons/Yr.)	Total Planned Sediment Yield (Tons/Yr.)	Planned Sediment Delivered To Hwy. 157 (Tons/Yr.)
Bluff Area 1	1622	3.3	1.2	1627	1139
Bluff Area 2	204	0.9	0.0	205	176
Bluff Area 3					
Bluff Area 3 - Madison County					
Bluff Area 4	442	0.7	0.0	443	361
Bluff Area 5	351	0.1	0.0	351	302
Bluff Area 6	5109	3.7	0.9	5114	4398
Burdick Branch	1369	0.7	0.1	1370	959
Canteen Creek	2476	4.5	0.4	2481	1489
Canteen Creek - Madison County	14345	24.1	2.1	14371	8622
Judy's Branch	3798	8.7	1.7	3808	2475
Little Canteen Creek	3670	9.0	0.0	3679	2759
Powdermill Creek	3271	2.4	0.3	3274	2456
Schoenberger Creek	4902	10.3	0.0	4912	2849
Schoolhouse Branch	2935	4.0	0.3	2939	2204
Terrace Area 1	485	0.4	0.0	485	209
Total	**44,979**	**72.8**	**7.0**	**45,059**	**30,418**

Prepared By: DK Beauchamp
USDA - NRCS
July 1999

Following analysis of this erosion treatment report by the Project team, the measures, which had been identified during the alternative development process relating to land treatment, were determined to be less viable than others under consideration. The fact that land treatment in the bluff would by necessity be a voluntary program, meaning its overall results could not be accurately predicted, coupled with the rate of urban development projected for the region made the expenditure of $4,000,000 only a temporary and un-quantifiable solution. For this reason the Project team and technical partners continued to pursue more permanent long term measures for erosion and sediment control. This decision eliminated land treatment from the list of viable measures to be considered during alternative analysis.

E.3 NRCS INVENTORY OF POTENTIAL TRIBUTARY STREAM SEDIMENT DETENTION BASINS

As a follow on to the inventory of cropland in the bluff watersheds of the Project area NRCS performed an analysis of the number and potential location of dry detention basins that could be located in the bluff tributaries to eliminate sediment at its source. The inventory produced from this analysis was used by the biology team during the HEP data gathering efforts in Spring 1999. The following table E-1 identifies the number from related mapping of the potential location of each basin initially recommended and inventoried by watershed.

Table E-1 Inventory of Potential Tributary Stream Sediment Detention Basins

Watershed	Structure Name	Structure County	COST	Uncontrolled Watershed Acres	Controlled Watershed Acres(Fixed)	Total Watershed Acres	Potential Site Concerns	Structure Landuse
Big Canteen Creek	bc104	Madison		104.7		104.7		Woodland
Big Canteen Creek	bc107	Madison		57.5		57.5	Driveway & Power line (?)	Woodland
Big Canteen Creek	bc110	Madison		379.7	1108.9	1488.6		Woodland
Big Canteen Creek	bc111	Madison		453.8	116	569.8		Woodland
Big Canteen Creek	bc112	Madison		451.1		451.1	Road & House	Woodland
Big Canteen Creek	bc114	Madison		112.9	243.4	356.3		Woodland
Big Canteen Creek	bc14	Madison		147.7	47.7	195.4		
Big Canteen Creek	bc17	Madison		215	64.2	279.2		
Big Canteen Creek	bc23	Madison		418.6	120	538.6		
Big Canteen Creek	bc25	St Clair		419.1	75.2	494.2		Woodland
Big Canteen Creek	bc27	St Clair		52	0.5	52.6		
Big Canteen Creek	bc3	Madison		283.2		283.2		Woodland
Big Canteen Creek	bc31	Madison		56.7		56.7		Woodland
Big Canteen Creek	bc32	Madison		465.2	55.7	520.9		Woodland
Big Canteen Creek	bc33	St Clair		54.9		54.9		Woodland
Big Canteen Creek	bc34	Madison		268.1		268.1		Woodland
Big Canteen Creek	bc36	St Clair		43.2		43.2		
Big Canteen Creek	bc37	Madison		66.3		66.3		
Big Canteen Creek	bc38	Madison		200.7	274.3	475		Woodland
Big Canteen Creek	bc39	Madison		93.5		93.5		
Big Canteen Creek	bc41	Madison		94		94		Grassland
Big Canteen Creek	bc42	Madison		41.7	25.1	66.8		
Big Canteen Creek	bc43	Madison		25.4		25.4		

Table E-1 Continued

Watershed	Structure Name	County	COST	Uncontrolled Watershed Acres	Controlled Watershed Acres(Fixed)	Total Watershed Acres	Potential Site Concerns	Structure Landuse
Big Canteen Creek	bc53	Madison		21.5				
Big Canteen Creek	bc55	Madison		55.8	17.6	73.5		
Big Canteen Creek	bc60	St Clair		59.5		59.5		
Big Canteen Creek	bc65	St Clair		48.4		48.4		
Big Canteen Creek	bc69	Madison		151.1		151.1		
Big Canteen Creek	bc71	Madison		53.1	5.9	59		
Big Canteen Creek	bc75	Madison		25.5	61	86.5		
Big Canteen Creek	bc79	Madison		71.5		71.5		
Big Canteen Creek	bc84	Madison		133.1	17.4	150.5		
Big Canteen Creek	bc87	Madison		172.8	7.7	180.5		Woodland
Big Canteen Creek	bc88	Madison		110		110		Grassland
Big Canteen Creek	bc91	Madison		89.8	129.5	219.3		Cropland
Big Canteen Creek	bc93	Madison		38.7		38.7		Woodland
Big Canteen Creek	bc94	Madison		77.1	37.5	114.6		Woodland
Bluff Area 1	b1-10	Madison		21.3		21.3		Woodland
Bluff Area 1	b1-11	Madison		51.2		51.2		Woodland
Bluff Area 1	b1-12	Madison		123.4		123.4		Woodland
Bluff Area 1	b1-16	Madison		86.2	129.6	215.8		Woodland
Bluff Area 1	b1-20	Madison		86.5	12.5	99		Woodland
Bluff Area 1	b1-21	Madison		51.7		51.7		Woodland
Bluff Area 1	b1-6**	Madison		206.9	236.3	443.2		Woodland
Bluff Area 1	b1-7**	Madison		63.1		63.1		Woodland
Bluff Area 1	b1-8**	Madison		80.2	90.7	170.9		Woodland
Bluff Area 1	b1-9	Madison		69.3	12.2	81.4		Woodland
Bluff Area 1	b3(b1-2)	Madison		207.3		207.3		Woodland
Bluff Area 1	b3-3	Madison***		234.1		234.1		Woodland
Bluff Area 1	b4(b1-1)	Madison		253.6		253.6		Road
Bluff Area 2	b2-1			46.2		46.2		Woodland
Bluff Area 2	b2-11			155	51.6	206.6		Woodland
Bluff Area 2	b2-2			61.9	206.6	268.5		Woodland
Bluff Area 3*	b3-1	Madison		138.9		138.9		
Bluff Area 4	b4-36			108.5	8.6	117.1		Woodland
Bluff Area 4	b4-37			109.8		109.8		Woodland
Bluff Area 4	b4-38			70.8		70.8		Woodland
Bluff Area 4	b4-39			38.7		38.7		Woodland
Bluff Area 4	b4-40			49.1		49.1		Woodland

Table E-1 Continued

Watershed	Structure Name	Structure County	COST	Uncontrolled Watershed Acres	Controlled Watershed Acres(Fixed)	Total Watershed Acres	Potential Site Concerns	Structure Landuse
Bluff Area 5	b5-1			193.1		193.1		Woodland
Bluff Area 5	b5-2			15.4		15.4		Woodland
Bluff Area 5	b5-3			74.3		74.3		Woodland
Bluff Area 6	hb1	St Clair		42.2		42.2		
Bluff Area 6	hb2	St Clair		86.2		86.2		Cropland
Bluff Area 6	hb3	St Clair		91.8		91.8		
Bluff Area 6	hb4	St Clair		229.3	50.8	280.1		Woodland
Bluff Area 6	hb5	St Clair		149.5	84.2	233.7		Woodland
Bluff Area 6	hb9	St Clair		96.2	371.9	468.1		Cropland
Burdick Branch	bb10	Madison		75.2	220.1	295.3		Woodland
Burdick Branch	bb11	Madison		301.4		301.4		Woodland
Burdick Branch	bb8	Madison		397.3	773.2	1170.6		Woodland
Burdick Branch	bb9	Madison		224.4	102	326.4		Woodland
Judy's Branch	jb1	Madison		293		293		Woodland
Judy's Branch	jb12	Madison		50.8		50.8		Woodland
Judy's Branch	jb13	Madison		114.7		114.7	Road	Woodland
Judy's Branch	jb14	Madison		64.8	60.4	125.2		Woodland
Judy's Branch	jb15	Madison		123	7	130		Woodland
Judy's Branch	jb16	Madison		39.4		39.4		Woodland
Judy's Branch	jb17	Madison		106.1		106.1		Woodland
Judy's Branch	jb18	Madison		29.6		29.6		Woodland
Judy's Branch	jb19	Madison		110.6		110.6		Woodland
Judy's Branch	jb2	Madison		200.9	38.2	239.2		Woodland
Judy's Branch	jb25	Madison		123.7	7.9	131.7		Woodland?
Judy's Branch	jb27	Madison		37.8		37.8		Woodland
Judy's Branch	jb3	Madison		209.7	38.4	248.1		Woodland
Judy's Branch	jb32	Madison		28	3.5	31.5		Woodland
Judy's Branch	jb34	Madison		50.4		50.4		Driveway
Judy's Branch	jb38	Madison		114.8		114.8		Woodland
Judy's Branch	jb4	Madison		60.4		60.4	road	Woodland
Judy's Branch	jb46	Madison		135.4	60.4	195.7		Woodland
Judy's Branch	jb5	Madison		71.1	116.5	187.5		Woodland
Judy's Branch	jb6	Madison		253.6	227.9	481.5	Road	Woodland
Judy's Branch	jb7	Madison		83.9	264.5	348.4		Woodland
Little Canteen	lc1	St Clair		279.4	20	299.4		
Little Canteen	lc12	St Clair		181.1	52.1	233.2		
Little Canteen	lc13	St Clair		64.6	67.9	132.4		

Table E-1 Continued

Watershed	Structure Name	Structure County	COST	Uncontrolled Watershed Acres	Controlled Watershed Acres(Fixed)	Total Watershed Acres	Potential Site Concerns	Structure Landuse
Little Canteen	lc14	St Clair		194.3		194.3		
Little Canteen	lc15	St Clair		14.7	54	68.8		
Little Canteen	lc17	St Clair		24.9		24.9		
Little Canteen	lc18	St Clair		146.4	57	203.4		
Little Canteen	lc19	St Clair		163.2	823.2	986.5		
Little Canteen	lc2	St Clair		207		207		Woodland
Little Canteen	lc20	St Clair		71.6	11.3	83		
Little Canteen	lc22	St Clair		140.9	38.6	179.5		
Little Canteen	lc23	St Clair		103.4		103.4		
Little Canteen	lc26	St Clair		40.2		40.2		
Little Canteen	lc28	St Clair		142.7	3	145.8		
Little Canteen	lc30	St Clair		40.8		40.8		
Little Canteen	lc34	St Clair		21.2		21.2		
Little Canteen	lc36	St Clair		46.8		46.8		Woodland
Little Canteen	lc38	St Clair		25.1		25.1		Woodland
Little Canteen	lc4	St Clair		415.6	230.1	645.7		
Little Canteen	lc40	St Clair		223.9		223.9		Woodland
Little Canteen	lc8	St Clair		212.3	17.9	230.1		
Powdermill Creek	pc10	St Clair		208.7		208.7		Woodland
Powdermill Creek	pc11	St Clair		75.5		75.5		Cropland
Powdermill Creek	pc12	St Clair		272.5		272.5		Woodland
Powdermill Creek	pc13	St Clair		607	405.9	1012.9		Grassland
Powdermill Creek	pc15	St Clair		118.5		118.5		Woodland
Powdermill Creek	pc16	St Clair		65	184.8	249.9		Woodland
Powdermill Creek	pc17	St Clair		66.3		66.3		Woodland
Powdermill Creek	pc18	St Clair		26.5		26.5		Woodland
Powdermill Creek	pc19	St Clair		38.1		38.1		Woodland
Powdermill Creek	pc20	St Clair		47.6		47.6		Woodland
Powdermill Creek	pc6	St Clair		274.8		274.8		
Powdermill Creek	pc7	St Clair		51.1		51.1		Woodland
Powdermill Creek	pc8	St Clair		263.3	20	283.3		Woodland
Powdermill Creek	pc9	St Clair		170	340	509.9		Woodland
Schoenberger Creek	hs18	St Clair		106.9		106.9		Woodland
Schoenberger Creek	hs19	St Clair		177.5		177.5		Cropland
Schoenberger Creek	hs20	St Clair		90.1		90.1		Woodland
Schoenberger Creek	hs21	St Clair		48.7	25.9	74.6		Woodland
Schoenberger Creek	hs22	St Clair		162.5	13.1	175.6		Woodland
Schoenberger Creek	hs23	St Clair		123.9	57.3	181.2		Woodland
Schoenberger Creek	hs24	St Clair		86.8		86.8		Woodland
Schoenberger Creek	hs25	St Clair		83.6		83.6		Woodland

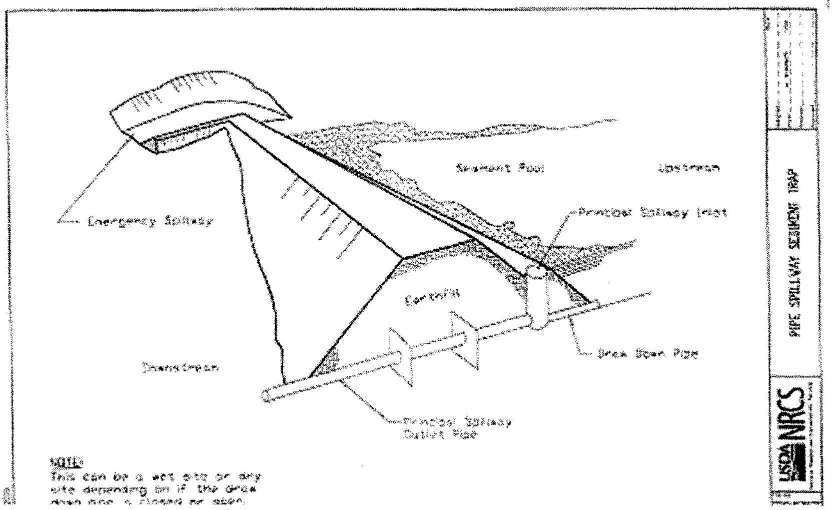
Table E-1 Continued

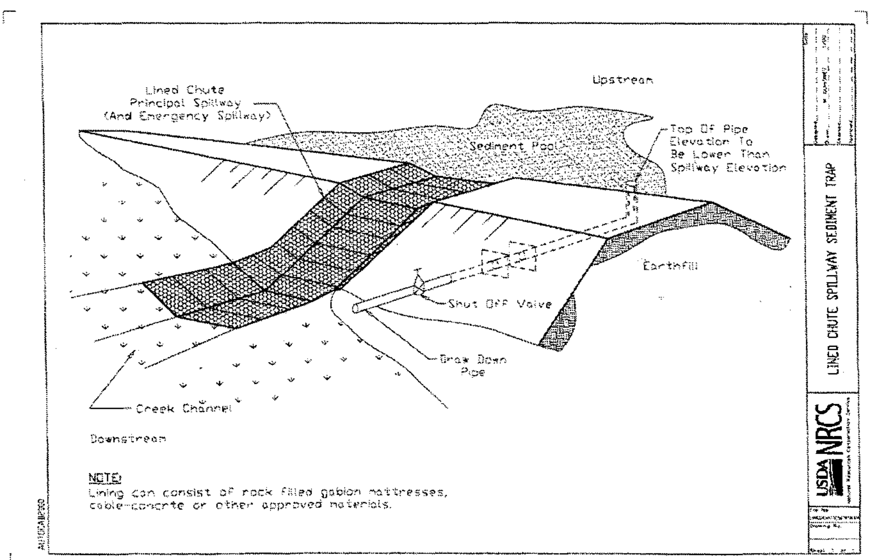
Watershed	Structure Name	County	COST	Uncontrolled Watershed Acres	Controlled Watershed Acres(Fixed)	Total Watershed Acres	Potential Site Concerns	Structure Landuse
Schoenberger Creek	hs26	St Clair		39.4		39.4		Woodland
Schoenberger Creek	hs27	St Clair		555.2	1496.8	2052		Woodland
Schoenberger Creek	hs28	St Clair		146.7		146.7		Woodland
Schoenberger Creek	hs29	St Clair		138.9		138.9		Woodland
Schoenberger Creek	hs30	St Clair		195.5		195.5		Woodland
Schoenberger Creek	hs31	St Clair		62.5	30.1	92.6		Woodland
Schoenberger Creek	hs32	St Clair		141.9	426.4	568.3		Cropland
Schoenberger Creek	hs33	St Clair		63.7	27.4	91.1		Woodland
Schoenberger Creek	hs34	St Clair		122.7	142.4	265.1		Woodland
Schoenberger Creek	hs35	St Clair		129.9	12.4	142.4		Woodland
Schoenberger Creek	hs36	St Clair		234.8	24.7	259.6		Woodland
Schoenberger Creek	hs53	St Clair		44.8		44.8		Woodland
Schoenberger Creek	hs54	St Clair		115.4	40.8	156.3		Woodland
Schoenberger Creek	hs55	St Clair		34		34		Woodland
Schoenberger Creek	hs57	St Clair		105.8		105.8	Driveway	Developed
Schoenberger Creek	hs59	St Clair		60.5	115	175.5		Woodland
Schoolhouse Branch	sh1	Madision		15.8		15.8		Developing
Schoolhouse Branch	sh10	Madision		458		458		Woodland
Schoolhouse Branch	sh11	Madision		197.1	8.2	205.3		
Schoolhouse Branch	sh12	Madision		49.6		49.6		
Schoolhouse Branch	sh13	Madision		60.5	30	90.4		Woodland
Schoolhouse Branch	sh14	Madision		191.6	629.2	820.8	Houses on site	Woodland
Schoolhouse Branch	sh15	Madision		43.2		43.2		Woodland
Schoolhouse Branch	sh17	Madision		139.4	150.3	289.7		Woodland
Schoolhouse Branch	sh2	Madision		11.4	77.5	88.9		Woodland
Schoolhouse Branch	sh3	Madision		317.9		317.9		Woodland
Schoolhouse Branch	sh4	Madision		132.1	19.5	151.6	Lane	Woodland
Schoolhouse Branch	sh5	Madision		67.9		67.9		Grassland
Schoolhouse Branch	sh7	Madision		169.4	288.5	457.8		Woodland
Schoolhouse Branch	sh9	Madision		54	6	60.1		Woodland

E.4. NRCS REPORT ON TRIBUTARY STREAM SEDIMENT BASINS

Analysis of the standard construction methods used for the construction of bluff dry detention basins was made. This analysis indicated that standard earthen dam structures, Figure E-1, typically seen, would by necessity disturb large areas of the bluff tributaries and their surrounding natural habitat, which is predominantly forest. The area required for the footprint of these structures in the bluffs and the methods used in their construction were determined not to be desirable. Based on this assessment the NRCS and Corps formed a technical team to evaluate alternate design and construction options for these basins. The following is the report prepared by NRCS on the re-evaluation of methods and recommendation for these basins.

Figure E-1 NRCS Standard Dry Detention Basin Designs





TRIBUTARY STREAM SEDIMENT BASIN ANALYSIS
U. S. ARMY, CORPS OF ENGINEERS
ECOSYSTEM RESTORATION PROJECT

Prepared by USDA, Natural Resources Conservation Service
March 8, 2000

E.4.1 Introduction. This report investigates the potential of using sediment retention structures in the tributary streams, which drain into the American Bottoms to reduce the sediment that is presently flowing down the existing stream system. The sediment that reaches the Bottoms is filling in the already limited system of existing drainage ditches, reducing their capacity to carry runoff without flooding. This sediment also affects the planning for future sediment control structures in the Bottoms, because any proposed structure must be designed to store this sediment over the life of the structure or include a scheduled clean-out cost. Structures that would retain some of the sediment in the tributary stream could reduce the cost of sediment control structures in the Bottoms by allowing them to be smaller, and/or reducing the clean-out maintenance required. The design and analysis of each structure's impact will be determined in the final design stage. A structure by structure site review, geologic investigation, and design will be needed to address the individual site-specific needs of each structure.

E.4.2 Structure Description. The type of structures proposed for use in the bluffs surrounding the Metro-East area (American Bottoms) must minimize environmental impact while maximizing sediment trapping efficiency. To reduce their impact on the environment, the proposed structures will be made predominantly of a material other than earthfill, allowing steeper slopes in the structure design. This will allow the structures to have a smaller footprint on the ground and not require the clearing of a borrow area from which to excavate earthfill.

The proposed dry structure type will allow more flow to pass quickly over the structure than the typical pond type of structure. A dry sediment trapping site is one where the water from a rainfall event fills up behind the structure and then is allowed to drain down slowly after the storm passes; no water is permanently held behind the structure. The corresponding sediment trap efficiency will be about 10% lower for a dry site versus a pond. The main advantage to a dry site in the wooded location is that it will not have the detrimental effect on the environment that a structure of the same size that impounds water permanently would have; by not submerging the base of the trees and eventually killing them.

The proposed structures will be built with chute or straight overfall type spillways, instead of using typical pipe outlet spillways. This reduces the amount of water storage area needed at each structure during rainfall events. A chute structure conveys major flows of water over the structure and down the back side through an armored chute, whereas a straight overfall structure directs the water through a notched weir and allows it to drop into a stilling basin below. Chutes will be protected from water erosion with materials such as rock riprap, roller compacted concrete, or reinforced concrete to line the channel. The use of rock riprap will be limited to only very small, low hazard structures. All sites will include low flow pipes to dewater the structures between flow events. Several innovative designs will be required to adapt these types of structures to the tributary stream environment. Because the watershed areas above these sites vary from 15 to 2000 acres in size, the engineering complexity in the design of the sites will vary from simple to elaborate.

With no permanent water in the sediment pool of the site, the sediment deposited will be denser than it would have been in a permanently wet site. This is because in an environment where the sediment is allowed to dry out, it is compressed by the total weight of the sediment above it, not the lighter buoyant weight that would be the case in a site that never dries out. The sediment in these sites is expected to reach a density of 80 lbs. per cubic foot. These sites will be designed to hold 50 years worth of sediment to the crest of the outlet of the structure, approximately double the life of a wet site with similar volume.

E.4.3 Preliminary Design Assumptions. Several assumptions have been made to simplify the preliminary design process. When the final design and construction plans are drawn up for each of these individual structures, the assumptions will need to be confirmed. In most cases, changes to the assumptions will translate into higher costs. These present assumptions are as follows:

E.4.3.1 Hazard Class. For the purpose of this analysis, all structures are assumed to be low hazard. A detailed breach routing analysis will need to be performed on each site to confirm this. This will be of particular importance where houses, roads or railroads are directly downstream.

E.4.3.2 Mining Activity. These structures are designed with the understanding that the sites are probably undermined, but that the mining activity will not substantially affect the design. This will require on-site drilling and/or the study of mining activity maps to confirm this for each site and estimations on the effect on the final design. It should be noted that more than 300 small structures have been successfully been built in the upland area since the end of commercial mining. This would indicate that although the potential of a site being undermined is high and should be considered in the design process, it is not an insurmountable problem. These structures were identified and located on the Geographic Information System (GIS) layers developed during this study.

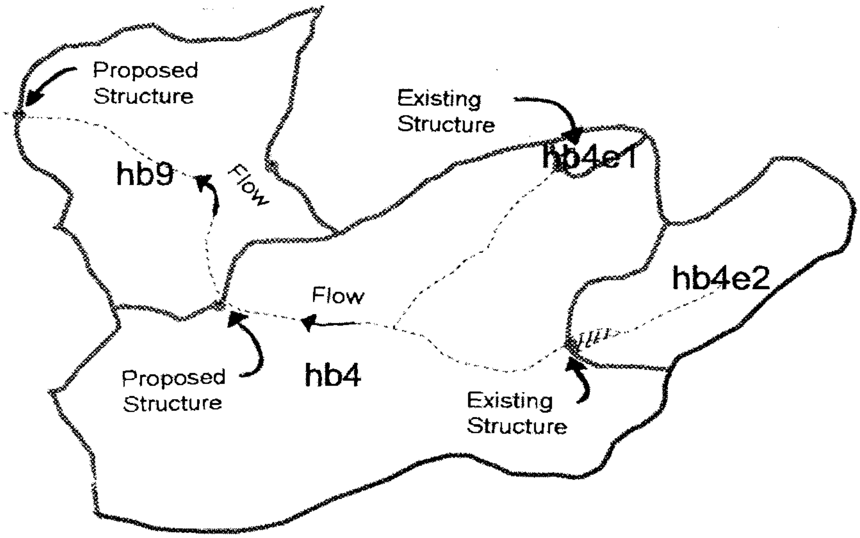
E.4.3.3 Sediment Flows Through Sites In Series. Where structures are arranged in series with flow from one or more upper areas flowing down through a structure site, it is assumed that each structure traps the sediment coming from the uncontrolled area directly above it, Figure E-2. Any sediment that escapes from the structures located above this area is assumed to pass through the lower structure without being trapped. This is because only the very small particles of soil will stay in suspension long enough to avoid deposition in the upper structures. If they were small enough to avoid precipitating out on the first structure, it is very unlikely that the downstream sites have a retention time long enough to prevent these small particles from being flushed through the system.

To help explain how the concept of controlled and uncontrolled watershed are defined and used in this study, complete definitions and simple examples follow:

"Uncontrolled sub-watershed": for the purpose of this study, a sub-watershed or portion of a watershed not upstream of another planned or existing structure. This area is contributing eroding soil to this planned structure basin.

"Controlled watershed": for the purpose of this study, a sub-watershed which has an existing structure, or a sub-watershed which is planned to have a structure in the future. The purpose of these structures is to capture or "control" eroding soil from proceeding further downstream.

Figure E-2 Example Watershed Map



Below, in table E-2, is a description of how, from the above map, the areas would be defined for the two proposed sites

Table E-2 Example of Basins in Watershed

Example	Proposed Structure	"Uncontrolled" Watershed	"Controlled" Watersheds	Explanation
1	hb4	hb4	hb4e1 and hb4e2	hb4e1 and hb4e2 are existing ponds
2	hb9	hb9	hb4, hb4e1, hb4e2	It is assumed that hb4 will be installed; hb4e1 and hb4e2 are existing ponds

E.4.3.4 Sediment Capacity. The structures will be sized to accommodate 50-years accumulated sediment at the crest of the weir or chute.

E.4.3.5 Sediment Density. Volume of the sediment will be based on a density of 80 lbs. per cubic foot. This sediment density is common in sites that are dewatered between storm events.

E.4.4 Changes from Earlier Work. An earlier study conducted by NRCS evaluated 21 structures in the tributary area in Judy's Branch, Big Canteen, and Schoolhouse Branch watersheds. Because of a change in methodology and detail, these structures were reanalyzed in this study. The main features that changed and affected the design are as follows:

The first study assumed the majority of these sites were pipe type structures, not chutes. This will cause the trap efficiency to be lower for the new study.

The original structures had no other structures above them. One example would be the structure named Big Canteen (BC) 32. In the original study, the structure was assumed to capture all the sediment above it. This study is more detailed; it takes into account several small existing sites that are trapping sediment above it. A new site, BC 7, was proposed in the watershed above BC 32, which will trap sediment that would have reached BC 32. The result of this new site is that the new structure BC 32 can be smaller and still store 50 years worth of sediment. Because of these differences, the structure designs should not be assumed to be comparable between the first study of tributary stream sites and this study.

E.4.5 Analysis Methodology.

E.4.5.1 Site Selection. This study looks at all potential sites in the bluffs. The largest number of sites identified (more than 350) are in the "existing" category. Second are the sites in the "potential" category, numbering 166. The sites were divided into three types:

Existing Sites, Potential Sites, Untreatable

The "potential" sites are the sites that this study concentrates on. For the sedimentation rate analysis, it is assumed that all of these sites are installed as a system. The decision to label a site "potential" was based on a visual review of the United States Geologic Survey (USGS) data layer that came from the 7.5 minute quadrangle sheets. This visual review removed sites that had a major site restriction readily apparent. "Untreatable" sites were those which included major incursions from houses, highways and/or railroads. In the final design stage, actual site reviews will be needed to confirm site viability.

E.4.5.2 Watershed Area and Landuse. The planned structures were incorporated into a Geographic Information System (GIS) data layer. This allows each site to be accurately located and its watershed delineated and measured. With the addition of the landuse layer, the watersheds above each site can be analyzed by land use. Because of the number of tributary stream sites reviewed, the use of GIS is critical to accurately analyze each site in a timely manner.

The landuse categories were reduced from the GIS layer to a spreadsheet, which was used to calculate structure size. This was done to match the land use categories in the NRCS, Metro East Re-evaluation Study completed in October 1998. Average erosion rates were established for these standard categories: Agricultural, Urban, and Forest/Grass. The landuse of open water was added later and a erosion rate of zero assigned to it.

E.4.5.3 Erosion Rates. For each site, the uncontrolled area of each land use was multiplied by its expected yearly sheet and rill erosion rate to produce the predicted erosion amounts. These rates also came from the NRCS, Metro East Re-evaluation Study completed in October 1998. The estimated erosion rates were developed with the use of the Universal Soil Loss Equation (USLE). Any future work done for comparison should also use the USLE for consistency. An adjustment was made to these rates in the case of forestland and grassland. To be consistent with the assumptions the Corps of Engineers has made about development over the next 50 years, the sedimentation rate was increased from 1 to 3 tons per acre per year. This accounts for the 2 to 3 year conversion period from forest and grasslands to urban and suburban development, when large parts of the landscape are exposed to excessive erosion. The predicted erosion rate will be reduced once it is converted to urban/suburban land uses. The Re-evaluation Study had predicted that the erosion rate on this disturbed ground could be expected to be in the 65 tons per year per acre range; the 3 ton per acre figure is an approximate average over the life of the structures.

For ephemeral and gully erosion, the same report was used to derive a per-acre rate for each watershed. These rates were used as the estimated ephemeral and gully erosion rate for the upland sites. The uncontrolled area was multiplied by this rate to produce an estimated ephemeral erosion quantity for each site.

E.4.5.4 Sediment Delivery Ratio. The sediment delivery ratio (SDR) captures how much erosion is moved from its original location to the edge of the main water course and is available to transport. Each type of erosion has an SDR associated with it. The total erosion in tons per year is multiplied by the SDR to find the amount of sediment available for transport. These factors also were taken from the NRCS, Metro East Re-evaluation Study completed in October 1998.

E.4.5.5 Sediment Transport Factor. A sediment transport factor (STF) rates the ability of the stream to transport sediment. Streams are not 100% efficient at moving sediment from the top of the drainage pattern to the bottom. The STF reflects this efficiency. The STF will usually decrease as you move down the drainage pattern. This is because, in most cases, the longer the flow length, the more potential that the sediment will have to fall out of suspension along the way due to changes in velocity. For the purpose of estimating the amount of sediment arriving at a potential site, this study uses an STF of one. Because most of these sites are in the upper end of the watershed, the STF should be high because of the limited flow length between the top of the flow pattern and the site.

This STF is also important in finding how much of the trapped sediment would have eventually made it to the bottom of the bluffs, had it not been stopped by the structures. The STF values for the watersheds (their ability to transport sediment to the bottom of the bluffs at Highway 157) all came directly from the NRCS, Metro East Re-evaluation Study done in October, 1998 and are as follows:

Watershed	STF
-Bluff Area 1	.68
-Bluff Area 2	.86
-Bluff Area 3	.84
-Bluff Area 4	.86
-Bluff Area 5	.86
-Bluff Area 6	.86
-Burdick Branch	.74
-Canteen Creek	.59
-Judy's Branch	.57
-Little Canteen	.59
-Powdermill Creek	.66
-Schoenberger Creek	.54
-Schoolhouse Branch	.6

This means that stopping 100 tons of sediment in the upper end of Burdick Branch will stop 74 tons of sediment from reaching Highway 157.

E.4.5.6 Sediment Volume. Sediment volume at each structure was found by multiplying the sheet and rill, ephemeral, and gully erosion quantities by their appropriate sediment delivery rate. This quantity was then multiplied by the STF of one. To convert from tons to acre-feet, the density of sediment of 80 pounds per cubic feet was used. This density assumes that the sediment is allowed to dry out after it is deposited.

E.4.5.7 Trap Efficiency. An estimated trap efficiency was multiplied by the volume of sediment arriving at each structure. The resulting volume was then used to derive a calculated trap efficiency, using the ratio of capacity of reservoir volume to the average annual inflow (CI ratio) (Brune 1953, Gottschalk 1965). There are three curves available based on soil texture; the median curve was used in this study. The estimated trap efficiency was interactively corrected in the spreadsheet until the estimate equaled the calculated value within a percent or two.

The equation for the trap efficiency curve was found using traditional curve fitting techniques. This produced an equation to automatically calculate trap efficiency (CT) in the spreadsheet as follows:

$CT=82 \arctan(\log CI-\log .0018)-2.5(CI-0018)$ when $CI>.04$
$CT=57(\log CI-\log .0018)$ when $CI<.04$

These are the equations for traditional retention (pond) type sites with standing water always present. For dry sites as analyzed in this report, the trap efficiency will be only 90 percent of what a wet site would be (SCS, NEH 3). The trap efficiency calculated for each site was produced by using the above equations multiplied by .9 to reflect the dry nature of these sites.

E.4.5.8 Weir Elevation. The weir elevation was found using the stage storage curve as produced by the GIS system. The 3D analyst tool in GIS used a triangulated irregular network (TIN) developed from the contours digitized from the USGS 7.5 minute quadrangle maps. This TIN found the area for each contour interval upstream of the structure. The stage storage volume was then generated from this elevation versus area data in the GIS system. The weir crest elevation was set to the height required to store the 50-year sediment volume as defined by the stage storage curve.

E.4.5.9 Structure Height. Weir height was found by subtracting the lowest elevation on the stage storage table from weir elevation. The height derived is based on the height above the flood plain. It does not include the depth of the incised low flow channel. This channel can range from 3 to 5 feet deep on average in the upper end of these watersheds. Therefore, one of the small sites that shows a 3' high structure may have a height from the low spot on the cross-section to the weir of 6 to 9 feet.

E.4.5.10 Surface Area. The surface area of ponded water during a storm event was found using the elevation versus surface area curve that was created when the stage storage curve was derived (See "Weir Elevation").

E.4.6 Results. The following, table E-3, presents a summary of the main results of this study. The average structure height is 13.6 feet above the flood plain, with a range from under 5 feet to over 25 feet.

Table E-3 Summary Data of Potential Tributary Stream Sediment Detention Basin

Watershed Name	Number of Potential Structures	Sediment Stored 50 Year Life (Ac-Ft)	Average Weir Height Above Floodplain	Surface Area, (Acres)	Amount of Sediment Not Reaching Highway 157 (Tons/yr)
Big Canteen Creek	37	1013.4	13.5	168.3	20835
Bluff Area 1	13	164.9	8.5	24.2	3908
Bluff Area 2	3	33.3	7.4	4.6	997
Bluff Area 3	1	20.8	22.6	2.3	609
Bluff Area 4	5	84.9	16.3	10.6	2545
Bluff Area 5	3	55.8	21.0	5.8	1673
Bluff Area 6	6	210.8	17.7	25.9	6316
Burdick Branch	4	148.7	16.0	22.8	3834
Judy's Branch	21	338.3	11.7	52.8	6720
Little Canteen	21	408.4	12.7	65.5	8398
Powdermill Creek	14	222.4	12.5	31.6	5115
Schoenberger Creek	24	218.0	9.4	38.7	4102
Schoolhouse Branch	14	263.1	13.5	24.5	5501
Total	166	3182.8	14.1	477.6	70553

E.4.7 List of NRCS Technical Specialists Responsible for this Project.

NAME	PRESENT TITLE	LOCATION
Paul Kremmel	Resource Analyst (GIS)	Southern Illinois University (Edwardsville Campus)
Donna Beauchamp	Soil Conservationist	Madison /St Clair Field Offices
Sam Janssen	Engineering Technician	Champaign State Office
John Harryman	District Conservationist	St Clair County Field Office
Leslie Michael	District Conservationist	Madison County Field Office
Thomas Book	Civil Engineer	Champaign State Office

E.4.8 NRCS Report Appendix

E.5 NRCS REPORT ON STREAMBANK EROSION

As a part of their cooperative effort on the Project, the NRCS performed a 100% inventory of the Big Canteen Creek Watershed in order to characterize streambank loss and its contribution to the sediment load being delivered to the bottoms. This work was done to compliment the inventory of cropland erosion and sediment control in order to provide a more complete understanding of the bluff dynamics. The following is the information provided from this effort.

PMOG 6/21/99

STREAMBANK INVENTORY FOR BIG CANTEEN CREEK
MADISON AND ST. CLAIR COUNTIES

INTRODUCTION

The field work for this report was completed by Jerry Berning, Soil Scientist; Roger Windhorn, Soil Scientist/Geomorphologist; and Wayne Kinney, Streambank Specialist. The data was summarized by Paul Kremmel, GIS Specialist; Karri Greten, Resource Conservationist and Chad Boeving, Resource Planning Specialist at the Bellville Field Office. The report was written by Wayne Kinney.

This report was completed as a portion of agreement MIPR W81C8X90950711 between the USDA, Natural Resources Conservation Service (NRCS) and the St. Louis Army Corps of Engineers (COE). The objective of this section is to provide an estimate of the extent of the annual sediment problem produced by streambank erosion in Big Canteen Creek and to identify potential streambank treatments and estimated installation costs, including those associated with geo-technical failures.

Soils in this area are primarily those formed entirely or at least partially in loess. This windblown material is quite high in silt content, and contains appreciable amounts of very fine and fine sand in the bluff areas immediately adjacent to the Mississippi River. Because of this, these soils are quite easily eroded. In the streambeds the loess has sometimes been totally eroded away leaving a channel bed of limestone, shale or glacial till. In these instances, the channel degradation is essentially halted in the case of limestone or substantially slowed in the case of glacial till. Channel adjustments to changing hydrologic conditions however continue to occur both vertically and horizontally. Streambank erosion may even increase over time as the channel adjusts due to impinging flow patterns exposing geo-technical problems such as seeps and slip planes that occur at the interface of these differing materials resulting in "rotational slumps" and other geo-technical failures. Channel erosion may also increase if bed degradation continues or accelerates due to removal or failure of some "existing" grade controls allowing "knickpoints" to advance.

METHOD

This report is based on a 100% inventory of all the perennial streams denoted on the USGS quadrangle maps by a solid blue line. To catalog and identify stream locations more easily Big Canteen Creek itself was divided into a hierarchical scheme of 10 segments denoted as 1M (main), 2M, 3M etc. Each tributary entering the mainstem was then assigned a number beginning at 3M as 1L (left), 2L, 3L etc. for those tributaries entering from the left and 1R, 2R, 3R, etc. for those entering from the right. Each secondary tributary was then given a numerical sequence from an upstream location in each tributary, such as 2L1, 2L2, etc. and if there is a tertiary tributary stem it was assigned a sequential number such as 6L4-1. Thus if a stream segment is identified as 6L4-2 it can be immediately recognized as a tributary to 6L4, a tributary to 6L which is the sixth tributary to enter the mainstem from the left side of the channel. This system also allows the cumulative computation of sediment generation as one progresses from upstream to downstream either on the mainstem or on a particular tributary. See the attached map for location of stream segments.

After stream segments were identified, each segment was then inventoried by walking the entire length of the segment and estimating the length, height, lateral recession rate and soil density of each partial segment on the right and left bank. These partial segments are of various lengths, but represent each significant change in channel condition throughout the segment on each side of the channel and are assigned a numerical "reference #". The reference numbers are sequential within the stream segment from a downstream to upstream sequence.

Sediment estimates are then calculated for each segment and added together to arrive at a total estimate of annual streambank erosion. Since literally everything eroded from the streambanks is immediately available for transport, the Sediment Delivery Rate for channel erosion is assigned a value of 1.0. The Sediment Transport Factor assigned for Canteen Creek watershed in a study conducted in 1998 by NRCS derived from curves prepared by Waldo and Clarke (Clarke and Waldo, Proceedings of the Fourth Federal Interagency Sedimentation Conference, March 1984) for small and medium watersheds remains valid, but is applicable to the entire watershed only. By factoring in 1) Size of the watershed 2) Channel density 3) Bifurcation ratio 4) Waterslope of the 3rd order streams (gradient) 5) Overall channel sinuosity 6) Connection of upland gullies to streams and floodplains (also the width of existing floodplains), and 7) Nature of sediment itself (i.e D50) a STF of .41 has been calculated. However, since the purpose of this portion of the study is to identify the portion of sediment contributed annually below Highway 157 by the streambank erosion, the STF of .41 must be adjusted to reflect the higher transport efficiency of this channel. A STF of .75 has been assigned to Canteen Creek for streambank erosion only, based on the following observations: 1) This channel has an average entrenchment ratio of just over 2.0, which means that flow at twice the maximum bankfull depth is just reaches the floodplain elevation, but does not spread out over the floodplain [approximately a 50 year return interval] 2) the major component of the sediment is fine sand or smaller in size which tends to stay in suspension at lower velocities and is therefore easily transported 3) there no evidence of significant deposition within the flood prone area in the form of overbank deposition or sediment deposits behind the existing rock grade control structures, although there are some developing point bars within the channel.

As this study looked at 100% of the perennial streams in the Big Canteen Creek Watershed above Highway 157, the "Delivered Sediment" to Highway 157 resulting from streambank erosion is simply the measured volume multiplied by the Sediment Delivery Rate of 1.0 and the Sediment Transport Factor of 0.75.

Lateral recession rates applied to eroding bank areas are based on criteria developed by the NRCS using bank exposure, tree root exposure, vegetation overhang, slumps, slides and cultural features such as fence corners missing or realignment of roads to estimate the annual recession rates. Height of the eroding bank used to calculate sediment generation is not based on the total height of the eroded bank since the entire bank is not subject to scour on an annual basis. To account for this difference the estimated depth of the bankfull flow (Dbkf) was initially determined based on a regional curve developed for bankfull dimensions vs. drainage area by Dunne and Leopold, 1978. This regional curve was then compared with a regional curve based on field determinations at 4 USGS Stream Gage Sites in the Metro-East area thought to be the best comparison data for Canteen Creek, which is not gaged. These two curves were then compared by taking a typical cross section on Canteen Creek and analyzing the stream dimensions predicted by the two curves. The locally developed curves were found to be closer to the field indications of bankfull flow, especially in relation to bankfull depth, and have been selected for use in this report. The stream used to develop the local curve are Indian Creek at Wanda, IL, Sta 05588000; Richland Creek near Hecker, IL, Sta 05595200; Cahokia Creek at Edwardsville, IL, Sta 05587900; and Silver Creek near Troy, IL, Sta 05594450. The average "Return Interval" for the bankfull conditions on these four streams was computed at 1.2 years based on USGS peak flow data.

Having developed a usable "regional curve" the height of eroding bank was then based on the following assumptions.

1) Severely eroding sights would use an eroding bank height of 1.3 times the Mean Bankfull Depth. This depth approximates the Maximum Bankfull Depth in the typical cross section and equates to the area impacted on an estimated 1.2 year return interval.

2) Moderately eroding sights would use an eroding bank height equal to the lesser of the Mean Bankfull Depth or the observed eroding bank height

3) Slightly eroding banks would use the field observed height of scour as the eroding bank height.

GEOMORPHIC CHARACTERIZATION

Canteen Creek has experienced downcutting action in the past and is still downcutting in some sections where there is no existing grade control. This past downcutting has caused the abandonment of the former floodplain confining most flood flows to within the channel resulting in width/depth ratios of 10 or less. (Mean Bankfull Width divided by Mean Bankfull Depth) The degradation process has resulted in the lowering of the base level an estimated 3 to 4 feet. This estimate is made based on observing this 3 to 4 feet difference in elevation at many older concrete box culverts under the railroad that parallels the lower portion of Canteen Creek. The result is over-steepening of the sideslopes and rejuvenating all the tributaries to the main-stem. The oversteepened sides then begin a process of "failing" to a stable slope and the "knickpoints" in the bed advance up each tributary in the drainage network increasing the sediment supply from both the channel degradation and bank failure. The mainstem of Canteen Creek is generally in Stage 3 (widening stage) of the evolutionary process where grade control exists. The remainder of the mainstem and many of the tributaries are in Stage 2 (downcutting). See Exhibit 1

The natural process of a channel to balance its slope with that of the valley and rebuild its floodplain will require the sinuosity to increase through a process of lateral extension (bank erosion). The result is then a movement to a channel where the width/depth ratio decreases as slope decreases and the energy gradient is lessened. This process will continue until the increase in sinuosity and decrease in width/depth ratio producing a channel that is no longer entrenched but has now developed a new floodplain at the bankfull stage and capable of safely passing even large storm events with very little channel erosion. At this point the channel would be considered to be back into a "stable" condition.

RESULTS AND DISCUSSION

The total annual sediment load being generated by streambank erosion is estimated at 4778 tons and 75% of this total load, or 3583 tons is estimated to be delivered below the IL. Rte. 157 bridge. This is somewhat higher than the 2800 tons total load and 1148 tons delivered to Rte. 157 as estimated by the "Metro-East Re-Evaluation Study" done by USDA-Natural Resources Conservation Service in October 1998. The differences can be attributed to a 100% inventory and use of "Mean Bankfull and Maximum Bankful Depths to approximate the annual height of bank scour. An additional consideration in the amount of sediment being delivered is the change in the Sediment Transport Factor being raised from .41 to .75 to reflect the efficiency of this stream to move fine sediment once it enters the stream system. The change in STF is justified by the determination of an entrenchment ratio of about 2.0 (annual floods do not reach the floodplain) and the lack of significant sediment deposition anywhere in the channel above Rt. 157 which is interpreted as meaning that the sediment is being transported downstream.

Canteen Creek is greatly benefited by a series of fifteen (15)"grade control" structures identified in the mainstream of the channel in the form of stone and/or "concrete waste" that have been placed under all bridges below Lebanon Road and there is also a series of "Rock Riffles" placed upstream of Lebanon Road during the reclamation of the old "Lamaghi Mine Site". These structures are providing a vital role in limiting the extent of the future downcutting that can take place on the lower portion of the Canteen Creek mainstem. The channel stability near these "grade control" structures is notably improved and every effort should be made to maintain these "grade controls" as well as to install "Rock Riffles" where noted in the inventory. By use of "grade control" the process of channel evolution is curtailed in that if degradation of the bed is no longer occurring, the evolutionary process to regain stability is dramatically shortened and channel rejuvenation upstream from the degraded section does not occur. Prevention of additional downcutting is therefore the most important element of stabilizing Canteen Creek and reducing sediment generation from the stream system.

It has been demonstrated that the "natural riffles" in a riffle and pool stream such as Canteen Creek will develop at a spacing of 5 to 7 bankfull widths as the channel reaches equilibrium. This would suggest that "grade control" structures need to be placed at a similar spacing where they are to be used. The spacing would then vary from 250 to 300 feet on the lower end of the mainstream to 75 to 100 feet in the upper reached of some tributaries. The "rock riffles" installed during the mine reclamation are near this recommendation at 375 feet between riffles. It was observed however that the "existing grade control" structures under bridges as much a 2000 ft. apart seem to be performing well. Although they are not completely effective in controlling degradation through this entire span, they are maintaining pool depth and reducing gradient without becoming silt laden. It may be possible, since the bedload in Canteen Creek appears to lacking in larger material and is composed of silts and fine sands, that the recommended spacing may be extended without causing a problem in sediment transport capacity. Future evaluation of this observation needs to be done prior to implemention of additional "grade controls".

The lateral migration of the streambanks on Canteen Creek are part of the natural evolutionary process as discussed above. The extent of lateral recession and the rate of recession will both be impacted positively by the implementation of "grade control" and any treatment of the eroding banks should done with assurance that continued degradation has been addressed. Use of Stone Toe Protection (STP) would appear to then be the best and most economical solution at most sites where use of grade control alone will not slow lateral migration to acceptable levels. STP will protect the lower portion of the eroding bank from being "undercut" by high velocity flows and secondary currents. This alone can dramatically reduce the amount of bank failure and sediment generation. By placing the Stone Toe Protection slightly away from the eroding bank the area behind the STP acts to do three additional things. First the area behind the STP will fill with bedload material forming a "bench" at the top elevation of the STP. Secondly this "bench" provides an excellent place for natural regeneration to occur and encourages revegetation of the bank providing additional protection from scour. Thirdly, the bench and vegetation that becomes established will provide an area to catch the colluvial material that will continue to slough from the oversteepened banks in these sections until a stable slope is achieved. By catching the colluvial material on this bench much of the sediment that would have been generated by the bank failure will be kept out of the channel and revegetated in place.

The success of STP in reducing sediment loading will depend on a more complete analysis of the channel dimensions at each location to insure that the addition of STP on one side of the channel does not increase sediment being generated from the opposite bank or immediately downstream.

The concern of "rotational slumps" and other "geo-technical" problems in Canteen Creek are the third major area of consideration. Generally geo-technical problems are extremely difficult and expensive to address and the "success" rate is often quoted as less than 50%. This can be attributed to the complexity and magnitude of the forces involved along with the difficulty of gaining access with equipment to the sites in order to complete the work. Forty-Five geo-technical problems have been identified in Canteen Creek. Except where the expense of treatment is justified for reasons other than sediment generation, i.e, roads, houses, bridges, etc. are threatened, the best solution for these sites may be addressed by the use of Rock Riffle Grade Controls and Stone Toe Protection. This inventory established a separate treatment cost for geo-technical problems, but consideration should be given to delaying these treatments until the effect of other measures implemented can be evaluated.

It has been demonstrated that geo-technical problems caused by "seeps' at the interface of differing soil materials can be positively impacted by using a "Rock Riffle" to back water up against the toe of the failure. Secondly the use of STP can in some cases move the toe of the slope away from the failure and prevent the channel from impacting the failure plane. These techniques are already needed in Canteen Creek as part of the general stability plans, and they should be implemented and evaluated prior to undertaking more direct measures of stabilizing these geo-technical failures.

RECOMMENDATIONS

The inventory recommendations to reduce the sediment loadings reaching IL Rte.157 are included in Appendix 1 thru 4. An attempt was made to provide the information in several different formats to ease its use and improve its clarity.

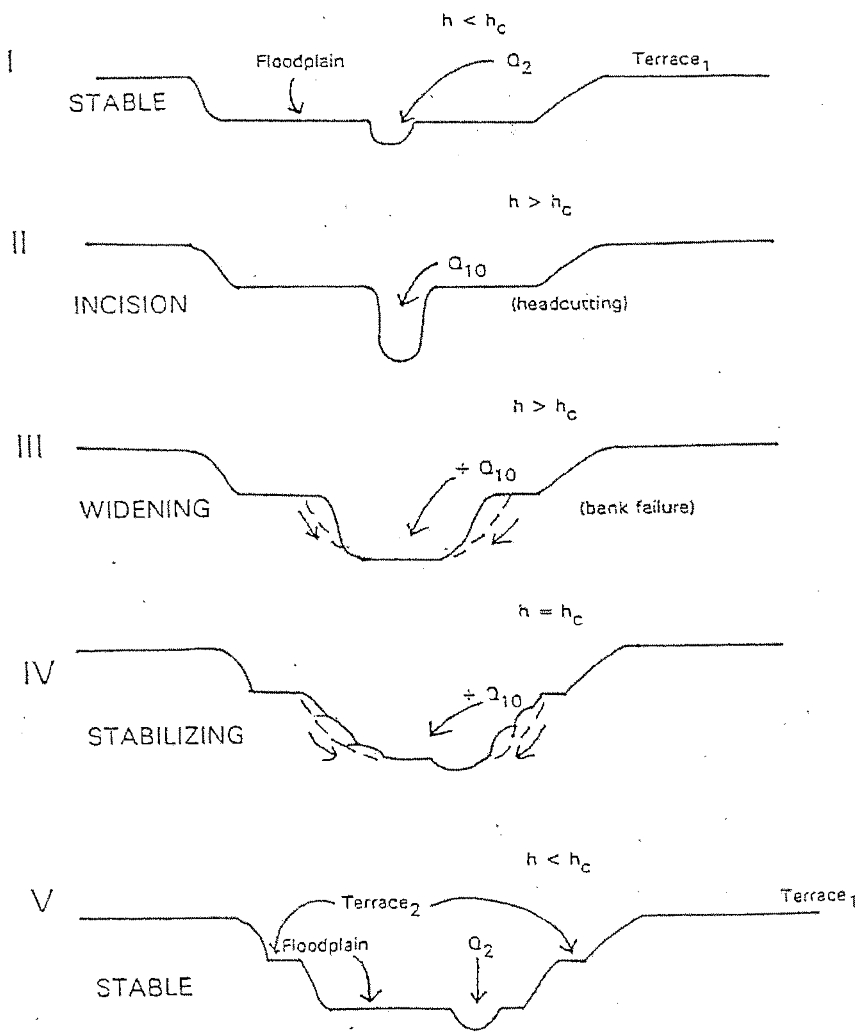
Appendix 1 is the Channel Inventory information gathered in the field and shows the erosion by reach and the need by reach for geo-technical control, Rock Riffles and/ or Stone Toe Protection. It also includes the total stone required by reach and estimated cost for Stone Toe Protection only. Other treatment methods were initially considered, but the field inventory has concentrated on these three as the most appropriate for Canteen Creek. Vegetative measures are largely eliminated as the stream corridor is nearly all wooded and few places receive enough sunlight to make vegetative control an alternative.

Appendix 2 is a summary of the locations, estimated height, stone requirements and cost for Rock Riffles only. A total of 185 sites were identified where grade control is recommended in addition to the 15 existing structures. The stone requirements are estimated based on a uniform height of 1.5 ft. per riffle, however it is recognized that during implementation a survey of the channel profile will be required and the actual designs will vary in height. Based on this assumption the total stone needed is about 5250 tons at an installed cost of $157,700. Twenty-five dollars per ton for Illinois Dept. of Transportation specified RR-5 stone in place has been the average cost for similar installations. There are, however some sites recommended for grade control where access will be extremely difficult and the cost are likely to escalate. This additional cost to work in areas where it may be difficult to transport stone has not been factored into these cost projections.

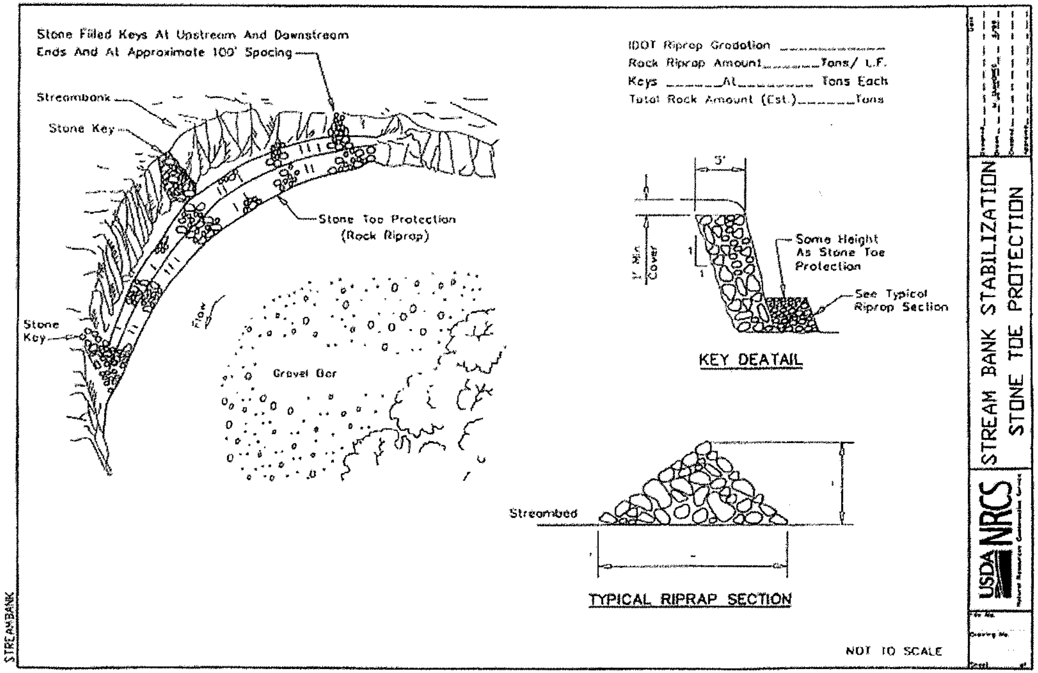
Appendix 3 sorts all the inventoried reaches and summarizes just those where Stone Toe Protection is recommended. The total length of streambank identified as needing toe protection is 41,878 feet requiring 28,300 tons of stone at a cost of $708,000. The average cost per foot of bank protected is computed at $16.90. This is by far the most extensive component recommended in this study, however it is the most effective and easiest to design and install. The only concern that remains to be addressed prior to implementation is the consideration of effects on the opposite bank and/or downstream from these installations. Technically trained personnel should be used to insure that Stone Toe Protection is placed so that it does not reduce the channel capacity or change flow direction to cause increased scour in neighboring reaches.

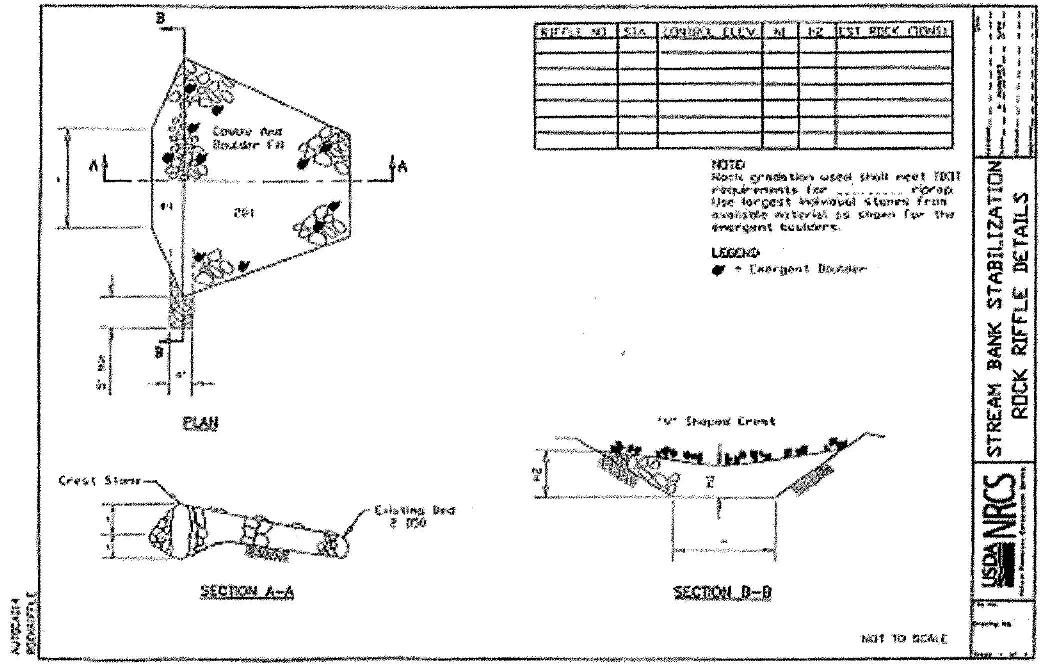
Appendix 4 addresses the locations of identified geo-technical problems and provides an initial estimate of the treatment needs and quantities. Due to the complexities of treating geo-technical problems it is recognized that these are rough estimates needing treatment. Prior to implementation, each site will require a thorough investigation which may lead to other treatment recommendations. This inventory should however serve to identify these sites so that they may be quickly relocated for further study. As discussed earlier, the installation of the proposed Rock Riffles and Stone Toe Protection are included in the treatment cost of these sites and may be sufficient in themselves for treatment in many locations. The total estimated cost of treatment of these 45 sites is $195,000.

CHANNEL EVOLUTION MODEL
(SCHUMM, HARVEY, WATSON, 1984)



SD-5


Stone Filled Keys At Upstream And Downstream Ends And At Approximate 100' Spacing
Streambank
Stone Key
Stone Key
Stone Toe Protection (Rock Riprap)
Flow
Gravel Bar
IDOT Riprap Gradation
Rock Riprap Amount ______ Tons/ L.F.
Keys ______ At ______ Tons Each
Total Rock Amount (Est.) ______ Tons
5'
1' Min. Cover
Same Height As Stone Toe Protection
See Typical Riprap Section
KEY DEATAIL
Streambed
TYPICAL RIPRAP SECTION
NOT TO SCALE
STREAM BANK STABILIZATION
STONE TOE PROTECTION
USDA NRCS
AUTOCAD14
STREAMBANK


STREAM BANK STABILIZATION
ROCK RIFFLE DETAILS
USDA NRCS
RIFFLE NO | STA | CONTROL ELEV. | H1 | H2 | EST ROCK (TONS)
NOTE
Rock gradation used shall meet TDOT requirements for riprap.
Use largest individual stones from available material as shown for the emergent boulders.
LEGEND
= Emergent Boulder
Cobble And Boulder Fill
PLAN
SECTION A-A
Crest Stone
Existing Bed
"V" Shaped Crest
SECTION B-B
NOT TO SCALE

With no permanent water in the sediment pool of the site, the sediment deposited will be denser than it would have been in a permanently wet site. This is because in an environment where the sediment is allowed to dry out, it is compressed by the total weight of the sediment above it, not the lighter buoyant weight that would be the case in a site that never dries out. The sediment in these sites is expected to reach a density of 80 lbs. per cubic foot. These sites will be designed to hold 50 years worth of sediment to the crest of the outlet of the structure, approximately double the life of a wet site with similar volume.

This report led the Project team and technical partners to conclude that rotational slumping and stream bank erosion were in all probability making a more significant contribution to sedimentation in the floodplain than was originally assumed. As a result work began with the partnership to assess an approach to evaluate what this contribution might be and how streambank stabilization might be achieved in the bluff streams.

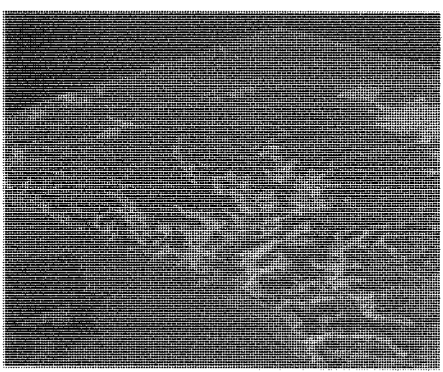
E.6 USGS INVESTIGATIONS AT JUDY'S BRANCH PILOT PROJECT

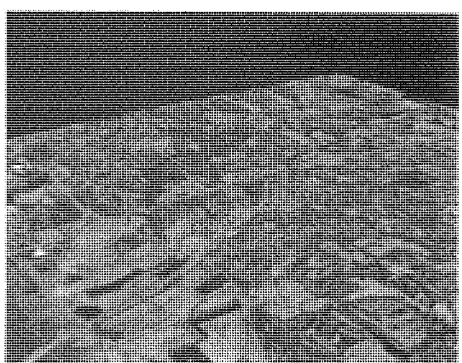
In an effort to advance knowledge on the effects of streambank stability and rotational slumping on floodplain sediment deposition, IDNR, Office of Water Resources entered into a partnership with the USGS. USGS established a demonstration project on Judy's Branch with in-stream instrumentation to measure rainfall events, establish peak flows, sample water for sediment content in three locations and gauge bank retreat in selected reaches. IDNR surveyed the stream to establish existing conditions. This work is slated to proceed over a three year period but information gathered during the first year have already provided

E.6.1 Metro East Sedimenttion and Geomorphic Study. The following information is taken from a USGS presentation of the preliminary assessment for the Judy's Branch Pilot Project results that provides an insight into the structure and characteristics of the bluff tributary, and the forces acting upon it.

Metro East Sedimentation and Geomorphic Study

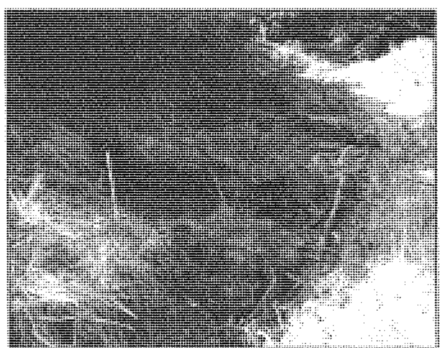
Project Location





Tributary Issues

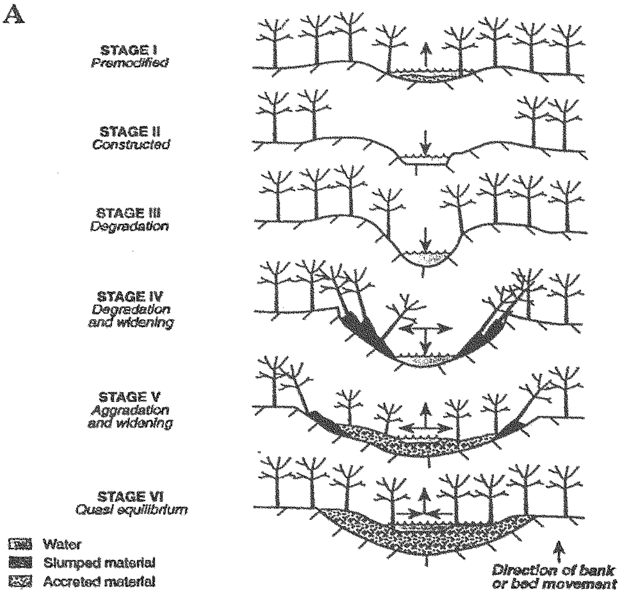
Study area characteristics that are also described in Appendix D.



Loess Banks

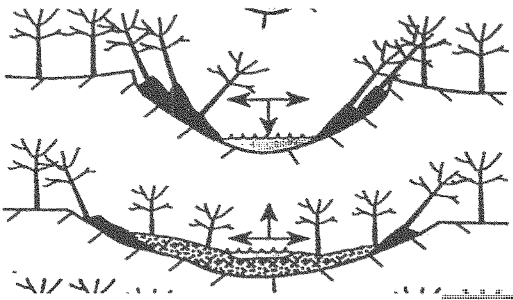
A

Stages of channel formation through time.

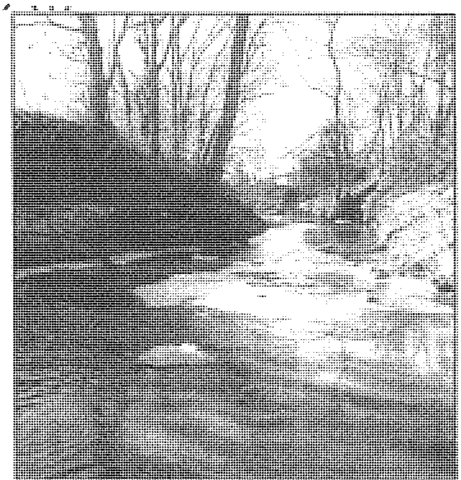


Bank Retreat

Stages of channel formation as
seen in the study area



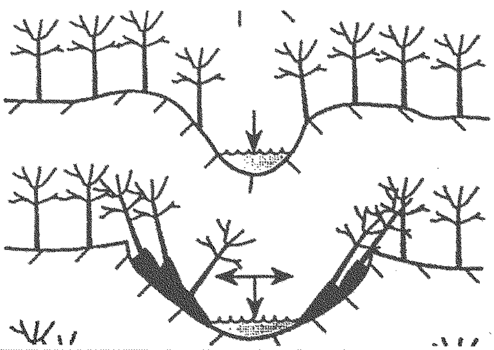
IV, V
Lowland Region

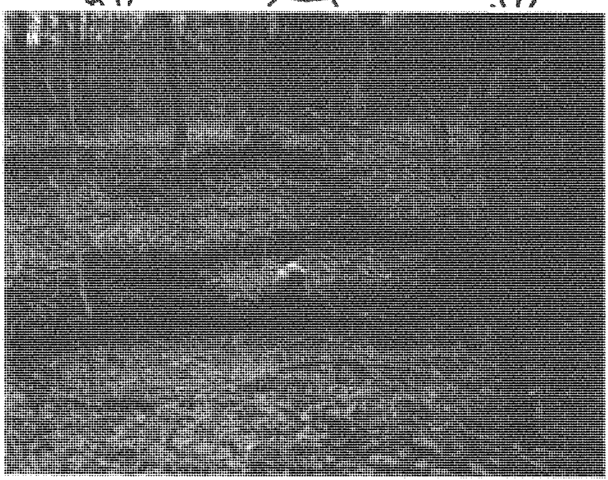


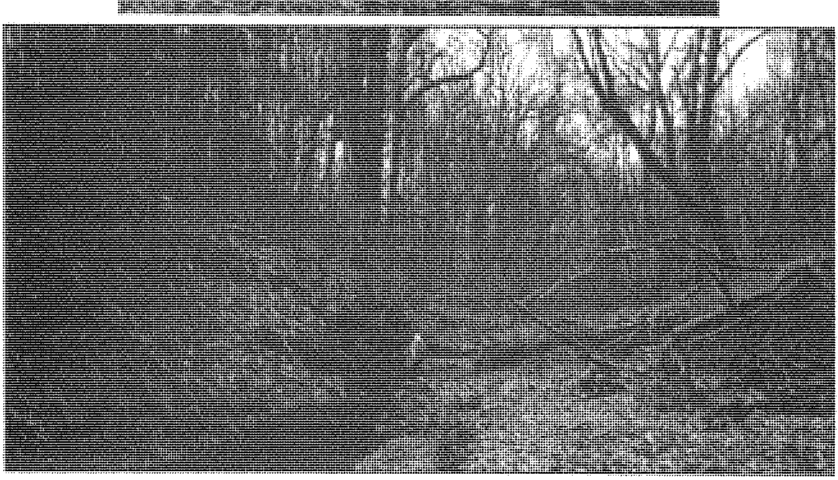
Judy's Branch upstream of the confluence but below Hwy 157

Confluence of Judy's Branch and Cahokia Canal

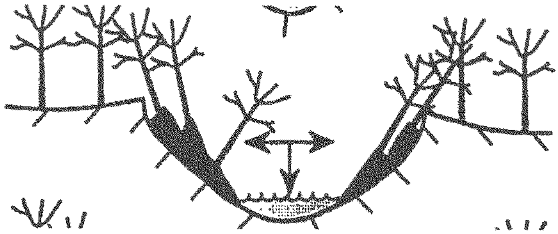
Stage III, IV

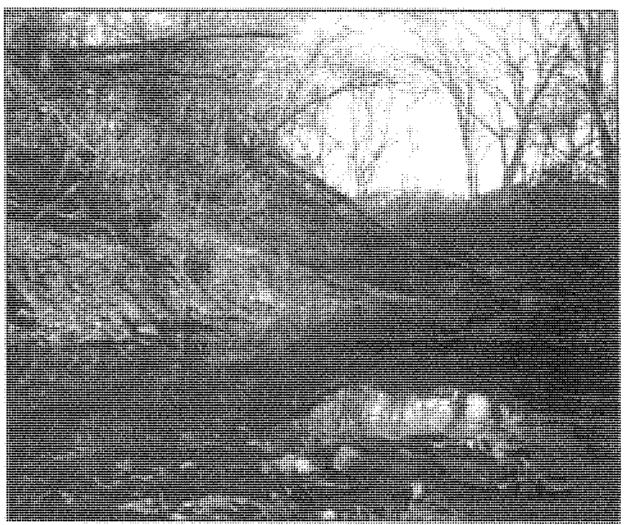


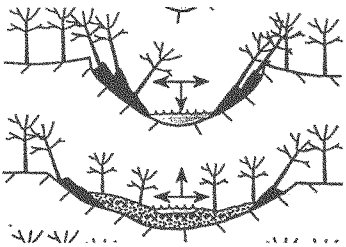




Stage IV

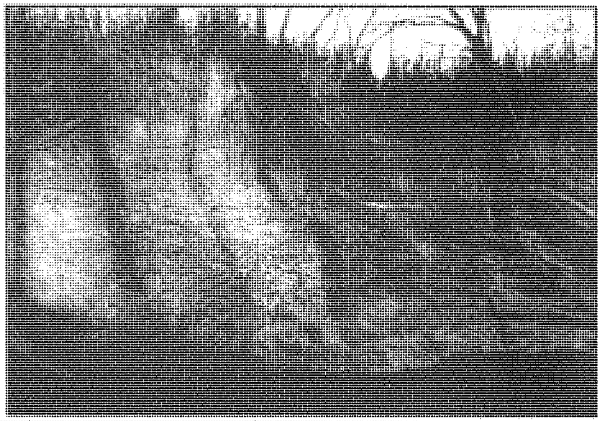


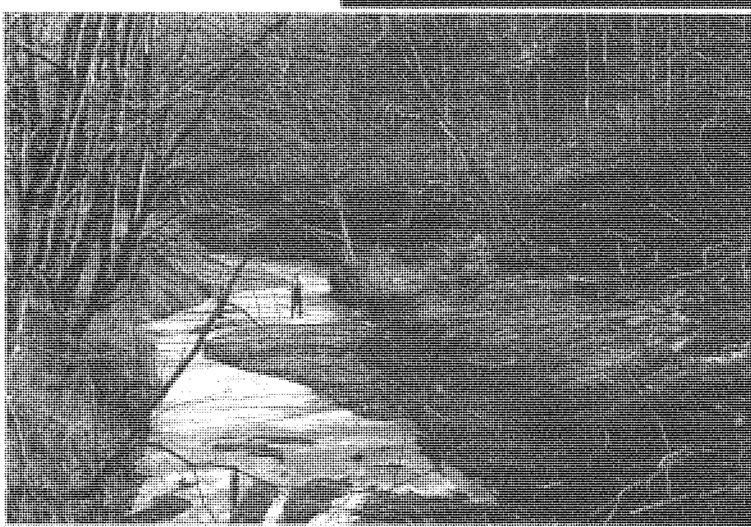


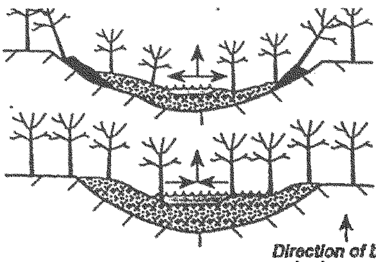


IV, V

Transition Region



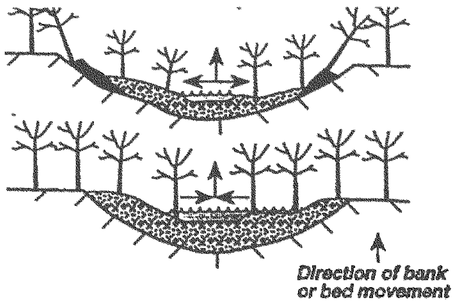




V, VI

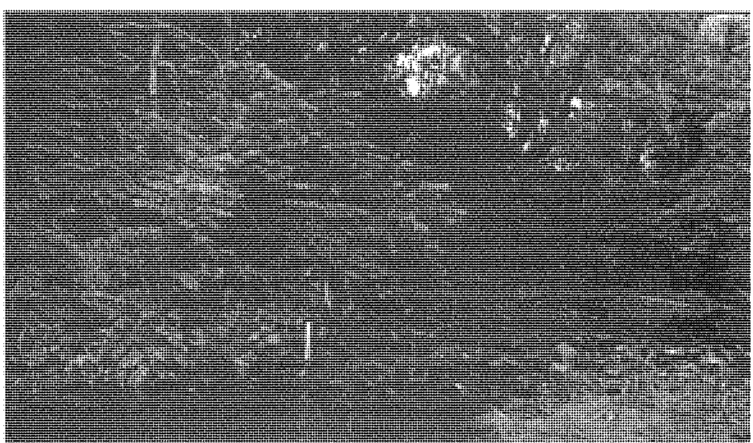
Upstream of Rte 159

V, VI



Streambed Control fromConcrete Structure and Bricks

Concrete
Control DS



Bricks

Metro East Solutions
Easy
–Control erosion from Ag and Construction
–Sediment detention
–Storm sewers drained to bottom of bluff areas
–Stabilize bluff banks
–Channel adjustments designed by professionals

Difficult
–Keep development away from high bluffs
–Controlling bed erosion: grade control, riffles or meanders?
–Debris jams worse after grade control?
–Stabilizing banks against erosion and failure

E.6.2 Geotechnical (Draft) Evaluation of Bank Stability on Judy's Branch near Glen Carbon Illinois and the St. Louis Metro East Region. The following is a draft report on the initial evaluation of technical data gathered to date on the demonstration project.

USGS
science for a changing world

In cooperation with the Illinois Department of Natural Resources, Office of Water Resources and U.S. Army Corps of Engineers St. Louis District

Geotechnical Evaluation of Bank Stability on Judy's Branch near Glen Carbon, Illinois and the St. Louis Metro East Region

U.S. Department of Interior

U.S. Geological Survey

USGS
science for a changing world

In cooperation with the Illinois Department of Natural Resources, Office of Water Resources and U.S. Army Corps of Engineers St. Louis District

Geotechnical Evaluation of Bank Stability on Judy's Branch near Glen Carbon, Illinois and the St. Louis Metro East Region

By Carlos R. Sierra and Timothy D. Straub

Water-Resources Investigation Report 04-XXXX

Urbana, Illinois
2004

U.S. Department of Interior
U.S. Geological Survey

CONTENTS

TABLES

Geotechnical Evaluation of Bank Stability on Judy's Branch near Glen Carbon, Illinois and the St. Louis Metro East Region

By Carlos R. Sierra and Timothy D. Straub

Abstract

This report presents the geotechnical aspects and scenarios that promotes bank instability on Judy's Branch and the St. Louis Metro East Region. Different bank stability scenarios as related to hydrologic events, and bank stratigraphy and geometry are evaluated. The most common stratification found is that of alluvial soil deposits (loose or medium to soft clayey silt) overlying a very stiff glacial till (stiff silt loam to silty clay loam). A stability chart for different bank geometries and stratifications was developed using a geotechnical slope stability model. Banks steeper than 70 degrees and higher than 10 to 11.5 ft become at risk under conditions that promote saturation of the bank and a sudden drop in the river level.

INTRODUCTION

The St. Louis Metro East region is located in southwestern Illinois, east of St. Louis, Missouri (Fig. 1). This area consists of two distinct physiographic regions: a bluff region and the American Bottoms. The bluffs consist of hills shaped by streams incised into loess, alluvium and glacial till. The American Bottoms forms part of the Mississippi River flood plain, which contains many canals, lakes, and swamps with low relief.

Judy's Branch watershed covers an area of 8.33 mi^2 of the uplands near Glen Carbon, Illinois. In the 1800s, much of the forest and prairie in the watershed, which includes the upland bluffs, was converted to agricultural land. Since the 1940's, urbanization in the upland areas is inferred to have caused increased runoff, sediment delivery, streamflow, and stream bank erosion.

Bank erosion and bed incision can cause oversteepening and undercutting that may lead to mass failures in the channel. Bank failures greatly increase sediment delivery rate over erosion solely by entrainment. Other effects of mass failures can include changes in channel plan form and the creation of debris jams. Bank failures result in loss of land, and the deposition of sediment in the American Bottoms has caused flooding and the need to dredge bottomland channels.

Purpose and Scope

This study was conducted by the U.S. Geological Survey (USGS) in cooperation with the Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR) and U.S. Army Corps of Engineers St. Louis District (USACOE-STL) to assess bank stability scenarios as related to hydrologic events, and bank stratigraphy and geometry in Judy's Branch and the Metro East region near St. Louis. Bank failures occured most common in alluvial soil deposits over stiff glacial soils and banks composed of colluvial deposits from previous mass failures. It is beyond the scope of this report to summarize the stability of the riverbed in Judy's Branch. Future reports will combine the results of this study with baseline data being collected including hydrology and repeated measurement of channel geometry.

Acknowledgments

Laboratory geotechnical tests of soil boring samples were performed by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) at their soil mechanics laboratory facilities in Lincoln, Nebraska.

GEOLOGY

A thorough understanding of the Quaternary geology and sequence of deposition of the stratigraphic units along Judy's Branch is crucial to understanding the interaction among hydrologic, geomorphologic, and geotechnical aspects of erosion and bank stability. Sediment deposits in the Metro East regions can be attributed primarily to the following time periods, the pre-Illinoian, Illinoian, and Wisconsinan glacial stages, and the Holocene epoch which is characterized by alluvial processes. The margins of glaciation and their location with respect to the Metro East region are shown in Figure 1. Weathering processes associated with the Sangamonian (the interglacial stage between the Illinoian and the Wisconsinan) may change the formations significantly. Of particular interest are clay accumulations that could be contribute to local perched water tables, with or without the presence of diamicton (Grimley and others, 2001).

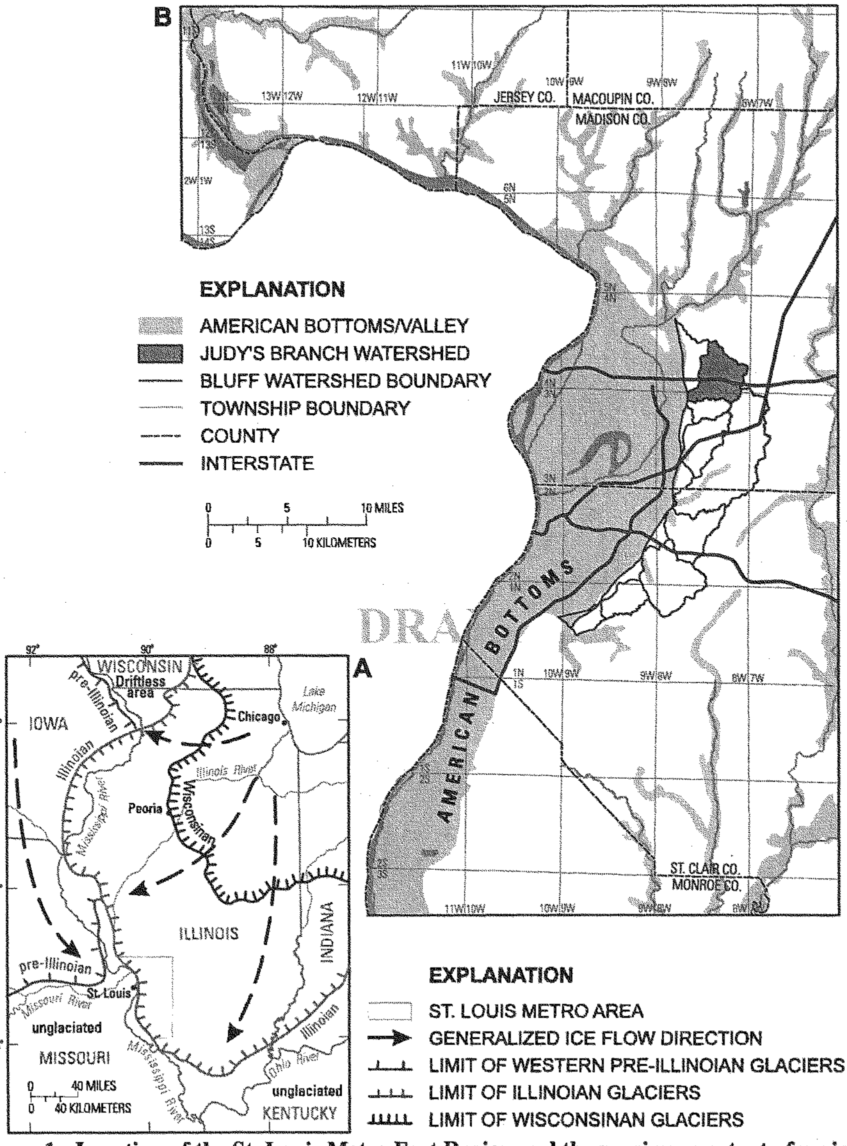


Figure 1: Location of the St. Louis Metro East Region and the maximum extent of major ice sheets (Grimley, 2000)

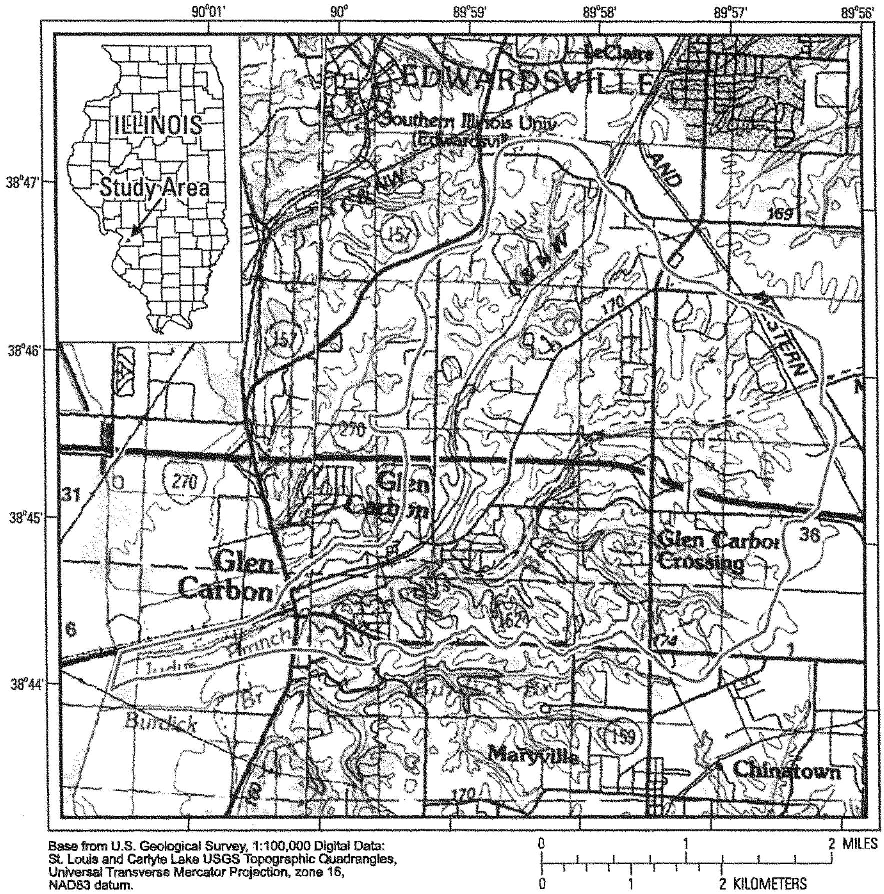


Figure 2: Location of Judy's Branch watershed

Uplands and Bluffs

The uplands and bluffs consist mainly of wind blown silt (loess) deposited during the Wisconsinan glacial stage. These deposits are up to 100 ft thick in regions near Collinsville, and about 20 ft thick towards the eastern portion of the Metro East area (Grimley, 2000). Wisconsinan loess deposits are subdivided into two formations, the Peoria Silt and the Roxana Silt. The older of these is the Roxana Silt, which consists of a yellow-gray to pinkish tan silt loam (Willman and others, 1975). The younger and thicker Peoria Silt is yellow-brown to gray silt loam (Grimley, 2000).

Lacustrine deposits (Equality Formation) in the area mainly consist of fine sand, silt and silty clay, which were deposited by backwater lakes formed by Mississippi River inundations of tributary valleys (Grimley, 2000). The Equality Formation deposits are interbedded and coeval with loess and till. Some of the Lower Equality deposits are of similar appearance and age to the Roxana Silt (Grimley, 2000).

In some Metro East areas, erosion has exposed underlying deposits, consisting of glacial till of Illinoian age (Glasford formation), lacustrine deposits and bedrock. The Glasford formation is composed of glacial till characterized as loam to silty loam to silty clay. This unit underlies most of the riverbed and lower portion of the banks of Judy's Branch, and appears to limit vertical incision. High preconsolidation of the glacial till gives it a high mechanical strength and resistance to erosion. On-site observations indicate that an abrasive bed load is required to cause significant erosion of the river bed within the glacial till outcrops. Numerous crayfish burrows (1 to 3 inches in diameter) dug in this material and erosion around rock deposits are seen at various locations and probably increase erosion.

Sand and gravel inclusions commonly are found overlying the glacial till with thicknesses varying from 2 in. to 2 ft. Some of these outcrops consist of poorly graded reddish-yellow sand. A profile of these deposits and others found in the St. Louis Metro East region has been prepared by the Illinois State Geological Survey (ISGS) (Fig. 3). A few siltstone outcrops are observed in the uplands and bluffs edge.

Alluvial deposits are mostly Holocene age and are a product of erosion and mass failure of previously described deposits. Upland streams like Judy's Branch contain silty alluvium and erosional features attributable to mass failures and incisions on the highly erodible loess deposits.

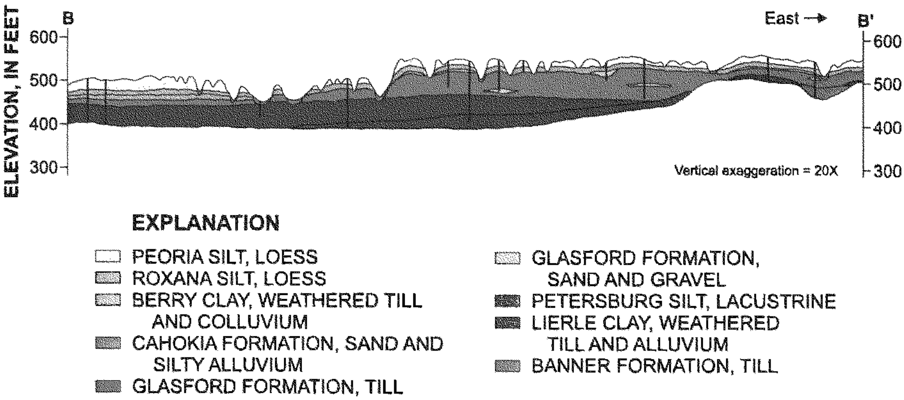


Figure 3: Geologic east-west profile of the uplands and bluffs on the French Village 7.5 minute quadrangle (from Grimley, 2000)

American Bottoms

The American Bottoms is an extensive flood plain on the Illinois side of the Mississippi River that is characterized with many lakes and swamps. The American Bottoms is underlain by Cahokia Alluvium of Pleistocene-Holocene age. The Cahokia alluvium, consists of up to 60 ft of silty clay deposits in abandoned meanders and oxbow lakes, and also former point-bar sand deposits (Grimley, 2000). These deposits have been described as poorly sorted silt, clay and silty sand with lenses of sand and gravel (Willman and others, 1975). Cahokia Alluvium overlies the Henry Formation, which consists of outwash sand and gravel deposited as the river aggraded with outwash during the Wisconsinan glaciation in the upper Midwest (Grimley, 2000).

DATA COLLECTION AND ANALYSIS METHODS

Data used for this study were collected from field visits, exploratory soil borings, in-situ tests, laboratory tests, and visual classification of samples obtained from both the borings and directly from the stream banks.

Subsurface Exploration

A Geoprobe model 5400 was used to perform the subsurface exploration. Six borings (1.5 inch diameter) to depths ranging from 20 to 24 ft, or 10 ft below the riverbed, were completed in the watershed (figure 4). Borings completed with the Geoprobe provide continuous subsoil samples, which can be used for laboratory testing and visual classification. For this study, shear strength tests were performed from both undisturbed and remolded samples collected with the Geoprobe.

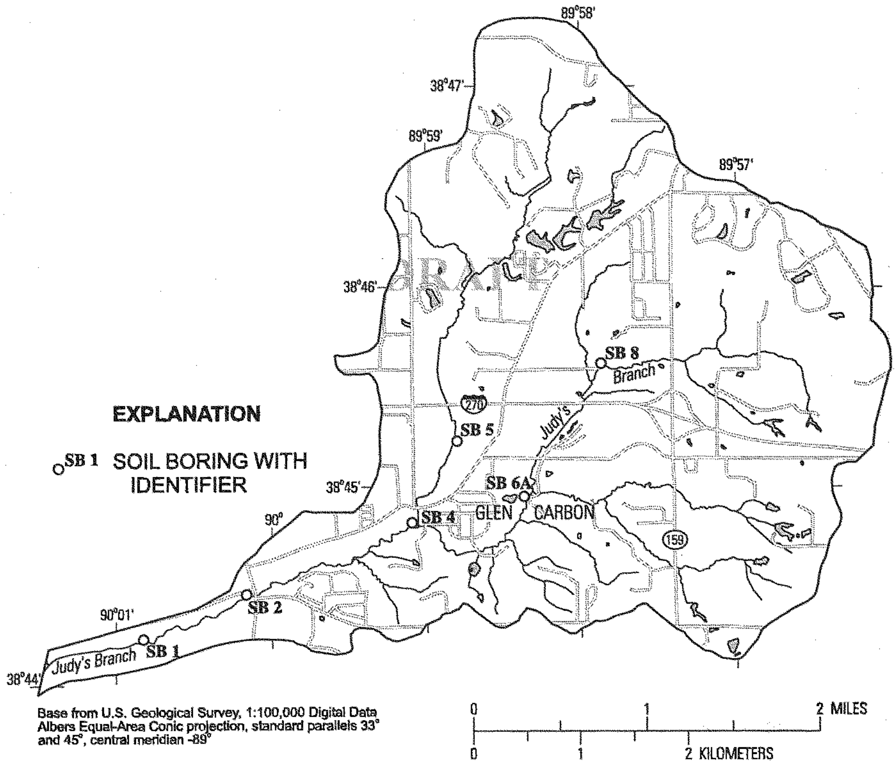


Figure 4. Location of soil borings in Judy's Branch watershed

Site Visits and In-Situ Tests

As part of the investigation on the geotechnical aspects of bank stability, the study area was visited various times. One visit was dedicated to making observations at specific locations on each of the different watersheds in the Metro East region. The other visits consisted of stream walks along several reaches of Judy's Branch. During site visits the undrained shear strength of the banks was measured with a portable field vane. The values obtained from this instrument were not used in the geotechnical analysis, but used more as a qualitative field assessment of the soil strength since cohesive and frictional components cannot be separated. These values are not further discussed in this report to avoid confusion with the actual methods and values used in the geotechnical analysis. Bank samples were taken from the different soil types. Observations were made on the relations among the different soil deposits, bank angles and heights, presence of trees, vegetation, occurrence of sand lenses, and the stability of the banks. Field visits and observations were made during all seasons.

Laboratory Tests

The NRCS, performed the geotechnical laboratory tests from the samples obtained from the borings at their soil mechanics laboratory facilities in Lincoln, Nebraska. The tests consisted of routine grain size distributions of both the coarse- and fine-grained material. Atterberg limits (plastic limit and liquid limit), unconfined compression tests and consolidated undrained triaxial (CU) tests were done on cohesive soils.

The USGS, Illinois District office in Urbana, Ill., tested samples in the laboratory collected from the stream banks. Tests for Atterberg limits, particle size by sieve analysis and hydrometer, specific gravity, and water content were completed on selected bank samples.

Geotechnical Laboratory tests performed by both the NRCS and USGS were made in conformity with their pertinent ASTM procedures. Hydrometer tests and grain size distribution tests were respectively made in accordance to ASTM D422 and ASTM D2217 specifications. ASTM D4318 specifications were used for liquid limit, plastic limit, and plasticity index tests for soils.

Soil Classification Methods

Routine laboratory tests such as the Atterberg limits and grain size distributions commonly are used to classify soils. These tests provide information on the behavior of soils. Atterberg limits are used to classify fine-grained soils, and the grain size distribution is used for both fine- and coarse-grained material.

From the Atterberg limits test, significant geotechnical properties can be derived. The most important of these properties are the plasticity index (PI) and the liquid limit (LL). The liquid limit is the moisture content at which the soil loses its consistency and behaves like a viscous fluid. The plasticity index is a measure of how much water a soil can absorb before behaving as a fluid. The plasticity index is obtained by subtracting the plastic limit from the liquid limits; thus the plasticity index defines the range of moisture contents where the soil exhibits plastic behavior. The higher the plasticity index the more compressible the soil is. The plasticity index and the liquid limit often are correlated to cohesive strength. The higher the plasticity index the lower the saturated strength.

Higher plasticity indices and liquid limits result from higher clay contents. Silt and clay soils with high plastic indexes typically have greater proportions of clay minerals with thin, platy-shaped particles. The nomenclature for soil groups as established in the Unified Soil Classification (USC) (Casagrande, 1948) is explained in table 1.

Table 1. Soil group symbols and typical names for cohesive soils as established in the Unified Soil Classification.

Soil Group Symbol	Typical Names
ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand, or clayey silt with slight plasticity
CL	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay, silty clay, lean clay
OL	Organic silt and organic silty clay of low plasticity
MH	Inorganic silt, micaceous or diatomaceous fine sandy
CH	Inorganic clay of high plasticity, fat clay
OH	Organic clay of medium to high plasticity

Soil-Strength Methods

Unconfined compression tests were used to determine the shear strength of soils. This test method consists of placing a cylindrical soil sample, as obtained from a boring sampler, and compressing it without lateral restrain until failure. The undrained shear strength of the soil sample is estimated by dividing the ultimate vertical stress (q_u) applied by two and given as

$$S_u = \frac{q_u}{2} \quad . \tag{1}$$

The other method used to measure the shear strength of soils was the consolidated undrained shear strength method with pore-water pressure measurements. By application of this method, the shear strength can be divided into cohesive and frictional components. Furthermore, this method can be used to test samples on both drained and undrained conditions. This method is better explained by the use of application

$$S = c + (\sigma - u)\tan\phi \ , \tag{2}$$

where S is the shear stress at failure, c is the cohesion intercept, σ is the normal stress, u is the pore water pressure and ϕ is the angle of internal friction. The parameters obtained when a sample is allowed to drain are those corresponding to the drained, effective stress shear strength in terms of c' and ϕ'.

BANK STRATIGRAPHY

Dominant bank stratigraphies are as follows: 1) Banks composed of alluvial soil deposits overlying stiff glacial soils defined by the presence and the absence of sand-and-gravel layers between the two deposits with and without vegetative cover and trees., 2) Banks composed of normally consolidated mixed colluvial and alluvial soils in which a glacial till soil horizon was buried., 3) High loess cliffs (bluffs), and other scenarios such as shale and siltstone outcrop, and banks composed of fill material. This section describes these stratigraphies in terms of their geotechnical properties, and their effects on riverbank stability and erosion processes.

Alluvial Soil Deposits over Stiff Glacial Soils

This stratigraphy includes the presence or absence of sand-and-gravel layers (figure 5), with and without vegetative cover including trees.

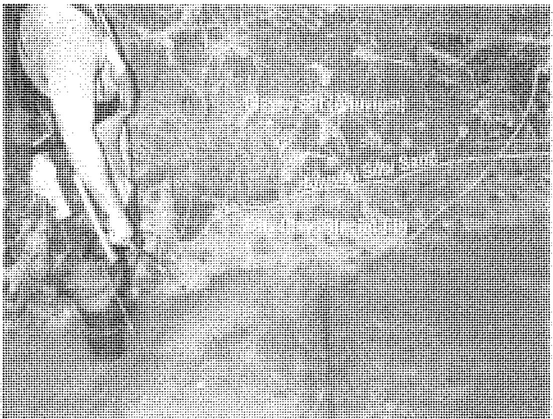


Figure 5. Typical bank stratigraphy with clayey-silt alluvium, a thin alluvial sand lense, and glacial till at Judy's Branch near Glen Carbon, Ill.

The alluvial soil deposits consist of normally consolidated medium to soft clayey silt. Glacial till regularly outcropped at the base of the banks and is sometimes found at mid-bank height. The glacial till strength varied probably with the amount of time it had been exposed to water. Undrained shear strength of weathered till will have soft to medium consistencies whereas the intact till will have stiff to hard consistencies. Sand-and-gravel layers within these deposits commonly occur at the contact between the clayey-silt alluvial deposits and the glacial till. Sand layers also exist within the alluvial stratigraphy and seem to have been deposited as bars during recent time. These sand lens-shaped units were typically poorly graded, reddish-yellow sand. Grain-size distribution of these soils found within this stratigraphy is shown in figure 6.

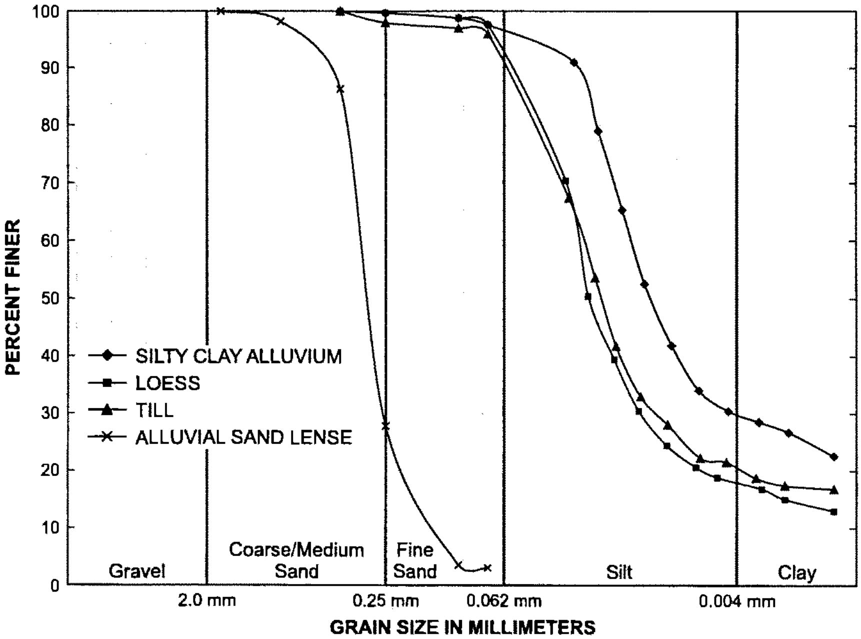


Figure 6. Grain-size distribution for different representative soils found in Judy's Branch near Glen Carbon, Ill.

Alluvial soils are mainly clayey silt (fig. 6). Alluvial soils at Judy's Branch generally contain approximately 25 percent clay and the rest silt, with trace amounts of sand. Although most of the samples collected are consistent with these characteristics, some samples had substantially greater sand content.

Glacial till had a lower clay content (15 percent), and silt, made up most of the soil composition. The glacial till resembles the wind blown loess in terms of grain size distribution (fig. 6), but it has a the higher percentage of sand. In some areas, the glacial till contained gravel and cobble, but the sub-sample shown in figure 6 does not include particle sizes greater than 2 mm. The coarse tails constitute a very small proportion of the particle size distributions, they can be vital in distinguishing one deposit from another (Phillips written commun. 2002). The samples used for the preparation of this graph were collected from Judy's Branch riverbanks. Grain size distributions of samples obtained from the subsurface agree closely with samples shown in figure 6.

Soils in the region consistently can be classified as low to slight plasticity clayey silt, sandy clay or silty clay (fig. 7). The abundance of silt may be explained by the fact that these modern alluvial deposits are derived from erosion and mass wasting of wind blown [silt or] loess. The fine-grained characteristics of the till are attributed to glacial erosion of shales and the incorporation of pre-existing loess and other fine-grained deposits (Phillips, written commun. 2002).

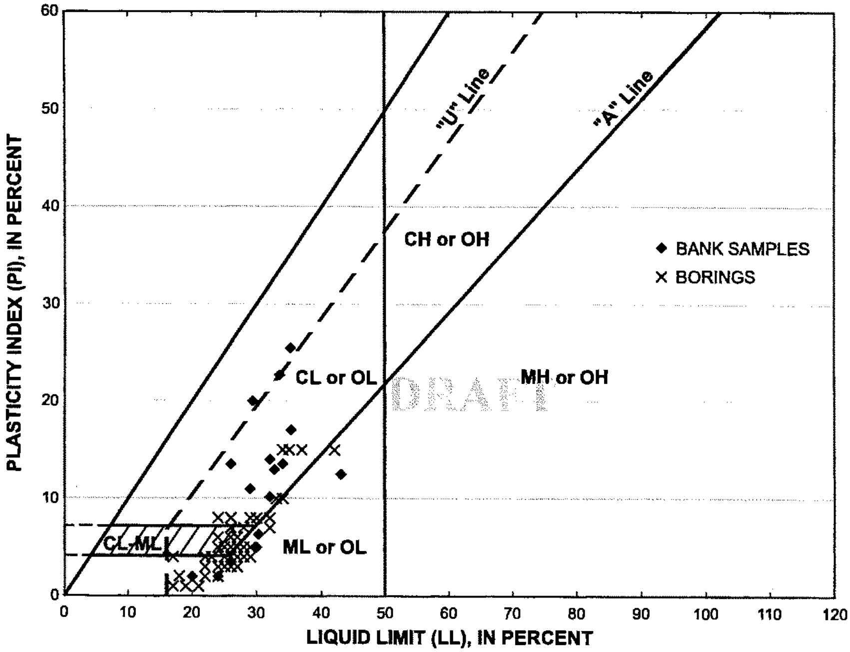


Figure 7. Plasticity chart developed from samples collected from banks and borings throughout Judy's Branch near Glen Carbon, Ill. Refer to table 1 for definition of soil classes. Samples plotting above the "A" Line contain clay and those below contain silt.

Colluvial or Terrace Deposits

Colluvial deposits, which are a product of previous hillslope failures and redeposited in a loose state, were found to be of softer consistencies than the clayey-silt alluvial deposits. These deposits are usually clayey silt mixed with some sand and organic matter.

Loess Cliffs

Although loess deposits constitute most of the surficial geology of the Judy's Branch watershed and the upland bluffs of the Metro East area, seldom do these deposits control bank stability and erosion of the riverbanks. Loess cliffs generally occur at distances away from streams.

Loess has a high strength when dry but low when wet. The decrease in strength results primarily because of the dissolution of the calcium carbonate that holds silt particles together. Also, the dry loess mass has a high magnitude of suction forces holding the body of silt together because of capillary effect.

Other Stratigraphies

Other stratigraphies found along Judy's Branch include siltstone and shale bedrock, and man-made fill from past coal mining and urban development. Fill deposits from coal mines consist of silty sand and gravel with fragments of brick and wood. Because these fill deposits are in a loose state and non-cohesive, they erode easily.

BANK RETREAT

The first step in the geotechnical assessment of riverbanks is to evaluate modes of failure. Bank retreat is composed of two components, bank erosion by hydraulic shear and bank failure by mass wasting. Bank erosion as defined by Thorne (1997) is the detachment, entrainment, and removal of bank material as individual grains or aggregates by fluvial and subaerial processes. Bank failure as defined by Thorne (1997), is the collapse of all or part of the bank in mass, in response to geotechnical instability processes. This section will focus on the description and modeling of bank failure. Bank erosion processes are especially important at the base of the banks, and which may be caused by erosion of the channel bed material. Further study of baseline data being collected including hydrology and repeated measurement of channel geometry will be used to combine results of this study to determine critical areas where further erosion of channel bed material will potentially cause bank failures.

The rate of lateral recession of streambanks in Judy's Branch is being measured at twenty-nine bank rod locations throughout the watershed (fig. 8). Bank rod locations were chosen as representative erosion sites to the reach in which they were installed. The annual values (June 2000 – June 2002) at each bank rod are categorized in figure 9 using modifed NRCS lateral recession rates for streams (Windhorn and Avello, 2001). Eighteen of the 29 bank-rod locations fall within the upper 3 categories, justifying further geotechnical analysis.

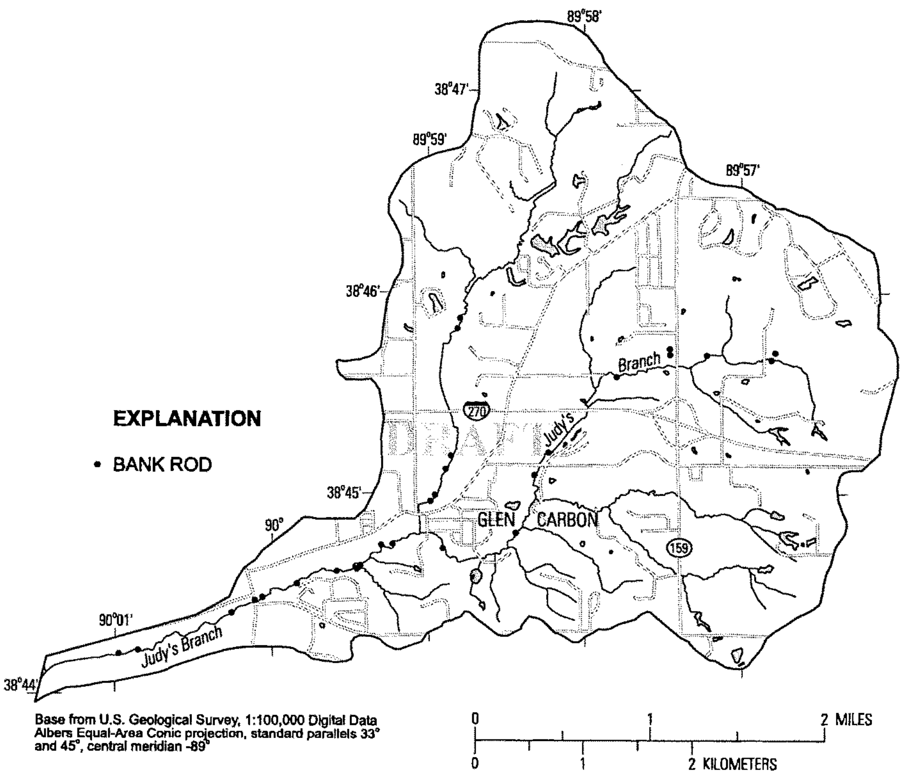


Figure 8. Location of bank rods in Judy's Branch near Glen Carbon, Ill.

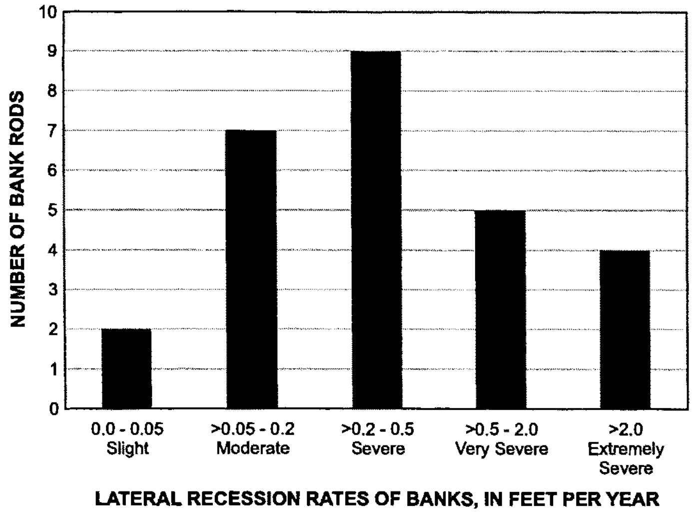


Figure 9: Lateral recession rates (using modified NRCS categories (Windhorn and Avello, 2001) at bank rod locations throughout Judy's Branch near Glen Carbon, Ill.

Bank Failure Types

Bank failures considered in this study are categorized as planar or rotational by their mode of failure as indicated by the shape of the failure surface. Both failure types are observed in Judy's Branch and the Metro East region. Pop-out failures are also discussed in this section.

Planar failures most likely occur in non-cohesive to slightly cohesive soils with slight plasticity. Planar failures sometimes are observed to begin with the development of a tension crack at the top of the bank. Size of failure wedges heights on the order of 75% to 90% of the bank height, and their lateral dimension along the stream ranged 5-10 ft. The depth of the failure wedge ranged from 3 to 8 ft from the failed river bank surface. When a planar failure occurs, material from the top of the banks becomes redeposited at the toe, temporarily buttressing the bank. With time, the wedge may crumble and become easily detached and washed away by the river flow. The mode of failure was generally observed on silty alluvial or colluvial deposits

Two types of rotational failures were classified in the Metro East region: deep and shallow. Deep rotational failures are common in soft deposits with high plasticity indexes (MH or CH).

High plasticity deposits are not common in the Metro East area and, therefore, deep rotational failures are not considered in this study.

Shallow rotational failures occur in low to medium plasticity soils and their orientation and extent depends on the presence of *weak* planes, discontinuities, zones of high infiltration rates, tree surcharge and other factors. Their failure is a long term process in which the shear stress increases because of prolonged wetting, loss of negative-pore-water pressures and the shear strength becomes degraded by progressive displacement, and remolding of the soil particles along the shearing plane. Rotational failure first starts as an imperceptibly slow displacement known as creep. This occurs once enough displacement has taken place so that the soil particles align parallel to the direction of movement and the failure plane becomes polished. Once sufficient displacement has occurred on an unstable bank, the shear strength available on the plane will be the residual shear strength (the shear strength between the polished failure planes). Displacements and distortion of the whole mass also will open new paths for easy infiltration of water; thus, allowing rapid saturation and decrease in shear strength because of elevated poor water pressure. Once the shear stress overcomes the weakened shear strength, it dislocates and displaces until it reaches a new state of equilibrium. The residual strength for low plasticity medium to soft soils, as the ones found during this study, is for practical purposes the same as the remolded or fully softened shear strength. (Starck and Eid 1997, Terzaghi et. al. 1996)

Shallow rotational failures are common on Judy's Branch and other streams in the Metro East region. The contact of alluvium over stiff glacial till, when present, is a weak zone preferentially used by failure surfaces. In some cases, it was observed that the failure plane had penetrated slightly into the till; this was more common if the glacial till was highly weathered. Bank failures in colluvial deposits are shallow rotational and planar failures.

Fill deposits usually were unstable. Typically they are observed to fail as planar failures and soil falls (occur when a stream undercuts the toe of a bank and the soil above falls into the river (Thorne, 1998)). These observations are supported in that these fill deposits are loose and are non cohesive. When material from planar failure or soil falls accumulates at the bottom of the bank covering a sand lens, the seepage through the sand lens may cause the soil to pop out or become detached from the face of the bank.

Bank Failure Conditions

Banks fail during the receding limb of a flood hydrograph, but often after prolonged period of rainfall. Contributing factors may include: (Simon and others, 2000)

1. Decrease in of lateral support and confinement by the receding water level after the storm.
2. Increase in driving forces due to the saturation process and consequential increase in unit weight on the bank.
3. Infiltration of water into the banks greatly reduces the negative pore-water pressure present in the soil mass while unsaturated.
4. Generation of positive pore-water pressures on the bank.
5. Erosion or undercutting of toe material that oversteepens the bank

Following a storm event, the banks lose moisture as water flows out of the bank by gravity, evaporation and evapotranspiration through tree roots. A typical scenario in Judy's Branch is one in which there are alluvial deposits with sand lenses at the contact with the glacial till. Rainfall that has infiltrated through vegetation roots and macropores on the ground surface, percolates through the silty soil until it reaches the high permeability sand lense to flow out of the bank parallel to the glacial till interface. Thus, the sand lens will help the bank drain faster. Faster drainage increases bank stability by decreasing surcharge and pore-water pressures.

Once the banks become drained or lose moisture to levels below saturation, the unsaturated strength starts to increase because of the increase in negative pore-water pressure. This effect is promoted by the capillary effect between soil particles. It has been found from field measurements that negative pore-water pressure contributes to the shear strength of bank under ambient field conditions. Reduction of negative pore-water pressure during saturation after prolonged rain events is a critical factor in determining stability (Casagli and others, 1997, 1999; Curini, 1998; Simon and Curini, 1998, Simon and others, 2000).

GEOTECHNICAL ANALYSIS

Bank stability can be assessed mathematically by computing the Factor of Safety (FS). FS is defined by the ratio of the shear strength (resisting force) along the failure surface and the shear stress (driving gravitational force) (see equation 3 below). Once the FS falls below one, the bank, theoretically becomes unstable.

$$FS = \frac{Shear\ Strength}{Shear\ Stress} \tag{3}$$

This study addresses how the shear strength and shear stress in a riverbank change with time in response to stream stage and soil saturation.

Model Parameters and Description

Shear strength of the banks were determined by laboratory and in-situ tests, and previous studies of similar materials. The modeled bank stratigraphies are alluvium over stiff glacial till with and without a sand lens, alluvium over till with a tree on top, and a bank consisting of colluvial deposits. Each stratigraphy is modeled based on typical geometric combinations found in the St. Louis Metro East Region; banks of 8, 10 and 13 ft in height are modeled for bank angles of 60, 70 and 80 degrees. Each of these combinations are modeled for five different river level heights. The glacial till is assumed to be at 1, 1.5 and 2 ft above the riverbed for 8, 10 and 13 ft high banks, respectively. For every case, the banks are considered to be completely saturated except for the top approximately 2 ft of the bank. The water levels in the river varied from bankfull height to 1.5 ft of depth, resembling the receding portion of a storm hydrograph. The combination of a saturated bank with water level receding represents a stream with a steep-peaked storm hydrograph similar to that found in the urban setting in Judy's Branch.

With the banks assumed to be completely saturated, the shear strength is expressed in terms of the total strength envelope. The strength parameters used for this analysis are those that occur when a soil mass becomes suddenly brought to increases in loads, similar to the conditions of excavated and built-up soils or slopes. The parameters to use for these cases are those obtained from an analogy with the "end of construction" condition for which the total stress envelope(c and ϕ) is used as obtained from CU lab test and a soil considered impermeable during the loading event (Duncan, 1996). A storm event in which the bank becomes suddenly saturated, losing its matric suction and gaining weight by the addition of water is acted upon by a rapid loading for which the prevailing conditions and strength parameters are consistent with the "end of construction" analogy.

The strength parameter values used in the analysis were determined from CU laboratory tests, in-situ test results, and previous studies of similar materials. From laboratory results, the clayey silt alluvium (ML) had values of cohesion intercept, c = 180 lb/ft^2, and an angle of internal friction, ϕ =18°. The glacial till is assumed from to have a c = 275 lb/ft^2 and a ϕ = 25°. The cohesion incorporated by tree roots is C_r= 205 lb/ft^2, as determined by Simon and Collison (2001) as a typical value for sycamore trees. Root cohesion was considered for the upper 1.5 ft. Tree surcharge was estimated, assuming the tree is a 30 ft long post with 2 ft diameter. The load was distributed over a 4 ft diameter base. The cohesion for the sand lense is determined to be negligible and the ϕ = 30°. A light brown layer on top of the bank has the same properties as the underlying clayey silt but is not considered saturated in model simulation (fig. 10).

Using the above scenarios and parameters, the modeling of the factor of safety computations are done with the slope-stability analysis software (SLIDE 3.0), which searches for the critical failure surface through a user-specified region (fig. 10), considering river water confinement, pore water pressures, surcharges and layered banks. The software made it possible to quickly edit the geometric and river level computations. It also has slope stability analysis methods to choose, from which the U. S. Army Corps of Engineers (COE) (1970) and the Spencer (1967) method were chosen. These methods are selected because they satisfy force equilibrium and may be applied to any shape of failure surface. More information about slope-stability methods may be found on Duncan (1996), Nash (1987), U.S. Army Corps of Engineers (1970), and others.

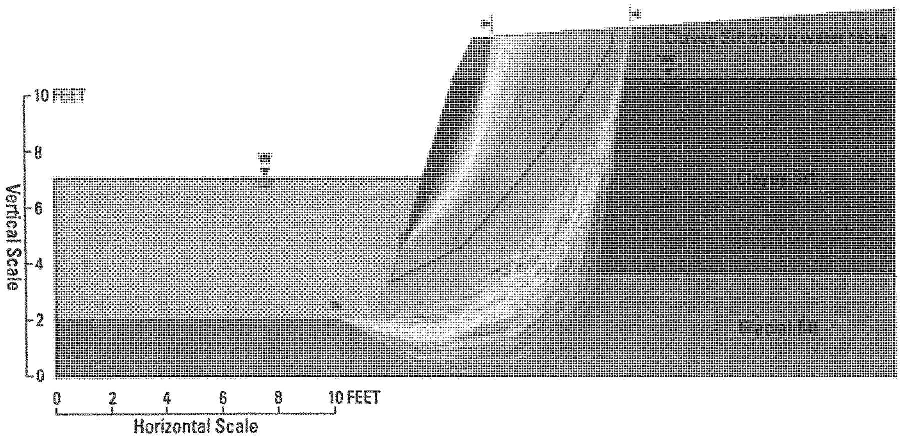


Figure 10. Modeled riverbank showing all failure surfaces attempted for one scenario in the St. Louis Metro East region. The most critical line is shown in dark green. Green arrows are the user-defined limits for the search region.

Model Results

The results of the analysis for alluvium over glacial till, 10 ft high and 70 degree bank angle during the recession limb of the storm hydrograph are shown in figure 11. Factor of safety degrades with the lowering of the river level when the alluvium remains saturated.

Site-specific stability charts for all scenarios and the condition where the river level is at 1.5 ft and the riverbank remains saturated are shown in figure 12. In order to know the factor of safety for bank angles other than 70 degrees, a correction factor must be used. For an 80 degree bank angle, the Factor of Safety for the given bank height must be multiplied by 0.9. For a 60 degree bank angle, the Factor of Safety for the given bank height must be multiplied by 1.2.

The colluvium bank scenario has the lowest Factor of Safety throughout the range of modeled bank heights. Also, the scenario becomes unstable at a bank height of approximately 9.8 ft. The alluvium over glacial till with sand lense scenario has the second lowest Factory of Safety for bank heights less than 10.8 ft and the second highest for bank heights greater than 10.8 ft; the scenario becomes unstable at a bank height of approximately 10 ft. The alluvium over till with tree scenario has the greatest Factor of Safety for bank heights above 9.5 ft and the second highest between 9.5

and 10.8 ft, and the second lowest for bank heights greater than 10.8 ft; the scenario becomes unstable at bank height of 10.3 ft. The alluvium over till scenario has the greatest Factor of Safety for bank heights below 9.5 ft and the second highest between 8 and 9.5 ft; the scenario becomes unstable at bank height of 11.5 ft.

It can be interpreted from the model analysis that the sand lens has a slight negative effect on the stability of the riverbanks as compared to the clayey silt over alluvium scenario. This effect arises because sand lenses have little to no cohesion and mechanical strength is based only on frictional forces. On a longer time frame, sand lenses in the riverbank would allow faster drainage of the bank, which would work to increase stability. Therefore, it would be less likely for the scenario with the sand lens to become fully saturated or reach the worst-case condition used in model analysis.

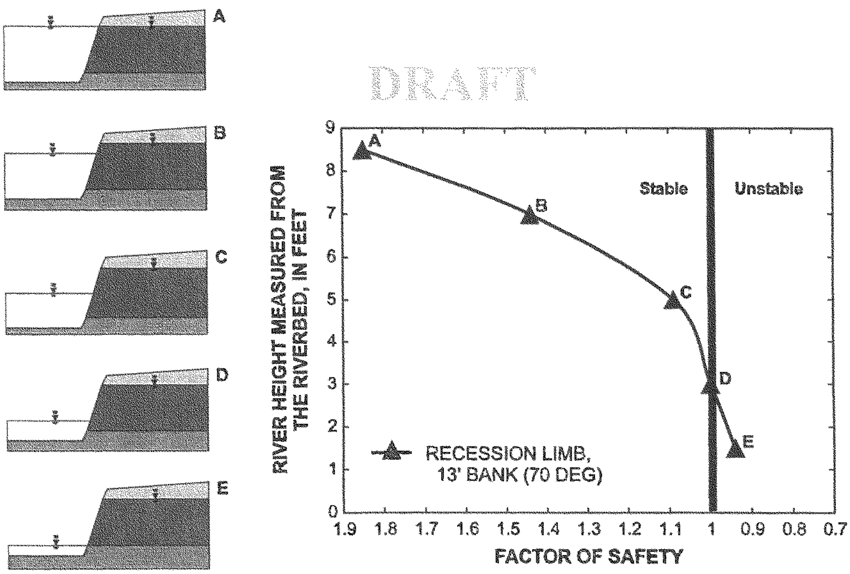


Figure 11. Factor of Safety with respect to the river height as measured from the riverbed on the recession limb of the hydrograph

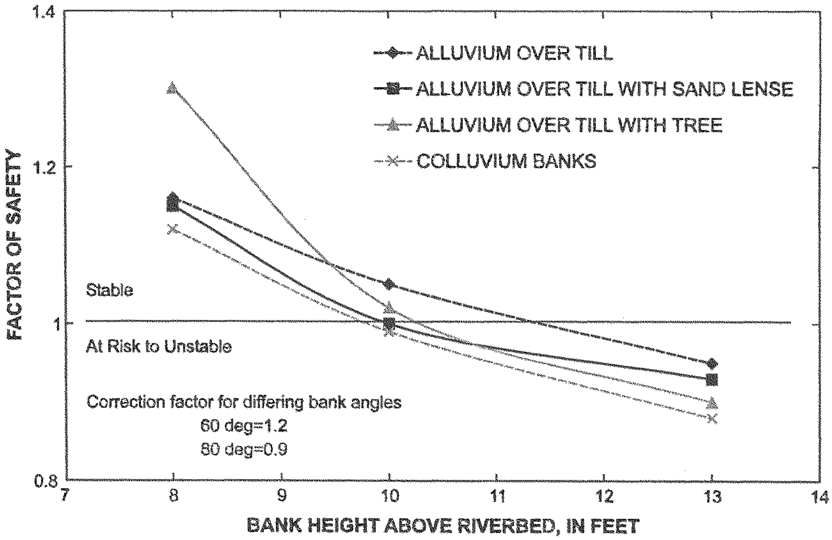


Figure 12. Factor of Safety with respect to bank height for a saturated bank and 1.5 feet river level and 70 degrees bank angle for riverbank scenarios in the Metro East region of southwestern Ill.

SUMMARY AND CONCLUSIONS

The riverbanks in the Metro East region in southwestern, Illinois, mainly consist of normally consolidated clayey silt and sand deposits of mixed alluvial and colluvial origin overlying stiff overconsolidated glacial till, which sometimes is observed to be weathered. Silt is the main component on the banks of the Judy's Branch and other streams in the Metro East region of southwestern Illinois. The silt on the banks of these streams is a product of erosion and mass failures of the abundant loess deposited during the last period of glaciation. The silt on these banks is easily detached because of its normally consolidated medium to soft state, the presence of sand layers, and poor cohesion. The typical scenarios considered in model simulations are:

1. Alluvial clayey silt over glacial till
2. Alluvial clayey silt over glacial till with trees
3. Alluvial clayey silt over glacial till with a sand lens at the contact between the two layers
4. Colluvial soil deposits.

Relative stiffness and consistencies of in-situ soils were assessed by the use of a portable field vane and by laboratory tests performed on both the boring samples and samples taken in situ. Other laboratory tests included consolidated undrained (CU) and unconfined compression tests from which the strength parameters were determined in conjunction with field tests and engineering judgment. Atterberg limits routinely were performed and also grain size distributions were determined.

Many factors such as the presence of sand layers, contrasting stiffness between the alluvial deposit and glacial till, vegetation and morphological stage affect the stability of the river banks for this region. Most bank failures occur during the recession limb of the storm hydrograph. Bank failure can result: partial withdrawal of lateral support and confinement by the receding water level after the storm, increase in driving forces due to the saturation process and consequential increase in unit weight on the bank, decrease in matric suction or negative pore pressures induced by the infiltration of water and the generation of positive pore water pressures on the bank (Simon and others, 2000). Also erosion or undercutting of toe material, can oversteepen the bank or cause a cantilever like unstable section.

Negative pore water pressures will result in banks with moisture contents less than saturated levels, which will act to increase shear strength and, thus, its factor of safety. When the bank becomes completely saturated, this negative pore pressures are lost, greatly reducing the stability of the riverbanks. A critical stability condition exists when banks are saturated and water levels no longer provide hydrostatic pressure on banks. Fine-grained soils similar to those found in the Metro East region encourage this condition because drainage is delayed.

Failure conditions for this project were modeled by considering the short-term response to undrained conditions of having a saturated bank and 1.5 ft river level. It can be interpreted from the stability chart that banks steeper than 70 degrees and higher than 10 to 11.5 ft in height become at risk under conditions that promote saturation of the bank and sudden drop in the river level.

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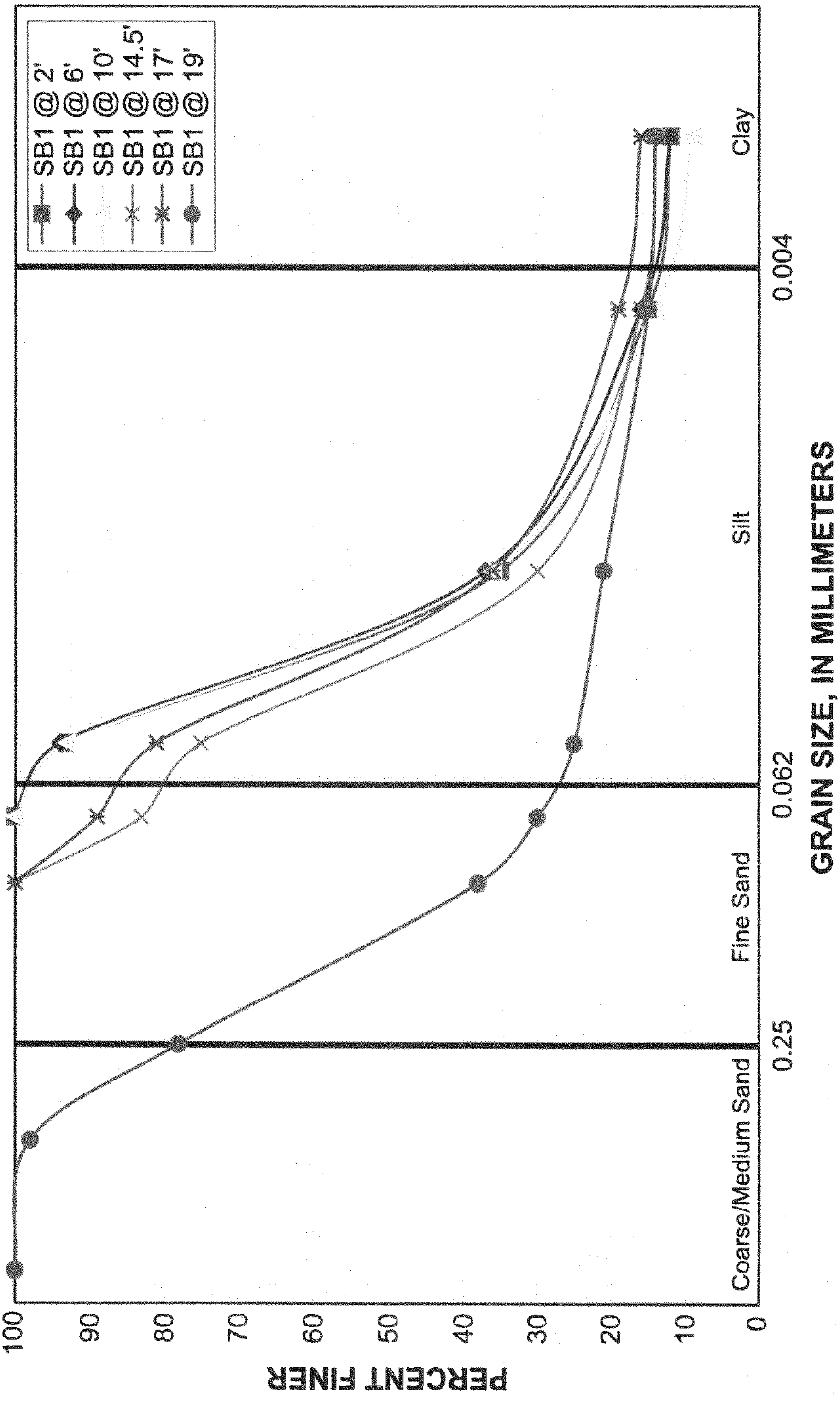
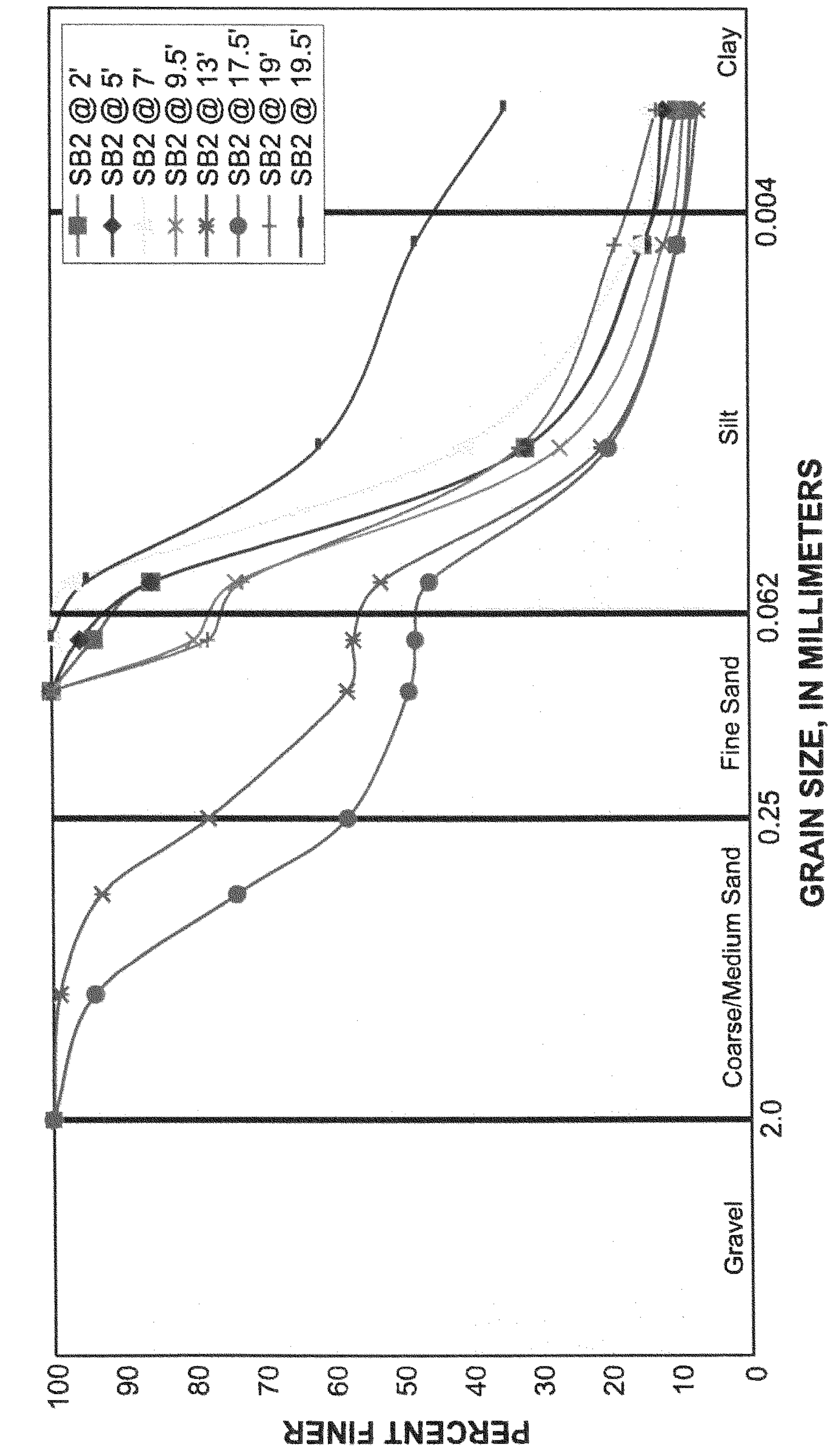
APPENDIX

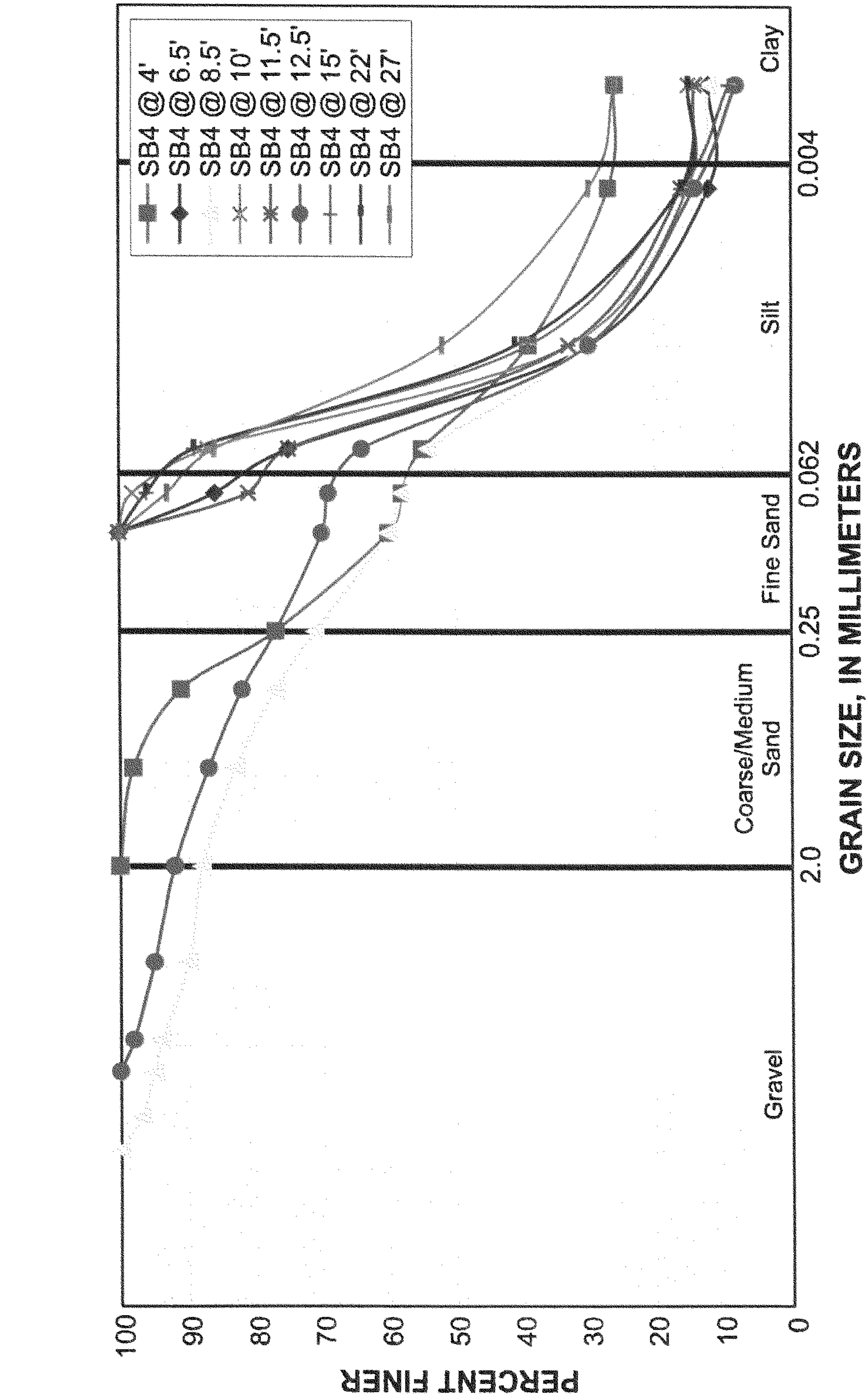
SOIL BORING PROFILE AND LABORATORY TEST RESULTS										
Soil Boring:	SB1									
Boring Date:	9/5/2000, USGS-WRD, Urbana	Tested by:		USDA-NRCS, Lincoln, NE						
Depth	Soil Description	USC	w%	LL	PI	Gs	γ [illegible]	test	results	Comments
0.65	*Light brown silt (loess)*									
2	*Medium brown silt with*	ML	15.4	28	5	2.65				
	thin sand lens and organic matter									
4										
6	*same as above*	ML	6	26	4	2.66				
8										
10	*same as above*									
12										
14	*same as above*	CL-ML	15.4	25	5					▽ river bed level
16										
	Medium gray clayey silt	CL	21.5	29	8	2.69				
18										
	Silty sand	SM	14							
20										
22	*Clayey silt w/ silty sand lenses*	ML	22.2	29	4	2.64				
	(fine to medium grained)	SP-SM	NP				103			
24	*end of boring*									


SB1 @ 2'
SB1 @ 6'
SB1 @ 10'
SB1 @ 14.5'
SB1 @ 17'
SB1 @ 19'
PERCENT FINER
100
90
80
70
60
50
40
30
20
10
0
Coarse/Medium Sand
Fine Sand
Silt
Clay
0.25
0.062
0.004
GRAIN SIZE, IN MILLIMETERS

SOIL BORING PROFILE AND LABORATORY TEST RESULTS												
Soil Boring:	SB2											
Boring Date:	9/5/2000, USGS-WRD, Urbana	**Tested by:**	USDA-NRCS, Lincoln, NE									
Depth	**Soil Description**	**USC**	**w%**	**LL**	**PI**	**Gs**	γ [illegible]	**test**	**results**	**Comments**		
2	*Light brown silt (loess)*	ML	6									
4												
	Medium to brown clayey silt with thin	CL-ML	25.7	25	4							
6	*silty sand lenses and*											
	some organic matter	ML	24.8	28	4	2.67						
8												
	Same as above	ML	21.3	24	3							
10		CL-ML	14.7	24	5		99					
			18.2				105	torvane	c=1300psf			
12	*Same as above with more sand*	ML	20.7	22	3	2.66	105			▽		
										river bed level		
14	*Gray clayey silt with gray sandy silt*	CL-ML		27	6	2.65	94	Qu	c=1238 psf			
	and trace organic carbon							torvane	c=1250 psf			
16	*Silty fine to medium fine sand*	SM										
	with silty clay											
18												
	Medium gray silty clay with	ML	39.4	32	8							
20	*fine sand and trace organic matter*	CL	26.5	34	151					End of boring		
	(stiff overconsolidated)											
22												
24												


SB2 @ 2'
SB2 @ 5'
SB2 @ 7'
SB2 @ 9.5'
SB2 @ 13'
SB2 @ 17.5'
SB2 @ 19'
SB2 @ 19.5'
Gravel
Coarse/Medium Sand
Fine Sand
Silt
Clay
2.0
0.25
0.062
0.004
GRAIN SIZE, IN MILLIMETERS
PERCENT FINER
100
90
80
70
60
50
40
30
20
10
0

SOIL BORING PROFILE AND LABORATORY TEST RESULTS										
Soil Boring:	SB4									
Boring Date:	9/5/2000, USGS-WRD, Urbana	Tested by:	USDA-NRCS, Lincoln, NE							
Depth	Soil Description	USC	w%	LL	PI	Gs	γ	test	results	Comments
	Cinder, topsoil, brick, gray silt									
2	cobbles and gravels, mixed	ML	21.6	27	3	2.67				
	with clay and silt (fill)									
4		ML	22.7	42	15	2.12				
6	Medium brown gray silt									
		CL-ML	17.9	23	4	2.66				
8	same as above with slight clay									
		ML	17.4	27	3	2.54				
10	Gravel cobble and sand lens	CL-ML	24.6	27	5	2.65				
	Clayey silt with fine sand									
12	and organic matter	CL	18.4	24	8					
	same as above without organic	CL-ML	19.4							
14										
		CL-ML	25							river bed level
16										
	Same as above									
18		ML	28.9	27	4	2.65	90	Qu	c=893 psf	
								torvane	c=750 psf	
20	Silty clay (glacial till)									
22		CL-ML	28.2							
24	Same as above									
26										
	Very stiff to hard silty clay	CL	21	35	15	2.76				
28	(possibly weathered rock)									refusal

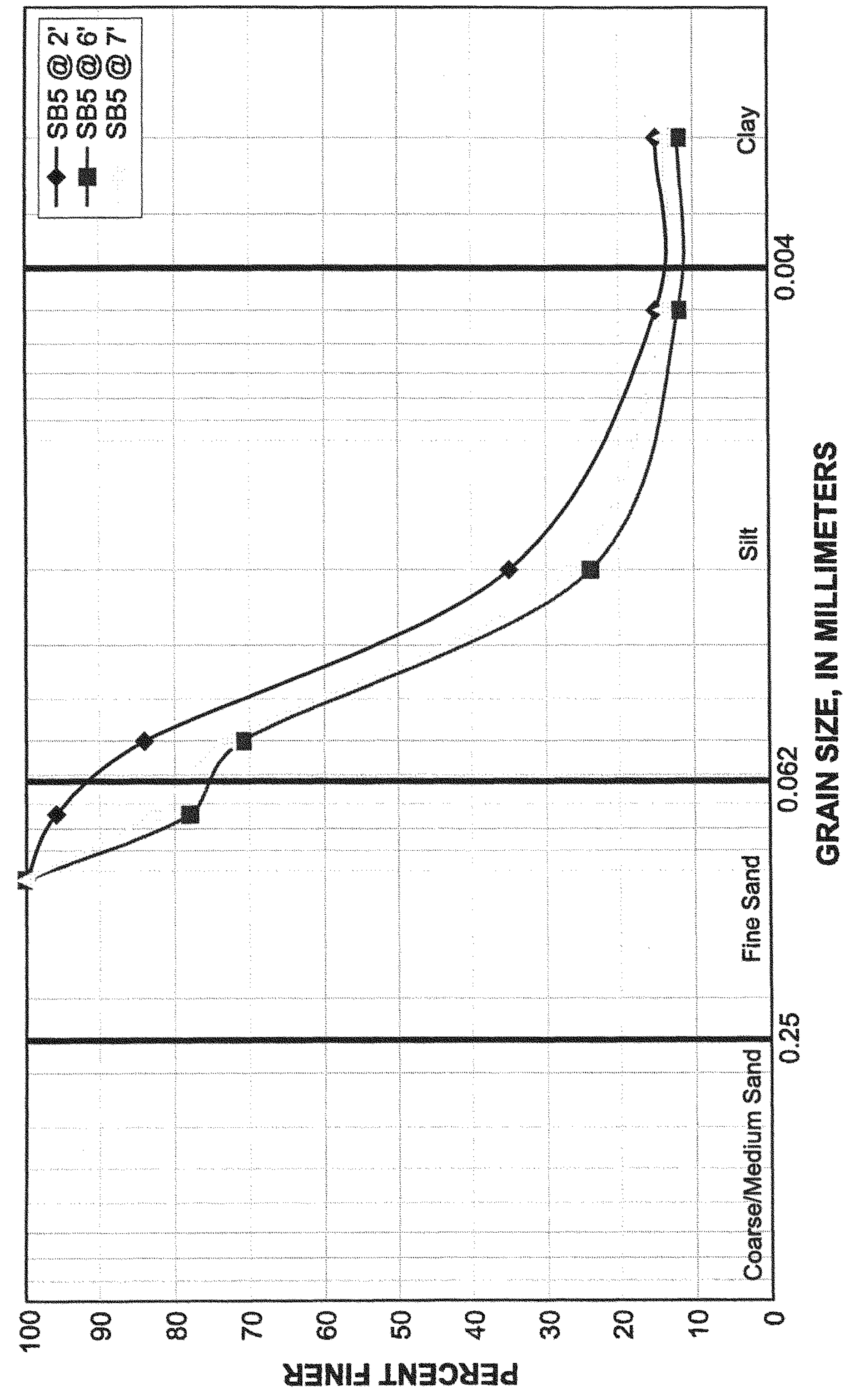

SB4 @ 4'
SB4 @ 6.5'
SB4 @ 8.5'
SB4 @ 10'
SB4 @ 11.5'
SB4 @ 12.5'
SB4 @ 15'
SB4 @ 22'
SB4 @ 27'
PERCENT FINER
100
90
80
70
60
50
40
30
20
10
0
Gravel
Coarse/Medium Sand
Fine Sand
Silt
Clay
2.0
0.25
0.062
0.004
GRAIN SIZE, IN MILLIMETERS

SOIL BORING PROFILE AND LABORATORY TEST RESULTS

Soil Boring: SB5

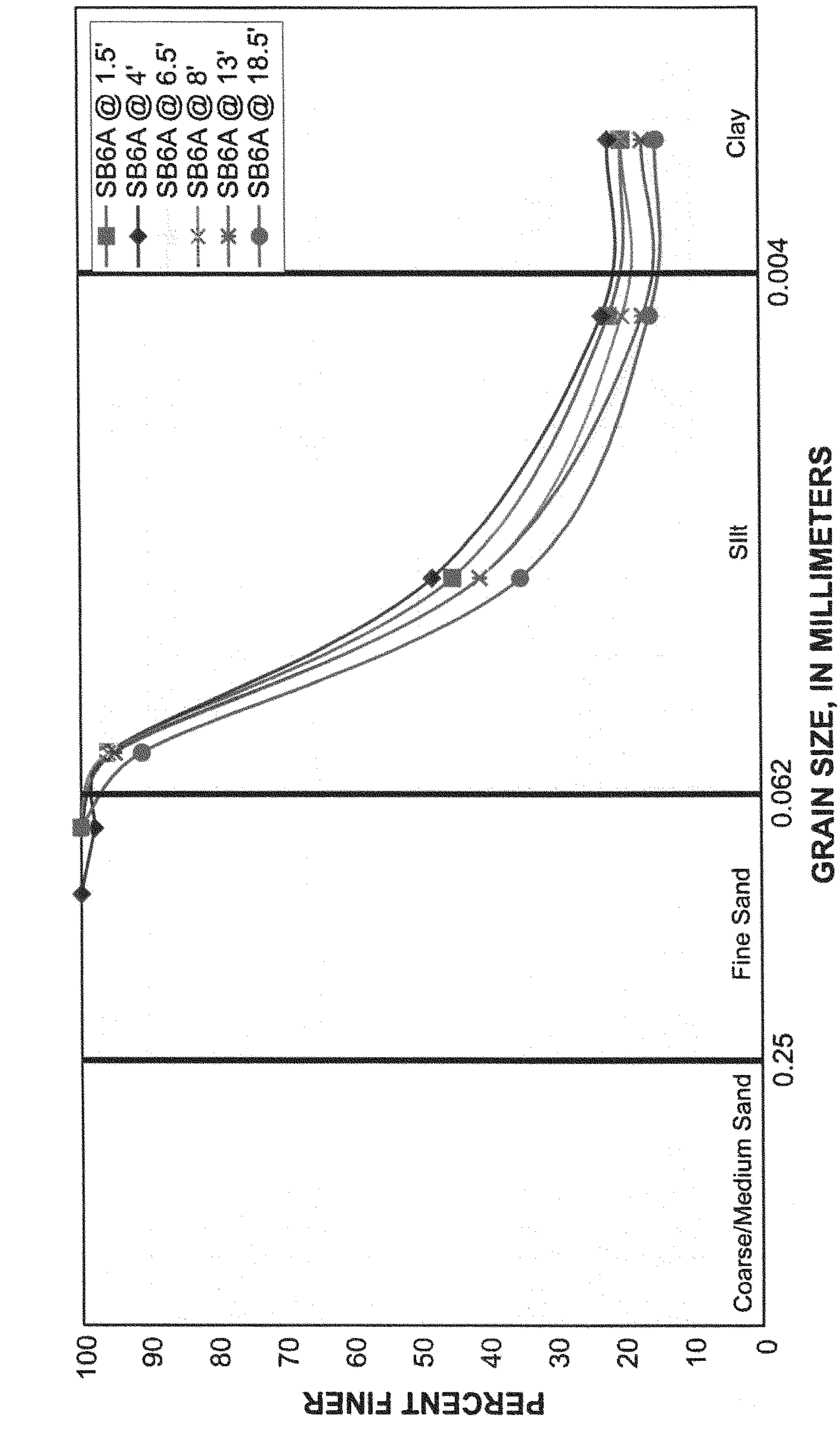
Boring Date: 9/5/2000, USGS-WRD, Urbana — **Tested by:** USDA-NRCS, Lincoln, NE

Depth	Soil Description	USC	w%	LL	PI	Gs	γ [illegible]	test	results	Comments
	Medium brown fine silt (loess)									
2	*with fine rootlets*	ML	21.6	27	3	2.67				
	Same as above but lighter brown color and									
4	*some organic matter*									
6	*Brownish gray silt with orange*	ML	19.8	22	2	2.66				
	(oxidized) fine to medium	ML	22.6	24	2	2.65				∇
8	*grained sand lenses*	ML		25	3			torvane	c=500psf	sfrearbed
	Gray silty sand	SM	22.5	19	1		103			
10	*Silt with thin laminae of fine*							torvane(op/bottom	625/750	
	sandy silt	ML	20.2	21	1	2.66	107	CU (eolded)	c=198psf	CU test @'
12								total strength	ϕ=17.6	end of core@'
								effective	ϕ=37.5	
								strength	c=0	


SB5 @ 2'
SB5 @ 6'
SB5 @ 7'
PERCENT FINER
100
90
80
70
60
50
40
30
20
10
0
Coarse/Medium Sand
0.25
Fine Sand
0.062
Silt
0.004
Clay
GRAIN SIZE, IN MILLIMETERS

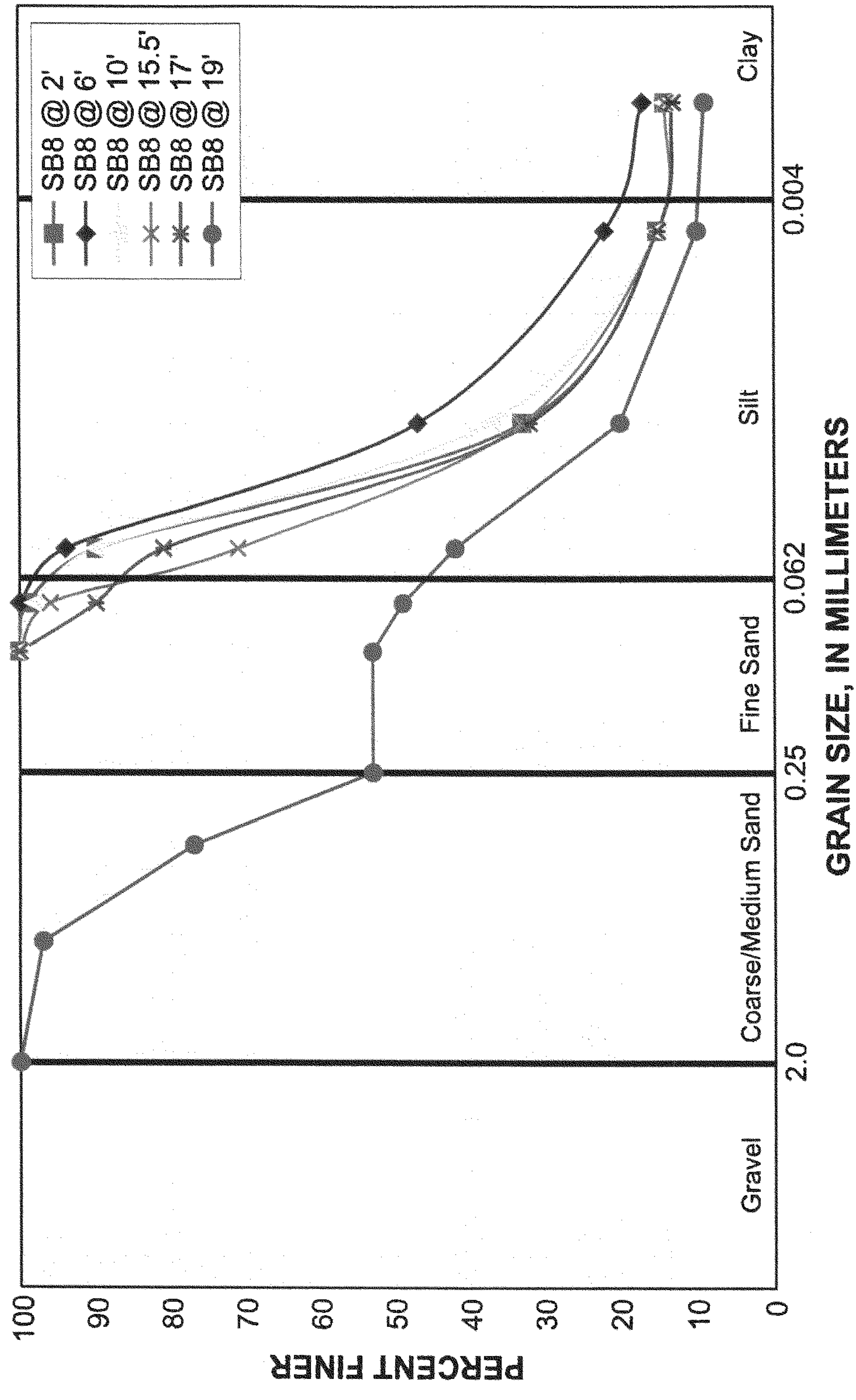
SOIL BORING PROFILE AND LABORATORY TEST RESULTS

Soil Boring:	SB6A									
Boring Date:	9/6/2000, USGS-WRD, Urbana	**Tested by:**	USDA-NRCS, Lincoln, NE							
Depth	**Soil Description**	**USC**	**w%**	**LL**	**PI**	**Gs**	γ [illegible]	**test**	**results**	**Comments**
2	*Top soil, organic clayey silt*	ML	27.2	34	10					
4	*Silty clay with rock fragments*	CL	26.4	33	10	2.7				
6										
8	*Medium gray clayey silt*	ML	25.6	32	7					
								torvane	1000 psf	
10								total strength	c=182 psf	
	Same as above	ML	24.3	29	5	2.72	100	CU	ϕ=15.8	
12									ϕ=27.8	
		ML	25.2	29	5	2.7		effective strength	c=0	▽
14	*Very stiff to hard silty clay*	CL-ML	26.5	28	7	2.69	97	Qu	c=1145 psf	river bed level
	(glacial till)							torvane	c=1375 psf	
16										
18										
	Saturated gray clayey silt	CL-ML	26.4	25	5	2.67				
20										end of core


SB6A @ 1.5'
SB6A @ 4'
SB6A @ 6.5'
SB6A @ 8'
SB6A @ 13'
SB6A @ 18.5'
PERCENT FINER
100
90
80
70
60
50
40
30
20
10
0
Coarse/Medium Sand
Fine Sand
Silt
Clay
0.25
0.062
0.004
GRAIN SIZE, IN MILLIMETERS

SOIL BORING PROFILE AND LABORATORY TEST RESULTS

Soil Boring:	SB8									
Boring Date:	9/5/2000, USGS-WRD, Urbana	Tested by:	USDA-NRCS, Lincoln, NE							
Depth	**Soil Description**	**USC**	**w%**	**LL**	**PI**	**Gs**	$\gamma_{d,\ lb/ft^3}$	**test**	**results**	**Comments**
2	*Light brown silt with organic rootlets and oxidized orange silts*	ML	9.1	26	3	2.63				
4										
6	*Medium dark gray clayey silt to silty clay*	CL	28	30	8	2.63				
8	*Same as above with higher clay content*									
10	*Medium gray clayey silt with fine grained thin sand lens*	CL-ML	27.4	26	7					
12								Qu	c=936 psf	
	Medium dark gray silty clay	CL-ML	21.7	24	6	2.67	103	torvane	c=1000psf	
14	*with organic material*	CL	31	37	15			torvane	c=750 psf	river bed level
		CL-ML	27.4	26	8	2.67				
16										
		CL	25.3	26	8					
18	*Tan brown clayey silty with*									
	lenses of silty sand and cobbles	SM	20.9	18	2	2.66				
20	*(glacial till)*									end of core



PERCENT FINER
100
90
80
70
60
50
40
30
20
10
0
GRAIN SIZE, IN MILLIMETERS
2.0
0.25
0.062
0.004
Gravel
Coarse/Medium Sand
Fine Sand
Silt
Clay
SB8 @ 2'
SB8 @ 6'
SB8 @ 10'
SB8 @ 15.5'
SB8 @ 17'
SB8 @ 19'

APPENDIX F – WATER AND AIR QUALITY

TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

APPENDIX F – WATER AND AIR QUALITY

F.1 WATER

F.1.1 Executive Summary. The purpose of this surface water quality evaluation is for inclusion into the body of the Integrated General Reevaluation Report and Environmental Impact Statement Report for the East St. Louis and Vicinity, Illinois, Interior Flood Control and Ecosystem Restoration Project.

A review and evaluation of historical and current surface water quality conditions was performed to determine the existing and future "Without Project" and "With Project" conditions. Surface waters within the project area are not pristine and have a varying degree of impairments depending on specific conditions surrounding each water body. The following lists the most common surface water quality impairments and sources of impairments within the project area.

Causes of Impairments

1. Priority Organic Contaminants
2. Metals Contaminants
3. Nutrient Enrichment (i.e., phosphorus, nitrogen, nitrates)
4. Siltation
5. Organic Enrichment/Low Dissolved Oxygen
6. Habitiat Alteration
7. Suspended Solids
8. Ammonia (unionized)
9. Ph Outside Accepted Standard Range of 6.5 to 9.0
10. Excessive Algae
11. Noxious Aquatic Plants

Sources of Impairment

1. Industrial Point Sources
2. Municipal Point Sources
3. Combined Sewer Overflows
4. Agricultural Runoff from Non-Irrigated Crop Production and Livestock Production
5. Urban Stormwater Runoff
6. Hydrologic/Habitat Modification (i.e., channelization, dredging, upstream impoundments, flow regulation/modification, removal of riparian vegetation, streambank modification, draining/filling of wetlands)
7. Construction/Land Development/Commercialization/Urbanization
8. Land disposal/Septic Tanks
9. Contaminated Sediments

The general trend in population/urbanization/industrialization for the project area and vicinity is increasing. Based upon this increasing trend, the conclusion that increased impairment loads would be realized, can be drawn. An increased impairment load would result in a declining surface water quality.

The general project area "Without" implementation of the proposed ecosystem restoration and flood damage reduction project would see a declining surface water quality condition.

The future "With" implementation of the proposed ecosystem restoration and flood damage reduction project would potentially realize an improving surface water quality condition due to natural attenuation of impairment loads within designed ecosystems and flood control systems. An additional benefit would be to downstream receiving waters (i.e., Mississippi River, Mississippi River Delta and the Gulf of Mexico). The nutrient and sediments trapped within the project area ecosystems would no longer be adding to the impairment loads of theses downstream systems. The oxygen deficiency problem (i.e., hypoxia problem) brought on by large algae blooms within the Gulf of Mexico and the Mississippi Delta and attributed to the nutrients being delivered by upstream sources would realize a net decrease in nutrient influx from the East St. Louis project. The removal of these nutrients could assist in eliminating the hypoxia problem in the future. Future sampling and testing of the water systems will be required to determine the actual impacts and benefits.

F.1.2 Introduction. The East St. Louis and Vicinity, Illinois Interior Flood Control and Ecosystem Restoration Project – Integrated General Reevaluation Report and Environmental Impact Statement requires compliance with the National Environmental Policy Act (NEPA). The following information regarding the surface water conditions within the project area is provided to satisfy the NEPA requirements for existing surface water conditions and future "With" and "Without-Project" evaluation requirements.

A review of historical and current surface water quality data was performed to determine the existing and future "Without-Project" and "With-Project" conditions in the project area.

F.1.3 Surface Water Quality. The East St. Louis and vicinity, Illinois Interior Flood Control and Ecosystem Restoration Project is within the watershed system commonly referred to as the American Bottoms Basin and/or the Mississippi South Central River Watershed (Illinois Environmental Protection Agency, IEPA designation). The Mississippi South Central Watershed encompasses parts of Jersey, Macoupin, Madison, St. Clair, Monroe and Randolph Counties in Illinois. The Corps' project area encompasses a subset area of the Mississippi south Central Watershed consisting of parts of Madison and St. Clair Counties. Streams within the project area which were assessed from historical water quality data were 1) Cahokia Chute; 2) Canal #1; 3) Prairie Du Pont; 4) Harding Ditch; 5) Cahokia Canal; 6) Canteen Creek; 7) Judy's Branch; 8) Cahokia Creek; 9) Indian Creek; and 10) Little Mooney Creek. Surface lakes assessed within the project area were the Horse Shoe Lake, the three Frank Holten State Park Lakes, Dunlap Lake, Mt. Olive (Old) Lake, Weslake, Holiday Shores, and Edward and Thompson Farm Pond. A segment of the Mississippi River, which accepts the discharges from the project area, was also assessed by review of historical water quality data.

F.1.4 Streams, Lakes and River Water Quality. The streams, lakes and river in the project area have been assessed on a wide variety of water quality parameters over time. None of the streams, lakes or river segments are pristine and, therefore, a common practice is to identify the causes of water quality impairment and the possible sources of impairment. The water quality conditions of each water body within Illinois are compared to the governing Illinois Water Quality Standards as set up by the Illinois Environmental Projection Agency. The water quality standards vary by designated use of the water body. The issue of classification of an area's water quality is complex in light of the fact that water systems will have varying use designations, impairments and impairment sources. The focus of this water quality assessment in light of the complexity of water quality classification has been to address the identified impairments and impairment sources based on historical water quality data within the project area. The identified impairments may have varying degrees of improvement with the implementation of the proposed ecosystem restoration and flood damage reduction project. Potential improvement are identified in the following sections which discuss individual water systems (i.e., streams, lakes and river segments).

F.1.4.1 Mississippi River. Data from several reference sites within the St. Louis Metropolitan Area segment of the Mississippi River were reviewed. The Mississippi River is designated for "Full Use" being a water supply, general use and aquatic life water body.

Cause of Impairments
1. Priority Organic Contaminants
2. Siltation
3. Habitat Alteration
4. Suspended Solids

Source of Impairments
1. Industrial Point Sources
2. Municipal Point Sources
3. Combined Sewer Overflows
4. Agriculture Runoff from Non-Irrigated Crop Production
5. Urban Stormwater Runoff
6. Hydrologic/Habitat Modification (i.e., channelization, dredging, upstream impoundments, flow regulation/modification, removal of riparian vegetation, streambank modification, draining/filling of wetlands).

The identified impairments to the water quality of the Mississippi River could be reduced in severity by implementing the proposed ecosystem restoration and flood damage reduction project. The project could result in improvements in siltation, suspended solids, organic contaminant loading and habitat area increases. The project would not remove impairment sources but would be providing a means to improve the water quality within controlled areas prior to discharge to the river system. Natural attenuation of organics would have time to occur in impoundments and created wetland areas. Siltation could occur in these areas as well as a reduction in suspended solids based upon the increased retention time.

F.1.4.2 Cahokia Chute. Cahokia Chute does not have any specific water quality data readily available in historical databases or reference water quality documents. Cahokia Chute is a part of the Canal #1 system which has several monitoring sites within the system and which are discussed below.

F.1.4.3 Canal # 1. Historical water quality data from sampling sites within the Canal #1 and several tributaries (Prairie Du Pont Creek, Hickman Creek, Sparrow Creek, Harding Ditch) was available for evaluation. The designated uses of Cahokia Canal # 1 are partial support of aquatic life, full use for fish consumption and an overall use consignation. Causes of impairment are siltation and habitat alteration. Sources of impairment are agricultural related runoff and hydrologic/habitat modification via channelization. Proposed ecosystem restoration and flood controls would decrease the total impact of the above impairments by 1) decreasing the surge flow events and 2) increasing residence times of upstream drainage systems.

F.1.4.4 Cahokia Canal and Tributaries. Cahokia Canal and tributaries drain a major portion of the southwest portion of Madison County and northwest corner of St. Clair County. Multiple sites have been monitored along the reaches of the Cahokia Canal and tributaries (i.e., Judy's Branch, Schoolhouse Branch, Burdick Branch, Schoenberger Creek, Canteen Creek). Cahokia Canal designated uses are: 1) full support for fish consumption; 2) partial support of general overall use; 3) partial support of aquatic life. The canal is designated as totally non-supportive for swimming.

The causes of impairments to the Cahokia Canal are as follows:

1. Priority Organic Contaminants
2. Metals Contaminants
3. Nutrient Enrichment (i.e., phosphorus, nitrogen, nitrates)
4. Siltation
5. Organic Enrichment/Low Dissolved Oxygen
6. Habitat Alteration
7. Suspended Solids

The source of impairments to water quality within Cahokia Canal area as follows:

1. Agricultural Operations
2. Construction/Land Development/Commercialization/Urbanization
3. Urban Runoff
4. Hydrologic/Habitat Modification via Channelization

Ecosystem restoration and flood damage reduction systems proposed would have a tendency to decrease the severity of each impairment by increasing detention areas and retention times of stormwater runoff within the immediate area and tributaries feeding the area drainage system.

F.1.4.5 Cahokia Creek and Tributaries. Cahokia Creek and tributaries (i.e., Indian Creek, Paddock Creek, Little Mooney Creek) drain a major portion of western Madison County. Historical water quality monitoring data was evaluated from sites within Cahokia Creek and its tributaries. The designated use of Cahokia Creek is listed as: 1) full overall general use; 2) support of aquatic life; 3) support of fish consumption; and 4) non-support of swimming. The identified causes and sources of impairment to water quality within Cahokia Creek and tributaries is as follows:

Causes of Impairment
1. Metals Contamination
2. Siltation
3. Organic Enrichment/Low Dissolved Oxygen
4. Habitat Alteration

Sources of Impairment
1. Agricultural operations including non-irrigated crops, grazing pastures and feed lots and/or animal holding/management areas
2. Hydrologic/Habitat Modification via Channelization

The proposed ecosystem restoration/flood damage control project would provide a means of decreasing the severity of impairment to water quality by providing increased retention area/time for natural attenuation of the impairment.

F.1.4.6 Lakes and Ponds. The lakes within and surrounding the project area which have readily available historical water quality data are Horsehoe Lake, Frank Holten State Park # 1, # 2, and # 3, Thompson Farm Pond, Westlake, Dunlap, Holiday Shores, Mt. Olive Old and Edward. The designated uses are as follows:

Designated Uses (As Defined by the IEPA)

Horseshoe Lake:	Full Support of Fish Consumption Non-support of Recreation Non-support of Swimming Partial Support of General Overall Use Partial Support of Aquatic Life
Dunlap Lake:	Full Aquatic and Fish Consumption Support Partial General Overall Use Partial Recreational Use Partial Swimming
Mt. Olive Old:	Full Aquatic Use Full Drinking Water Use Partial General Overall Use Partial Recreational Use Partial Swimming Use
Westlake:	Full Swimming Use Partial General Overall Use Partial Recreational Use Partial Aquatic Life

Frank Holten # 1:	Non-support of Recreational Use Non-support of Swimming Partial General Overall Use Partial Aquatic Life
Frank Holten # 2:	Full Aquatic Life Non-support of Swimming Partial General Overall Use Partial Recreational Use
Frank Holten # 3:	Non-support of Overall Use Non-support of Recreation Non-support of Swimming Partial Support of Aquatic Life
Holiday Shores:	Full Support of Aquatic Life Partial Support of Overall Use Partial Support of Recreation Partial Support of Swimming Partial Support as a Drinking Water Supply
Edward:	Full Support of Aquatic Life Non-support of Recreation Partial Support for General Overall Use Partial Support for Swimming
Thompson Farm:	Full Support of Aquatic Life Partial Support for General Overall Use Partial Support for Recreation Partial Support for Swimming

Causes of impairments to the lakes and ponds as identified by historical water quality data are as follows:

1. Priority Organics Contaminants
2. Metals Contaminants
3. Ammonia (Non-ionized)
4. Nutrients (i.e., phosphorus, nitrogen, nitrates)
5. pH Outside Accepted Range of 6.5 to 9.0
6. Siltation
7. Suspended Solids
8. Excessive Algae
9. Noxious Aquatic Plants

The sources of water quality impairment to the lakes and/or ponds are as follows:

1. Agricultural Operation/Runoff
2. Construction/land Development
3. Urban Runoff/Stormwater Runoff
4. Land disposal/Septic Tanks
5. Hydro-modification via Dredging
6. Habitat Modification via Shoreline Modification/Destabilization
7. Contaminated Sediments
8. Heavy Forest/Grassland/Parkland

The lakes and ponds within the project area are currently receiving waters which have been impaired by multiple sources. Water quality improvement of upstream water sources by implementation of the proposed ecosystem restoration and flood damage control project would result in a decreased load to the current lakes and ponds. The improvement of incoming water would allow the lakes and ponds to recover from incoming impairment loads via natural attenuation. The amount of impairments that a lake or pond can attenuate naturally is dependent upon the specific type impairment, residence time and many other factors. Monitoring of the system would be required to determine the improvement level based on a decreased loading.

F.1.5 Future "With-out" Project Conditions. The surface water quality within the project area has a wide variety of impairments with causes originating from agricultural uses, urban-runoff, point source discharges (industrial and public/private treatment works) and land development. The general trend in population and commercialization/industrialization is increasing within the project area. Based upon the increasing trend, the surface water quality would most likely have additional impairment loads placed upon it over time. The surface water quality would degrade with an increased impairment load. Downstream receiving water would then have an increased impairment load which decreases water quality within those regions. The degrading water quality condition, with time, within the project area would result in a decreased amount of possible designated uses.

F.1.6 Future "With" Project Conditions. Implementation of the ecosystem restoration and flood damage reduction project would provide a means to naturally attenuate some of the water quality impairments identified for the surface water within the project area. Agricultural and urban runoff would be retained in designed ecosystem retention areas. This increased retention time would allow for natural attenuation of portions of nutrient and organic loading from sources of impairment. Loading of known water quality impairments to the current drainage system and lakes within the project area would, therefore, decrease and potentially provide a sufficient reduction such that natural attenuation can further reduce the impairments prior to discharge to downstream receiving waters.

A broader view of the potential benefits of the ecosystem restoration project reveals the potential for reduction in the amount of nutrients and sediments being passed to the Mississippi River and ultimately to the Gulf of Mexico. Currently the Gulf of Mexico west of the Mississippi River Delta is experiencing a severe oxygen deficiency on a seasonal basis. The major contributor to this undesirable water quality condition is wide spread algae blooms which deplete oxygen levels and upset the natural food chain and result in significant loss of fish and other aquatic organisms. This condition is commonly referred to as the "Hypoxia Problem of the Gulf of Mexico". Algae blooms are dependent, among other things, upon the availability of nutrients (i.e., nitrogen and phosphorus compounds), and studies have shown that the Mississippi River delivers about 935,000 metric tons of nutrients to the Gulf of Mexico annually. The proposed ecosystem restoration and flood damage reduction project in East St. Louis and vicinity can potentially decrease the impact on the hypoxia problem within the Gulf of Mexico and the Mississippi Delta area. Decreased sediment loading to the Mississippi River would also be realized by implementing the project. Future sampling and testing will be required to determine the actual impacts and benefits.

F.2 AIR

F.2.1 Clean Air Act Conformity.

F.2.2 Introduction. The 1990 Amendments to the Clean Air Act (CAA) [42 United States Code 7401 et seq.] require Federal agencies to ensure their actions conform to the appropriate State Implementation Plan (SIP). The SIP is a plan that provides for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS), and includes emission limitations and control measures to attain and maintain the NAAQS. Conformity to a SIP, as defined in the CAA, means conformity to a SIPs purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards.

The Federal agency responsible for the action is required to determine if its action conforms to the applicable SIP. Thus, the purpose of this analysis is to document the determination of conformity of the Federal action planned for the U.S. Corp of Engineers East St. Louis Interior Flood Control Project to the SIP for the State of Illinois.

This conformity determination has been prepared in accordance with the final rule of the Environmental Protection Agency (U.S. EPA), Determining Conformity of General Federal Actions to State of Federal Implementation Plans, published in the Federal Register on November 30, 1993. The general conformity rule [40 Code of Federal Regulations Part 93, Subpart B] was effective January 31, 1994.

F.2.3 Conformity Background Information. Conformity provisions first appeared in the CAA Amendments of 1977. Although these provisions did not define conformity, they did address the association of Federal department activities with a SIP. The 1977 provisions stated that no Federal agency could engage in, support in any way, or provide financial assistance for, license or permit, or approve any activity that did not conform to a SIP after its approval or promulgation.

Section 176(c) [42 USC 7506c] of the CAA Amendments of 1990 expanded the scope and content of the conformity provisions by defining conformity to an implementation plan. Specifically, the language requires that a Federal agency cannot approve or support an action that causes or contributes to new violations of any NAAQS, Increases the frequency or severity of existing violations of any NAAQS, or Delays the timely attainment of any NAAQS or any required interim emission reductions or milestones.

The purpose of Section 176(c) is to make emissions from Federal actions consistent with the CAA's air quality planning goals. The intent of the provisions is to foster long range planning for the attainment and maintenance of air quality standards by evaluating air quality impacts of Federal actions before they are undertaken. Federal actions are divided into transportation projects and non-transportation related projects. The "transportation conformity" regulations (40 CFR Part 51, Subpart T) govern projects developed or approved under the Federal Aid Highway Program or Federal Transit Act. Non-transportation projects, which include the Federal action planned for the East St. Louis Interior Flood Control Project, are governed by the "general conformity regulations discussed above.

F.2.4 General Conformity Determination Process. The general conformity rule consists of three major parts - applicability, analysis, and procedure. These three parts are described in the following sections.

F.2.4.1 Applicability.

F.2.4.1.1 Attainment Areas. The general conformity rule applies to Federal actions occurring in the air basins designated as nonattainment for criteria pollutants or in attainment areas subject to maintenance plans (maintenance areas). Federal actions occurring in air basins that are in attainment for criteria pollutants are not subject to the conformity rule, except for those basins that recently met attainment and are being managed through a maintenance plan.

A criteria pollutant is a pollutant for which an air quality standard has been established under the CAA. The designation of nonattainment is based on the exceedances or violations of the air quality standard. A maintenance plan establishes measures to control emissions to ensure the air quality standard is maintained in areas that have been redesignated as in attainment from a previous nonattainment status. Criterial pollutants and designation of attainment status are further discussed later in this document.

F.2.4.1.2 De Minimis Emission Levels. To focus conformity requirements on those Federal actions with the potential to have significant air quality impacts, threshold (de minimis) rates of emissions were established in the final rule. With the exception of lead, the de minimis levels are based on the CAA's major stationary source definitions for the criteria pollutants (and precursors of criteria pollutants) and vary by the severity of the nonattainment area. A conformity determination is required when the annual net total of direct and indirect emissions from a Federal action, occurring in a nonattainment or maintenance area, equals or exceeds the annual de minimis levels.

Table F-1 lists the de minimis levels by pollutant applicable for Federal actions. The de minimis level for ozone applies to each precursor - volatile organic compounds (VOCs) and nitrogen oxides (Nox). Those levels specific to the air quality control region in which the Interior Flood Control Project will be located are shown in italics. This Federal action will occur in an area designated as moderate nonattainment for ozone (outside an ozone transport region).

F.2.4.1.3 Regional Significance. A Federal action that does not exceed the de minimis levels of criteria pollutants may still be subject to a general conformity determination. The direct and indirect emissions from the action must not exceed 10 percent of the total emissions inventory for a particular criteria pollutant in a nonattainment or maintenance area. If the emissions exceed this 10 percent de minimis, the Federal action is considered to be a "regionally significant" activity, and thus, general conformity rules apply. The concept of regionally significant is to capture those Federal actions that fall below the de minimis levels, but have the potential to impact the air quality of a region.

Table F-1 De-Minimis Levels for Criteria Pollutants

Pollutant	Designation	Tons per Year
Ozone*	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other nonattainment areas outside ozone transport region	100
	Marginal and moderate nonattainment areas inside ozone transport region	50/100**
Carbon Monoxide	All nonattainment areas	100
Sulfur Dioxide	All nonattainment areas	100
Lead	All nonattainment areas	25
Nitrogen Dioxide	All nonattainment areas	100
Particulate Matter	Moderate nonattainment	100
	Serious nonattainment	70

* Includes precursors of volatile organic compounds (VOCs) and nitrogen oxides (Nox).
** VOCs/NOx

Maintenance areas are former nonattainment areas, which have met the criteria for attainment and have been redesignated to attainment by the U.S. EPA and have an approved maintenance plan. The General Conformity regulations also set de minimis levels for maintenance areas. For Particulate matter (PM10) maintenance areas the de minimis level is 100 tons per year.

F.2.4.1.4 Exemptions and Presumptions. The final rule contains exemptions from the general conformity process. Certain Federal actions are deemed by the U.S. EPA to conform because of the thorough air quality analysis that is necessary to comply with other statutory requirements. Examples of these actions include those subject to the New Source Review program, and remedial activities under the Comprehensive Environmental Response, Compensation and Liability Act program.

Other Federal actions that are exempt from the conformity process include those actions that would result in no increase in emissions, or an increase in emissions that clearly is de minimis. Examples include continuing or recurring activities, routine maintenance and repair, administrative and planning actions, land transfers, and routine movement of mobile assets.

A Federal agency can establish their own presumptions of conformity through separate rulemaking actions. Section 176(c) of the CAA does not specifically exempt any activity, thus a separate analysis would need to show that the activity presumed to conform has no impacts to air quality. Based on this analysis, the Federal agency can document that certain types of future actions would be de minimis.

F.2.4.2 Analysis. A conformity analysis of the Federal action pursuant to the rule is required in areas designated by the U.S. EPA as nonattainment or maintenance areas. A conformity analysis examines the total direct and indirect emissions of criteria pollutants or their precursors from the Federal action. Direct emissions are those emissions of a criteria pollutant or its precursors that are caused by or initiated by the Federal action, and which occur at the same time and place as the action. Indirect emissions are those emissions of a criteria pollutant or its precursors that are caused by the Federal action, which may occur later in time and/or may be further removed in distance from the action itself, but are still reasonably foreseeable and which the federal agency can practicably control and will maintain control over due to a continued program responsibility of the federal agency. Reasonably foreseeable emissions are projected future indirect emissions identifiable and quantifiable at the time the conformity analysis is done. Emissions from certain parts of the Federal action are exempt from the conformity analysis under the rule (e.g. stationary source emissions subject to New Source Review Standards).

The analysis is based on the latest planning assumptions derived from population, employment, and travel data acquired from the local metropolitan planning organization in the area where the Federal action is to occur. The latest and most accurate emission estimation techniques must be applied, unless written approval to employ modifications or substitutions is obtained from the U.S. EPA regional administrator. These techniques include motor vehicle emission models used to prepare or revise the SIP, and factors for non-motor vehicle sources, databases, and models specified and approved by the U.S. EPA. The analytical methods are further described in F.2.11.

F.2.4.3 Procedure. Procedural requirements of the conformity rule allow for public review of the Federal agency's conformity determination. Although the conformity determination is a Federal responsibility, State and local air agencies are notified and consulted. If a Federal action would not exceed de minimis levels, a formal conformity determination would not be conducted and public participation would not be required.

The Federal agency must provide a 30-day notice of the Federal action and draft conformity determination to the appropriate U.S. EPA Region, and State and local air control agencies. The Federal agency must also make the draft determination available to the public to allow opportunity for review and comment.

F.2.5 Description of the Federal Action. The recommended Federal Action consists of the alternative selected from each of the 11 Project action areas as identified in Section 6. To recap, these Project action areas are: Old Cahokia Creek; Judy's and Burdick Branch; Brushy Lake; Spring Lake; Wedgewood; Mullens Slough; Dobrey Slough; Elm Slough; Cahokia Mounds Prairie; Borrow Pit I-55/70; and, Historic Cahokia Creek. The alternative selected to be a part of the Recommended Plan from each of these areas was the one that best addressed study objectives and planning targets within each respective Project action area.

Section 6 of this report details the development, evaluation and selection process. Section 8.4 contains a detailed breakdown of the construction features and their quantities (when applicable) within each of the 11 Project action areas.

In general, the Recommended Plan consists of the following measures: the creation or improvement of marsh and shrub swamp habitat (951 acres); prairie habitat (1,110 acres); bottomland forest habitat (1,752 acres); upland forest (410 acres); lake habitat (460 acres); floodplain stream restoration 10.4 miles; floodplain channels (161 acres) upland dry detention basins (155); earthen embankments (15.5 miles); hydraulic control devices (culverts, flap gates, and new channels); wood duck boxes (651 boxes); prairie bird perches (870 perches); creation of over wintering holes; shoreline plantings (20 acres). Currently a total of 4,593 floodplain acres and 493 upland acres are included in the ecological restoration Project footprint. The floodplain acres will increase by approximately an additional 160 acres if work is ultimately undertaken as recommended at the Stockyards and Borrow Pit sites.

F.2.6 Location of the Federal Action. The East St. Louis and Vicinity, Illinois Flood Protection Project is located in Madison and St. Clair Counties, Illinois, along the left bank of the Mississippi River between river miles 175 and 195 above the Ohio River. It includes all of the bottomlands between the bluffs on the east and the Mississippi River and Chain of Rocks Canal on the west. It extends from the Prairie du Pont canal on the south to the Cahokia Creek diversion channel on the north.

The location of the Federal Action includes approximately 55,000 acres of floodplain that is protected by a levee system along the Mississippi River, the Chain of Rocks Canal, the Prairie du Pont canal, and the Cahokia Creek diversion channel. An additional 51,000 acres of upland area that are tributary to and drain into these bottomlands are also apart of the project area

F.2.7 Purpose of the Federal Action. The planned Federal Action is to restore the ecosystem and provide incidental interior flood damage reduction within the East St. Louis floodplain.

F.2.8 Elements of the Federal Action. The Federal Action will be in its construction phase over a period of 15 years. This phase consists of the moving of earth, the demolition of houses, and the burning of trees and prairie for the purpose of excavation and berm construction. The maintenance phase of the project includes the burning of trees and prairie on an irregular basis as needed.

F.2.9 Existing Air Quality. The area is in attainment for most of the criteria pollutants, sulfur dioxide, particulate matter, carbon monoxide, nitrogen dioxide and lead. The area is nonattainment for the pollutant ozone and is classified as moderate. A portion of the area is also a maintenance area for particulate matter. The townships of Granite City and Nameoki are maintenance for PM10.

F.2.10 Meterological Conditions. The area of the Federal Action has a modified continental climate with moderately cold winters and warm summers. The average annual precipitation is over 40 inches, with an average snowfall of approximately 18 inches per year. The region gets thunderstorms on an average of 51 days per year. The relative humidity ranges from an average of 78 percent in the morning to 54 percent in the late afternoon. Monthly temperatures average from 30 degrees Fahrenheit in January to 78 degrees Fahrenheit in July. The predominate wind direction is from the south for all months except February, when the wind is from the northwest. Calm conditions of wind speeds less than 1.1 miles per hour prevail about 15 percent of the time, with an annual average windspeed of 5.4 miles per hour.

F.2.11 Criteria Pollutants and Standards. The U.S. Environmental Protection Agency (U.S. EPA) under the requirements of the 1970 Clean Air Act (CAA), as amended in 1977 and 1990, established primary and secondary standards for six criteria pollutants, which are known as the National Ambient Air Quality Standards (NAAQS). The primary standards are intended to protect the public health. The secondary standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare. The NAAQS were established for six pollutants: carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, particulate matter, and lead.

Attainment status designations are made for each air quality control region (AQCR) or parts thereof for each air pollutant. A designated area is classified a) as not meeting primary standards ("non-attainment"), b) as not meeting secondary standards ("non-attainment"), c) as not classified if available data are insufficient ("unclassifiable"), or d) as better than national standards ("attainment").

F.2.11.1 Ozone. Ground-level ozone (the primary constituent of smog) is the most complex, difficult to control, and pervasive of the six principal air pollutants. Unlike other pollutants, ozone is not emitted directly into the air by specific sources. Ozone is created by sunlight acting on nitrogen oxides (NOx) and volatile organic compounds (VOC's) in the air. There are many sources of these gases. Some common sources include gasoline vapors, chemical solvents, fuel combustion products, and some consumer products. Emissions of NOx and VOC's from motor vehicles and industry can be carried hundreds of miles from their origins, and result in high ozone concentrations over very large Regions.

Scientific evidence shows that ground-level ozone not only affects people with impaired respiratory systems, such as asthmatics, but healthy adults and children as well. Exposure to elevated concentrations of ozone for 6 to 7 hours significantly reduces lung function and induces respiratory inflammation in normal, healthy people during periods of moderate exercise. It can be accompanied by symptoms, such as chest pain, coughing, nausea, and pulmonary congestion.

F.2.11.2 Carbon Monoxide. Emissions of CO, an invisible, odorless gas that comes primarily from vehicle exhaust, reduces oxygen delivery to the body's organs and tissues. This results in visual impairment, reduced work capacity, reduced manual dexterity, poor learning ability. Exposures to high levels are lethal.

F.2.11.3 Nitrogen Dioxide. Nitrogen dioxide (NO2) belongs to a family of highly reactive gases called nitrogen oxides (NOx). These gases form when fuel is burned at high temperatures, and come principally from motor vehicle exhaust and industrial combustion sources such as electric utilities and industrial boilers. A suffocating, brownish gas, nitrogen dioxide is a strong oxidizing agent that reacts in the air to form corrosive nitric acid, as well as toxic organic nitrates. It also plays a major role in the atmospheric reactions that produce ground level ozone (or smog). Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza.

F.2.11.4 Sulfur Dioxide. Sulfur dioxide is a colorless gas with a strong suffocating odor. Sulfur oxides (Sox) are gases produced from the burning of sulfur-contained fuels such as coal and oil, the smelting of metals, and other industrial processes. About 95 percent of these oxide gases are SO2. Exposure to SO2 may cause health effects including throat and lung irritations, swelling and accumulation of fluid in the throat and lungs, and nasal bleeding. Further oxidation of SO2 in the presence of moisture can form a sulfuric acid mist that can damage vegetation.

F.2.11.5 Particulate Matter. Particulate matter is the dirt, smoke, and soot in the air, most of which comes from diesel engines and industrial sources. It accumulates in the lungs, causing decreased lung function, higher risk of heart and lung disease, and aggravation of existing conditions such as asthma.

F.2.11.6 Lead. Lead is a bluish-white to a silvery-gray solid. Particles of lead found in the ambient air originate from motor vehicle exhaust from the use of leaded gasoline, and industrial lead smelting. Federal controls on leaded gasoline have caused a major decrease in lead emissions from vehicles. Health effects that can be caused from lead exposure include fatigue, sleep disturbance, headache, aching bones and muscles, constipation, abdominal pains and decreased appetite, and permanent nervous system damage. At high levels of exposure to lead, seizures, coma, or death may result.

F.2.12 Air Quality Control Region. The Federal Action area is located to the east of St. Louis, within the Metropolitan St. Louis Interstate Air Quality Control Region (AQCR). This AQCR covers part of Missouri and Illinois. Areas within the AQCR are further defined according to the attainment status of criteria pollutants. The Metropolitan St. Louis AQCR includes the Illinois counties of Madison, Monroe, and St. Clair, which are referred to as the Metro-East Nonattainment Area (IEPA, 1995). The Metro-East Nonattainment Area is a moderate nonattainment area for ozone.

F.2.12.1 Attainment Status. As discussed previously, areas not meeting ambient air quality standards are designated as being nonattainment for the specific pollutant causing the violation. Standards are not to be exceeded more than once a year, except for O3 and PM10, which are not to be exceeded more than an average of one day per year. For example, exceeding the O3 standard on four days in three years or less is a violation. The general conformity rule only addresses the impact of the Federal Action on the area's nonattainment status with the NAAQS.

The Illinois Environmental Protection Agency (IEPA) Bureau of Air, Division of Air Pollution Control, performs air monitoring in the vicinity of the Federal Action. The sites monitor only ozone except the East St. Louis site, which also monitors NOx.

F.2.12.1.1 Ozone. Metropolitan St. Louis, including the Metro-East Nonattainment Area, is in moderate nonattainment status for ozone based on data collected during the 1987 to 1989 base year determination by IEPA. Because the St. Louis AQCR was designated as non-attainment, U.S. EPA required it to create a plan by 1994 designed to reduce VOC emissions by 15 percent. The reductions in the plan result from such things as controlling emissions during the loading of crude oil into tank ships and barges on local waterways, implementing an automobile inspection and maintenance program, and adjusting gasoline composition to evaporate less during the hot, ozone-conducive weather. In addition to implementing the requirements of the plan, Missouri and Illinois were given until November 1996 to attain the ozone standard.

Even with the implementation of the VOC reduction plan, the St. Louis AQCR was not able to attain the standard by November 1996. U.S. EPA's standard requires that no monitor in the St. Louis AQCR exceed the measured limit of 0.12 parts per million (ppm) more than three times over three years. In the years before November 1996, several monitors recorded measurements higher than the allowed limit. Recent data displayed in table F-2 shows that the St. Louis AQCR is still in violation of the ozone NAAQS based on the total number of exceedences at the West Alton (MO) site in years 1998-2000.

Table F-2 AWCR Measurements

Monitor #	Site Name	1998 Exceedences	1999 Exceedences	2000 Exceedences	Total
171190008	Alton	0	1	0	1
171191009	Maryville	0	0	0	0
171192007	Edwardsville	0	0	0	0
171193007	Wood River	0	1	0	1
171630010	E. St. Louis	1	0	0	1
290990012	Arnold	1	1	0	2
291831002	West Alton	2	3	1	6
291831004	Orchard Farm	1	2	0	3
291890001	Affton	0	0	0	0
291890006	Queeny	1	1	0	2
291893001	Clayton	1	1	0	2
291895001	Florissant	1	1	0	2
291897002	St. Ann	1	1	0	2
295100007	Broadway	1	0	0	1
295100072	Clark	1	1	0	2
295100080	Newstead	0	0	0	0

In December 2000, the states of Missouri and Illinois submitted new plans showing that the St. Louis AQCR will attain the ozone standard by 2003. This plan was later supplemented and the attainment date revised to November of 2004. A number of Federal Register notices have been published to extend the attainment date and approve the submittals from Illinois and Missouri.

A notice of proposed rulemaking was published on this action on April 17, 2000 (65 FR 20404) and notices of supplemental proposed rulemakings were published on April 3, 2001 (66 FR 17647) and April 19, 2001 (66 FR 20122). The state plans include adoption of all local VOC measures under the Clean Air Act. Additionally, the plans will rely upon statewide controls of NOx emissions from major sources (primarily electric generating units). EPA proposed to approve these plans under a new attainment date extension policy. EPA has approved these plans and also formally extended the date for attainment from 1996 to 2004 in a rulemaking published June 26, 2001 (66 FR 33996).

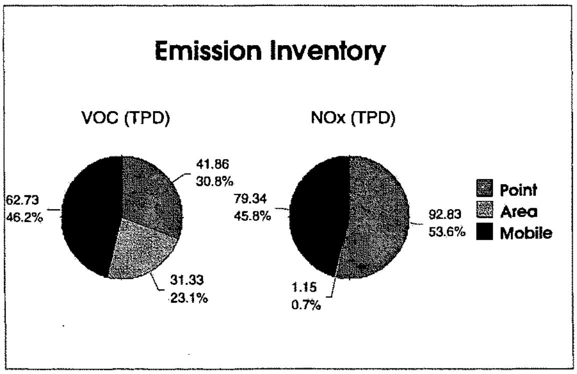
The plans submitted by Missouri and Illinois contain inventories of VOC and NOx sources. These sources of air pollution are characterized into two broad categories of emission sources:

Stationary sources. There are two types of stationary emission sources. These include: a) point sources which are sufficiently large enough to be permitted and b) area sources which are not specifically identified in the emission point inventories because they are too small, too numerous, or too difficult to inventory. Typical point sources include factories and electric power plants, while area sources include minor residential, commercial, and industrial boilers for space heating and hot water usage, dry cleaners, degreasing operations, and fugitive dust emissions from agricultural tilling.

Mobile sources such as aircraft, automobiles, trucks, buses, and taxis.

Figure F-1 below shows the tons per day of VOC and NOx emissions using 1995/1996 base data. For the sake of this analysis, the figure will only contain data regarding Illinois, as it is the location of the Federal Action.

Figure F-1 Emission Inventory



F.2.12.1.2 Carbon Monoxide. The Metropolitan St. Louis Interstate AQCR is in attainment for CO, including the Metro East area. In the three counties that make up the Metro East area, approximately 75 percent of the CO emissions come from mobile sources - the largest mobile sources being highway vehicles.

F.2.12.1.3 Nitrogen Dioxide. The Metropolitan St. Louis AQCR is in attainment for NOx. Nearly 90 percent of the NOx sources are classified as point sources, generally from utility and industrial boilers. About 24 percent of the tri-county emissions come from St. Clair County - mainly from mobile sources, again in the form of highway vehicles.

F.2.12.1.4 Sulfur Dioxide. The Metropolitan St. Louis AQCR is in attainment for S02.

F.2.12.1.5 Particulate Matter (PM). The Metropolitan St. Louis AQCR is currently attainment for the particulate matter standard, although fine particulates, which impair visibility and cause health problems when inhaled deeply, are an emerging area of concern. The townships of Granite City and Nameoki were redesignated to attainment and have a maintenance plan approved by the U.S. EPA. Projects in the maintenance area need to be assessed for any PM impacts to the air quality and show conformity to the SIP maintenance plan.

F.2.12.1.6 Lead (Pb). The Metropolitan St. Louis AQCR is currently attaining the Pb standard, although several monitors in Granite City have recorded high levels in recent years.

F.2.13 Conformity Determination Methodology.

F.2.13.1 Analytical Methods. The methodology for the general conformity analysis for the Federal Action consists of the following steps: 1) determine pollutants of concern based on attainment status of the AQCR; 2) define the scope of the Federal Action to include timing and location; 3) calculate emissions based on the scope; 4) review net emission changes for threshold levels and regional significance; and 5) determine conformity for applicable criteria pollutants.

As specified by 40 CFR 93.159(d), the analysis encompasses the year during which the total direct and indirect emissions are anticipated to be the greatest. For the Federal Action planned for the Interior Flood Control Project, the net total of VOC and Nox emissions are projected to be highest in [date].

The analysis is influenced primarily by the moving of earth, the demolition of houses, and the burning of trees and prairie for the purpose of excavation and berm construction. The analysis is influenced secondarily by the burning of trees and prairie on an irregular basis as needed.

The emission factors applied in the analysis were taken from U.S. EPA sources. The primary U.S. EPA sources used were the Compilation of Air Pollution Emission Factors (AP-42) (1985); Nonroad Engine and Vehicle Emission Study-Report (1991); and Procedures for Emission Inventory Preparation (1992).

F.2.13.2 Pollutants of Concern. The area affected by the Federal Action is in moderate nonattainment status for ozone (outside an ozone transport region), as described above. Consequently, direct and indirect emissions of VOCs and Nox (precursors to ozone) resulting from the Federal Action are subject to the conformity determination. Portions of the Federal Action will take place in the PM maintenance area. The following analysis will focus only on these pollutants.

F.2.13.3 Applicability. As discussed previously, if the emissions for a criteria pollutant do not exceed the threshold level specified in the final conformity rule, the Federal Action conforms for that pollutant. However, if the total direct and indirect emissions of a pollutant are above the de minimis value, a formal general conformity determination is applicable for that pollutant. As will be shown in the following analyses, PM, VOCs and NOx from the Federal Action will not exceed the de minimis level of 100 tons per year for each pollutant.

F.2.14 Changes in Emission Amounts. The Federal Action will affect the total amount of emissions from two categories of sources. The analysis includes all sources subject to changing emission rates, exclusive of any stationary sources that are subject to review and that may require a permit under the New Source Review (NSR) or Prevention of Significant Deterioration (PSD) programs. Stationary sources reviewed under NSR or PSD would include such sources as industrial facility boilers and the construction and operation of the hydrant refueling system. The emissions associated with the moving of earth, the demolition of houses, and the burning of trees and prairie have been included in the analysis. The net cumulative emission changes by year for each source are shown in tables in the following sections.

F.2.14.1 Off-Road Mobile Construction/Demolition Vehicles. Although the types and number of construction and demolition equipment is preliminary, the following analysis demonstrates that the emissions from the construction and demolition vehicles will be well below the de minimis levels. The number and types of equipment have been estimated and the emissions analysis assumes the highest number of vehicles to be working at one time and during the one year period that is used for the analysis. Although the General Conformity regulations do not require a worst case situation to be analyzed, it is appropriate to use this analysis in this situation since the exact equipment requirements have not been specified. The use of a worst case analysis clearly demonstrates the project to be below de minimis.

Clearing activities will probably be conducted using two bulldozers, a hydraulic excavator, a large capacity tub grinder, and a water truck for dust control. All cleared woody materials will be placed in a high capacity tub grinder to produce mulch. This mulch will be stockpiled until it is needed on-site for environmental plantings. The topsoil will probably be excavated with up to six scrapers. Root wads will be excavated with a hydraulic excavator in areas where water retention embankments are to be constructed.

In areas where restoration of channels, sloughs, and wetlands requires excavation, up to six scrapers and a hydraulic excavator will be used. The excavated materials will be transported with the scrapers and placed to construct the embankments. Two bulldozers will spread and compact the embankment materials to construct sound water retention berms. The same bulldozers will shape the embankments to their final grades and slopes. A water truck will be used for dust control. The embankments will be fertilized and seeded with drought and inundation resistant grasses.

Stockpiled topsoil will be replaced with the two bulldozers and up to six scrapers over the excavated areas to provide a rooting medium for plantings. Wetland tree stock will be planted with small backhoes or soil borers. Mulch will be placed around tree stock to maintain moisture during drought periods. A no-till planter will be used to plant seeds wetland and prairie grasses and flowers.

The construction work activities described above and shown below in table F-3 are typical for the proposed projects. The makeup of the work crews and equipment were developed as to what would be anticipated to complete the work within the specified construction contract durations.

Table F-3 Work Activities and Anticipated Equipment To Be Used

Construction Activity	Time (%)	Days/ Year	Anticipated Construction Equipment
Clearing and Grubbing	10	25	2 Bulldozers, 1 Hydraulic Excavator, 1 Tub Grinder, 2 Chainsaws, and 1 Water Truck
Floodplain Earthwork	50	124	2 Bulldozers, 1 Hydraulic Excavator, 6 Scrapers, and 1 Water Truck
Upland Sediment Detention Dams	25	62	2 Bulldozers, 1 Hydraulic Excavator, 14 Dump Trucks, 1 Vibratory Roller, and 1 Water Truck
Stream Bank Stabilization	10	25	1 Hydraulic Excavator, 1 Bulldozer, 6 Dump Trucks, and 1 Water Truck
Topsoil Placement	3	7	2 Bulldozers, 6 Scrapers, and 1 Water Truck
Environmental Plantings & Seeding	2	5	1 Small Backhoe and 1 No-Till Planter

The following Table F-4 summarizes the anticipated emissions from the construction activities. Emission factors were obtained from either "A Compilation of Air Pollutant Emissions Factors Fourth Edition (USEPA, AP-42, September 1985, revised July 1993) or "Nonroad Engine and Vehicle Emission Study - Report (USEPA, November 1991) which give emission factors for various types of heavy construction related motorized equipment.

The analysis and Table F-4 show that the construction emissions for the project are below the 100 tons per year de minimis levels for VOCs, NOx and PM10. The area is a moderate ozone nonattainment area and the emissions of VOCs and NOx from the project show conformity by being below the de minimis levels set by the General Conformity regulations. Portions of the area are maintenance for PM10 and the PM analysis is below the 100 tons per year de minimis level for a PM10 maintenance area. This also demonstrates conformity. The analysis in Table F-4 included the entire project not only the portions that are within the PM maintenance area. Thus the emissions in Table F-4 represent higher emissions than would be expected in the townships that are maintenance for PM10.

Table F-4 Summary of Air Emissions from Construction Activities

Construction Activity	Hours/ Year	VOC Emissions tons/year	NOx Emissions tons/year	PM Emissions tons/year
Clearing and Grubbing	1400	0.651	1.872	0.256
Floodplain Earthwork	9920	2.485	18.96	3.798
Upland Sediment Detention Dams	9424	1.798	18.832	1.282
Stream Bank Stabilization	1800	0.386	3.643	0.311
Topsoil Placement	504	0.134	0.976	0.201
Environmental Plantings & Seeding	80	0.020	1.10	0.019
Total Emissions per Year		**5.48**	**45.38**	**5.87**

The proposed project is a de minimis source of PM-10, VOC and NOx emissions. Construction activities would cause temporary increases in exhaust emissions from machinery and equipment during construction activities. However, all activities are below the de minimis level and thus demonstrate conformity to the SIP.

F.2.14.2 Forest and Prairie Burning. In terms of air quality, the principle operations/maintenance activity that will occur once the projects are constructed is the implementation of prescribed burns within certain floodplain project areas. These periodic controlled burns will be targeted at prairies and marshes, where they will be used to maintain the biological integrity of these plant communities. A total of about 1,800 acres of such natural habitats will be managed with prescribed burns.

Each year about one-third of these 1,800 acres will be burned, such that on a rotational cycle every area would be burned once during a 3-year period. Under this management schedule, about 600 acres of prairies and marshes will be affected each year. Burns will be conducted in the late fall and early spring when plants are dormant.

In May 1998, the USEPA issued interim Air Quality Policy on Wildland and Prescribed Fires to address the air quality goals and national air quality standards while improving the quality of ecosystems through the increased use of fire. Under the Policy, Federal prescribed fire projects are considered to conform with the state implementation plan if they are managed under a certified basic smoke management program. The program must require regional coordination (cooperation of all jurisdictions in an airshed) when authorizing fires and real time air quality monitoring at sensitive receptors, when warranted, in addition to the basic program components.

F.2.15 Conformity Determination Results.

F.2.15.1 De Minimis Levels. The de minimis level for a moderate ozone nonattainment area such as the St. Louis metro area where the project is located is set at 100 tons per year each of VOCs and NOx. The expected emissions from the project are well below the 100 tons per year level for both VOCs and NOx.

F.2.15.2 Regionally Significant. The project must also meet the test of being not regionally significant. Regionally significant is defined in the general conformity regulations as being more than 10% of the total emissions in the nonattainment or maintenance area. The emissions for just the Illinois portion of the St. Louis ozone nonattainment area are shown in the earlier table and total 156 tons per day of VOCs and 173 tons per day of NOx. To convert to tons per year, we have used 261 (the number of workdays in the year). We have used 261 days because the ozone inventory is based on a ton per summer weekday emission rate so to convert we have used the number of workdays. This results in 3393 tons per year of VOC and 4515 tons per year of NOx. Ten percent of the yearly numbers are 339 tons per year of VOC and 451 tons per year of NOx. Therefore, because the project is less than 10% of the total emissions for the area for both VOCs and NOx the project is not regionally significant.

F.2.16 Conclusion. The project has minimal air quality impacts and has been shown to be below the de minimis levels set for a moderate ozone nonattainment area and for a PM10 maintenance area. Also, the project is not regionally significant.

APPENDIX G
PUBLIC INVOLVEMENT

TABLE OF CONTENTS

SECTION **PAGE**

The public involvement process for this study occurred over a four plus year period. The process described in Section 10 was designed to 1) inform the public, 2) gather information, 3) identify public concerns, 4) develop consensus and 5) develop and maintain credibility.

The following documents referred to in Section 10 are contained in this appendix as further documentation of the public outreach and public coordination, which occurred.

TABLE OF CONTENTS - Continued

Appendix G - Public Involvement

G.1 Cooperating Agency Letters

G.1.1 USEPA

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO ATTENTION OF:

NOV 2 0 1998

Executive Office

Mr. Dave Ullrich
Regional Administrator,
U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Dear Mr. Ullrich:

The St. Louis District of the U.S. Army Corps of Engineers, in accordance with the National Environmental Policy Act (NEPA), is preparing to perform an analysis in support of a General Re-Evaluation Report for the East St Louis Interior Flood Control and Ecosystem Restoration Project authorized by the Flood Control Act of 1965 and Water Resources Development Act of 1976. This project encompasses land in both Madison and St. Clair Counties, Illinois, and includes a largely urbanized area of approximately 55,000 acres of bottomland and 51,000 acres of adjacent upland, located between the bluffs on the east and the Mississippi River and Chain of Rocks Canal on the west.

Based on the scope of the project an Environmental Impact Statement will be required. This project is directly related to the effects of storm water, water quality and urban sprawl on the local area. Based on your Gateway Initiative in this same urban area and the Environmental Justice Issues, which this study may raise, it seems appropriate and essential to the accomplishment of mutual goals that your agency participate as a Cooperating Agency in this endeavor. The study that we have currently underway will have implications to wetlands and wildlife habitat as they relate to both restoration and protection in our effort to obtain beneficial flood control results for the urban population. Based on our participation in your Gateway activities in this area and discussions with Mr. Jerome King of your organization, it seems logical that our mutual interests will be served for the benefit of this unique and valuable area by joining together on this effort.

Enclosed for your review is the draft Notice of Intent and related information for your review. We are anxious to get the public involvement process started in January and would request you advise us of your interest in this endeavor at your earliest convenience.

My point of contract for this project is Ms. Deborah L. Roush who can be contacted at 314-331-8033 for any additional information you or your staff may require. I look forward to hearing from you on this important matter.

Sincerely,
Signed
Thomas J. Hodgini
Colonel, U.S. Army
District Engineer

Enclosure

Thomas J. Hodgini
Colonel, U.S. Army
District Engineer

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G.1.2 NRCS

pm-

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO ATTENTION OF:

NOV 2 0 1998

Executive Office

Mr. William Gradle
State Conservationist
U.S. Department Of Agriculture
National Resource Conservation Service
1902 Fox Drive
Champaign, Illinois 61820

Dear Mr. Gradle:

The St. Louis District of the U.S. Army Corps of Engineers, in accordance with the National Environmental Policy Act (NEPA), is preparing to perform an analysis in support of a General Re-Evaluation Report for the East St. Louis Interior Flood Control and Ecosystem Restoration Project authorized by the Flood Control Act of 1965 and Water Resources Development Act of 1976. This project encompasses land in both Madison and St. Clair Counties, Illinois, and includes a largely urbanized area of approximately 55,000 acres of bottomland and 51,000 acres of adjacent upland, located between the bluffs on the east and the Mississippi River and Chain of Rocks Canal on the west.

Based on the scope of the project, an Environmental Impact Statement will be required. This project is directly related to the effects of storm water, water quality and sediment control in the local area. Based on your previous emergency and ongoing conservation efforts in this same urban location, it seems appropriate and essential to the accomplishment of mutual goals that your agency participate as a Cooperating Agency in this endeavor. The study that we have currently underway will have implications to wetlands and wildlife habitat as they relate to both restoration and protection in our effort to obtain beneficial flood control results for the urban population. Based on your past and current activities in this area and discussions with Mr. William Lewis of your organization, it seems logical that our mutual interests will be served for the benefit of this unique and valuable area by joining together on this effort.

Enclosed for your review is the draft Notice of Intent and related information for your review. We are anxious to get the public involvement process started in January and would request you advise us of your interest in this endeavor at your earliest convenience.

My point of contract for this project is Ms. Deborah L. Roush who can be contacted at 314-331-8033 for any additional information you or your staff may require. I look forward to hearing from you on this important matter.

Sincerely,

Thomas J. Hodgini
Colonel, U.S. Army
District Engineer

Enclosure

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G.2 Notice of Intent

Federal Register / Vol. 64, No. 14 / Friday, January 22, 1999 / Notices 3491

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Intent To Prepare a Draft Environmental Impact Statement (DEIS) for the East St. Louis and Vicinity, Illinois, Interior Flood Control and Ecosystem Restoration Project General Reevaluation Report

AGENCY: U.S. Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: The St. Louis District of the Corps of Engineers is preparing an integrated Draft Environmental Impact Statement and General Reevaluation Report for proposed measures to provide interior food control and ecosystem restoration for East Louis and Vicinity, Madison and St. Clair Counties, Illinois. The interior drainage system currently does not have sufficient capacity to handle local and upland runoff from rainfall events greater than 5-year storms, and sediment from upland tributaries not only reduces the channel capacity of the drainage system but causes environmental degradation. The purpose of the reevaluation study is to investigate measures that blend flood control with ecosystem restoration. Measures to be investigated will be designed to restore and enhance natural habitats, with a focus on wetlands as temporary storage areas for stormwater. The goal will be to develop strategies for the control of various storm events, with emphasis on the 100-year event. Likewise, strategies will be investigated to significantly reduce sedimentation within the drainage system and environmentally sensitive areas.

FOR FURTHER INFORMATION CONTACT: Questions about the proposed action and DEIS can be addressed to Ms. Deborah Roush, (314) 331–8033, or Mr. Timothy George, (314) 331–8459; Planning, Programs, and Project Management Division, U.S. Army Corps of Engineers, St. Louis District, 1222 Spruce Street, St. Louis, Missouri 63103–2833.

SUPPLEMENTARY INFORMATION:

1. *Authorization.* The reevaluation study is being conducted under the authorities of Section 204 of the Flood Control Act of 1965 and Section 137 of the Water Resources Development Act of 1976 (Public Law 94–587).

2. *General Information. a. Location and Land Use of the Study Area.* The study area is in southwestern Illinois in Madison and St. Clair Counties, and lies within the Metro East St. Louis area along the east bank of the Mississippi River. It encompasses about 106,000 acres (166 square miles). About 55,000 acres are bottomland on the Mississippi River floodplain (locally called the American Bottoms), and upland watersheds that drain into these bottoms comprise the remaining 51,000 acres of the study areas. After New Orleans, the American Bottoms is the second largest concentration of residential, commercial, and industrial land use on the Mississippi River floodplain. Agriculture is also a significant land use in the bottoms. The floodplain is scarred with ox-bow lakes and marshes that are remnants of former meanders of the Mississippi River. An urban design levee protects the bottoms from Mississippi River flooding. Runoff from the upland or hill areas reaches the bottoms through numerous individual streams and ditches, and traverses the relatively flat floodplan through an old agricultural ditch system built at the turn of the century. The American Bottoms was a heartland of the prehistoric Mississippian culture, which today is represented most dramatically by the Cahokia Mounds World Heritage Site.

b. *Interior Flooding.* The floodplain of the Mississippi River in the Metro East St. Louis area has experienced interior flooding from hillside runoff and local rainfall for many years. The interior drainage ditch system is inadequate to handle more than minor rainfall events. Past efforts by the Corps to develop an economically justified project in this area have been unsuccessful. The benefits required to justify improvements could not be achieved because of the low value of flood-damaged housing and business structures within this economically depressed area. Areas of frequent flooding contains a large community of minority citizens and low-income citizens. For four consecutive years (1993 through 1996), the project area received a National Disaster Declaration due to flooding. Flooding during the 1995 and 1996 closed transportation routes, including Interstate highway ramps. The Federal Emergency Management Agency is estimated to have expended in excess of $60 million for disaster relief over this four-year period.

c. *Sedimentation.* Upland watersheds adjacent to the bottoms are experiencing rapid residential and commercial development. Land clearing and other factors have led to high rates of soil loss from the uplands, more intense upland runoff, and more frequent overtopping of drainage ditches in the bottoms. High rates of sedimentation have also caused a significant drain on scarce budgets of the local communities to operate and maintain the drainage system. Sedimentation over the years has also extinguished or degraded many existing wetlands and natural water bodies in the bottoms and currently threatens additional harm. Further, the historical loss of swamps, marshes, and wet prairies located in topographic depressions in the bottoms—places that previously acted as temporary storage areas for local rainfall and upland runoff—to drainage improvements, agricultural conversion, and development appears to have been extensive.

3. *Proposed Alternatives.* Alternatives to be considered will address both bottomlands and uplands. Within the bottoms, measures will be investigated to divert and temporarily store stormwater from the interior drainage system for enhancement of existing wetlands and restoration of historic wetlands. These measures will address the 10-, 25-, 50-, 100-, and 500-year rainfall events. Bottomland sediment detention basins will also be investigated to capture sediment from upland runoff and minimize its deposition within the interior drainage system and existing as well as proposed wetlands for temporary storage of stormwater. Typical structures used to achieve these goals are detention basins, dikes, and berms. Upland sediment control measures will also be investigated to reduce erosion at its source.

4. *Significant Issues and Resources.* Significant issues and resources identified to date for discussion in the DEIS are (1) erosion, sedimentation, and interior flooding; (2) natural resources including fisheries, wildlife, vegetation, wetlands, and riparian areas; (3) cultural resources; (4) water quality and groundwater; and (5) social and economic resources. Additional issues and resources of significance may be identified through public and agency meetings.

5. *Environmental Review and Consultation.* Our environmental review will be conducted according to the requirements of the National Environmental Policy Act of 1969, National Historic Preservation Act of 1966, Council on Environmental Quality Regulations, Endangered Species Act of 1973, Section 404 of the Clean Water Act, and other applicable laws and regulations.

6. *Scoping Process.* The purpose of this notice is to solicit suggestions and information from Federal, State, and local agencies; the general public; interested private organizations and

3492 Federal Register /

parties on the scope of the reevaluation study and the alternatives, issues, and resources to be addressed in the DEIS. Comments and participation in this process are encouraged. An informal scoping workshop will be held on Monday, February 1, 1999, from 1 PM until 8 PM within the project area at the State of Illinois Building (Illinois Department of Transportation) located at 1100 Eastport Plaza Drive in Collinsville, Illinois (telephone 618–346–3100). A notice of this meeting will be provided to interested parties and to the local news media.

7. *Availability* The Draft EIS is scheduled to be available for public review in late 1999.

Dated: January 12, 1999.

Thomas J. Hodgini,

COL, EN, Commanding.

[FR Doc. 99–1452 Filed 1–21–99; 8:45 am]

BILLING CODE 3710–55–M

G.3 Agency Responses to Notice of Intent

G.3.1 IDNR

ILLINOIS
DEPARTMENT OF
NATURAL RESOURCES

524 South Second Street, Springfield 62701-1787 George H. Ryan, Governor ● Brent Manning, Director

March 11, 1999

Colonel Thomas J. Hodgini
District Engineer
Department of the Army
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attn: Mr. Timothy George

Dear Colonel Hodgini:

Director Manning asked that I respond to your letter of January 13, 1999 regarding the St. Louis District's *General Reevaluation Study and Environmental Impact Statement for the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Project, Madison and St. Clair Counties, Illinois.*

The proposed area of study includes most of the American Bottoms in Madison and St. Clair counties as well as the adjacent uplands draining into the area. The interior drainage system in the project area does not have sufficient capacity to handle major storm events. The St. Louis District proposes to investigate measures that might combine future flood control with ecosystem restoration, particularly wetland creation.

The Department supports the St. Louis District's conceptual approach for addressing these issues of mutual concern. Several of our staff were in attendance at the February 1, 1999 workshop in Collinsville initiating the public involvement process to ensure that all problems, needs, resources, etc. are considered in the study scope. We look forward to working closely with the St. Louis District and the other participating agencies in evaluating and implementing solutions to the area's flood control and habitat needs.

Sincerely,

Tom Flattery, Director
Office of Realty and Environmental Planning

TF:rs

cc: IDNR/OWR (Allison), USFWS (Collins)

[printed on recycled and recyclable paper]

G.3.2 USEPA

pm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 01 1999

REPLY TO THE ATTENTION OF

B-19J

Colonel Thomas J. Hodgini
District Engineer
Department of the Army
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Colonel Hodgini,

In accordance with Section 309 of the Clean Air Act, and the National Environmental Policy Act (NEPA), the United States Environmental Protection Agency (U.S. EPA) Region 5 has reviewed the scoping letter dated November 20, 1998, for the preparation of a Draft Environmental Impact Statement (DEIS) for the Interior Flood Control and Ecosystem Restoration for East St. Louis and vicinity, in Madison and St. Clair Counties in Illinois. The study area is located in Madison and St. Clair Counties, and lies within the Metro East St. Louis area along the east bank of the Mississippi River. The study area encompasses about 106,000 acres. Approximately 55,000 acres are bottomlands on the Mississippi River floodplain know as the American Bottoms. The upland areas of these watersheds comprise the remaining 51,000 acres of the study area. The American Bottoms is the second largest concentration of residential, commercial, agricultural and industrial land use on the Mississippi River floodplain. Historically the use of levees and drainage ditches have been incorporated to provide flood protection to this area from the Mississippi River. The proposed study would investigate measures that would blend flood control with ecosystem protection, such as, upland storm water retention basins, buffer areas, and restoration of wetlands.

In addition to identification of several issues that will be fully evaluated and discussed in the DEIS, your agency requested that the U.S. EPA Region 5 becomes a Cooperative Agency under the NEPA. We are currently evaluating this request and will notify you shortly of our decision. In the event that we elect to become a Cooperating Agency, we will require a Memorandum of Understanding (MOU) that outlines each agency's role and expectations during this undertaking.

Our agency has the following issues that need to be incorporated in the DEIS. These issues are scope of analysis, natural resources, sediment management, and interior flooding. We consider these issues to be relevant and therefore must be fully discussed in the upcoming DEIS.

The scope of analysis or the proposed project, as described above, is defined by Section 204 of the Flood Control Act of 1965, and Section 137 of the Water Resources Development Act of 1976. However, section 1502.14(c) of NEPA indicates that the lead agency is to include feasible alternatives that are not within the jurisdiction of that agency. Therefore, the scope of analysis of the proposed DEIS needs broadening to include the entire American Bottoms ecosystem which is from Alton to Dupo and the

2

adjacent upland areas. This expansion of the scope would identify and discuss other scenarios that are outside your agency's jurisdiction, but are prudent and would further promote the achievement of meeting the stated purpose and need for the proposed project. These types of activities could be implemented by local, county, state, or other federal agencies that have the appropriate authority. In the course of considering all the feasible alternatives, it is also important that the various project components that would be implemented do not contribute to increased development. This type of change in land cover could diminish the flood protection that would be achieved by the proposed project. The analysis of alternatives should also consider future local, and county zoning and best management practices as integral components of the proposed project.

The proposed habitat restoration options should not be limited to holding pond wetlands. The creation or restoration of prairies, bottomland hardwoods and other wetland types as well as the use of native vegetation in upland areas would provide the appropriate environmental functions while enhancing the biodiversity of these various watersheds. Therefore, the alternatives analysis needs to focus on nonstructural designs that will contribute to development of habitat corridors, while providing the required level of flood protection.

We understand that the Habitat Evaluation Procedures (HEP) model will be used to aid in assessing affected environment and the environmental consequences for each alternative. This analysis should also include data to illustrate that the faunas chosen are representative species and currently exist in the project area. The DEIS needs to clearly state the limitations of the HEP analysis. This discussion should incorporate all assumptions that are made as part of the analysis.

In terms of water quality and interior flooding, the DEIS needs to include data and a full analysis of the sediment quality, removal options, and disposal locations. The sediment analysis should also include a discussion of the historical land use, such as, industrial, commercial, and agricultural activities and practices. The DEIS needs to indicate if any RCRA and CERCLA designated sites are present in the proposed project area. If present, the DEIS needs to fully discuss the potential environmental impacts that could occur if these areas are affected by a flood event.

Thank you for providing us the opportunity to offer scoping comments on the proposed DEIS. If you have any questions or comments, please contact Al Fenedick of the Environmental Review group, at 312 886-6872 or by E-mail, fenedick.al@epamail.epa.gov.

Sincerely,

Al Fenedick for

Sherry Kamke, Acting Group Manager
Environmental Review Group
Office of Strategic Environmental Analysis

G.3.3 USDI Fish and Wildlife Service

PM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Marion Illinois Suboffice (ES)
8588 Route 148
Marion, IL 62959
(618) 997-3344

Roush

March 10, 1999

Colonel Thomas J. Hodgini
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Colonel Hodgini:

This is in reference to the Notice of Intent (NOI) to prepare an integrated Draft Environmental Impact Statement and General Reevaluation Report for proposed measures to provide interior flood control and ecosystem restoration for East St. Louis and Vicinity, Madison and St. Clair Counties, Illinois. These comments are provided to assist your agency in further project planning and in evaluating the environmental consequences of any proposed actions. This letter will also serve as the Fish and Wildlife Service (Service) Planning Aid Letter identifying important fish and wildlife resources in the project area. These comments are provided under the authority of and in accordance with the provisions of Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et. Seq.); and the Endangered Species Act of 1973, as amended; and the National Environmental Policy Act.

According to the NOI the purpose of the reevaluation study is to investigate measures that blend flood control with ecosystem restoration. Measures to be investigated will be designed to restore and enhance natural habitats, with a focus on wetlands as temporary storage areas for stormwater. Study goals include development of strategies to address control of stormwater from various storm events, with emphasis on the 100-year event, and significant reduction of sedimentation in drainage systems and environmentally sensitive areas. Proposed measures include, but are not limited to, design and restoration of natural wetland habitats, detention basins and other appropriate projects that can be used for temporary storage of stormwater. This reevaluation study is being conducted under the authorities of Section 204 of the Flood Control Act of 1965 and Section 137 of the Water Resources Development Act of 1976 (Public Law 94-587).

Colonel Thomas J. Hodgini 2

DESCRIPTION OF THE PROJECT AREA

The study area consists of approximately 106,300 acres located in the Metro East St. Louis area of Southwestern Illinois along the east bank of the Mississippi River. Approximately half of the project area is located in the Mississippi River floodplain (locally referred to as the American Bottoms). This area is the second largest concentration of commercial, industrial and residential land use on the Mississippi River floodplain. The remainder of the study area includes the upland area to the east, which drains westward into the floodplain. This area has rapidly urbanized in recent years with increases in commercial and residential developments.

FISH AND WILDLIFE RESOURCES

Before European settlement of the American Bottoms, the majority of the area consisted of various wetland types, including a vast area of wet prairie. The floodplain is scarred with oxbow lakes and marshes that are remnants of former meanders of the Mississippi River. Since settlement, these wetlands have been drained, filled and altered to provide for agricultural, residential, commercial and industrial use. The remaining wetlands in the American Bottoms retain little of their historic characteristics. Although remaining wetlands are degraded, these areas provide important habitat for many wildlife species, including large numbers of migratory birds. One of the largest heron/egret nesting colonies in the state occurs in the vicinity of Sauget in the southern portion of the study area.

Other habitats which occur in the study area include upland and riparian forest, intermittent and perennial streams, small lakes and ponds and old fields. Forested habitats are highly fragmented. Riparian corridors along streams are typically narrow or nonexistent. The habitat which is available provides food and cover to migratory birds and other resident wildlife species.

The aquatic resource value of the streams in the project area is not well understood, but does not appear to be very good. The upland streams are highly influenced by non-point sources of pollution and increased water velocities due to poor stormwater management practices. Floodplain streams have been highly channelized and degraded by sedimentation and pollution. Some of the larger lakes in the American Bottoms have a fishery resource dominated by bass, crappie, sunfish, carp and catfish.

THREATENED AND ENDANGERED SPECIES

To facilitate compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, Federal agencies are required to obtain from the Service information concerning any species, listed or proposed to be listed which may be present in the area of the proposed action.

Therefore, we are furnishing you the following information concerning species that have ranges that include the concerned area.

The endangered Indiana bat (*Myotis sodalis*) is found throughout most of Illinois. Habitat for the bat consists of riparian/floodplain and upland forests. Dead or dying trees with exfoliating bark, cavities, and live trees (e.g., shagbark hickory) with loose or plated bark, are utilized for roosting and maternity colonies. This type of habitat is utilized from April 1 to September 30 and during the fall swarming season. The diameter and size of trees do not appear to affect use by bats, if tree cavities or loose bark are present. Indiana bats winter in caves and abandoned mines.

The endangered gray bat (*Myotis grisescens*) is a cave dwelling species that feeds nocturnally on insects over rivers, tributaries and floodplains. In Illinois, the species range is limited by the occurrence of caves near suitable feeding habitats. Gray bats reproduce by forming maternity colonies on the roof of cave roosting sites. Flooding of cave roost sites and human disturbance of maternity colonies during the breeding and winter hibernation periods are the major threats to this species.

The bald eagle (*Haliaeetus leucocephalus*) is listed as threatened throughout Illinois. Bald eagles utilize trees along ice free bodies of water to forage for fish in winter. At night, wintering bald eagles often congregate at communal roost trees. The roosts are usually in locations protected from wind by vegetation or terrain. Birds may abandon roost sites when human disturbance occurs. Large concentrations of bald eagles can be found on the Illinois and Mississippi Rivers during the winter months. Nesting sites are usually located near large rivers and major reservoirs.

The endangered least tern (*Sterna antillarum*) nests on bare alluvial and dredge spoil islands, usually located within or adjacent to large rivers. Least terns nest on sand bars in the Mississippi River and agricultural fields if other areas are unavailable. This diminutive bird is susceptible to human disturbance and flooding during nesting. Suitable nesting habitat is often limited because of high water levels in the large rivers during the nesting season or lack of suitable foraging habitat near the nesting area.

The endangered pallid sturgeon (*Scaphirynchus albus*) requires large, turbid, free-flowing, braided-channel riverine habitat with sandy or rocky substrate. This species is most frequently caught over a sandy bottom. Spawning is suspected to occur over rocky substrate, rubble or gravel bottoms in the main rivers and major tributaries. Modifications to pallid sturgeon habitats have blocked its movements to feeding and spawning areas, reduced its food sources or its ability to obtain food, destroyed or altered its spawning areas, altered water temperatures and changed hydrography.

The endangered Illinois cave amphipod (*Gammarus acherondytes*) is a small crustacean that inhabits underground karst caves and streams. The distribution of this species is localized to specific underground cave systems. A very small portion of this specific habitat type is located

Colonel Thomas J. Hodgini 4

in extreme southern St. Clair County. The main threats to the species are degradation of water quality from agriculture and residential and commercial development.

The decurrent false aster (*Boltonia decurrens*) is federally listed as threatened. This species prefers the disturbed alluvial soils of river floodplains and it appears to be disturbance dependent for survival. Flood events in recent years in the American Bottoms have resulted in discovery of many new populations of this species in St. Clair and Madison Counties.

The Eastern prairie fringed orchid (*Platanthera leucophaea*) is federally listed as threatened in Illinois. This species occurs in mesic to wet prairie habitat and may be present whenever prairie remnants are encountered. Known populations of this plant occur primarily in northern Illinois, but historical records indicate that its former range included Madison County and probably portions of St. Clair County.

There is no designated critical habitat in the project area at this time.

In addition to the above, the eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*), a species of concern to the Service and a state endangered species, occurs in Madison County. A recent status assessment for this species indicates noticeable population declines across the range of the species. Habitat loss (prairie, forest, wetland) is cited as one of the primary factors in the decline of the massasauga. Adverse impacts to habitats utilized by this species and potential direct impacts to individuals should be avoided. In addition, a number of other state listed threatened and endangered species may occur in the project vicinity. The Illinois Department of Natural Resources, Division of Natural Heritage should be contacted to determine the distribution of these species in the project area.

PROBLEMS AND OPPORTUNITIES

The reevaluation study area encompasses upland and floodplain areas that are both urban and agricultural in character. The American Bottoms is the second largest population and industrial concentration on the Mississippi River floodplain, after New Orleans. Flooding in this area is caused by a combination of many factors. Firstly, the wetlands in the American Bottoms have been largely drained and filled over time. In addition, almost all of the natural stream systems have been channelized and ditched. These activities have severely altered the natural flood storage capacity of the area and adversely affected natural resource values and functions.

Secondly, the upland portions of the project area are rapidly urbanizing with tremendous increases in residential and commercial developments. Most of these activities have been implemented without adequate attention to stormwater runoff. Consequently, upland stream channels have degraded and sedimentation and flooding have increased in the bottomlands. Potentially, all aquatic resources in the American Bottoms have been adversely affected.

All of the habitats that occur in the study area, especially floodplain forests, wetlands, and lakes and streams, are subject to sedimentation problems resulting from erosion of upland stream channels, agricultural ditching, and upland development sites. A combination of high sediment loads, insufficient drainage systems, upland development, and lack of sufficient flood water detention have caused significant problems for associated fish and wildlife resources of the area. For this reason, the Service supports inclusion of both upland and floodplain areas in the subject study, particularly for purposes of ecosystem management. We support continued study of the proposed measures identified in the NOI. However, we recommend the following measures also be evaluated to address stormwater and sedimentation problems:

A. Establishment of stormwater detention basins in the uplands. This could include a combination of dry dams, in-stream structures, or constructed basins.

B. Reestablishment of buffer areas and/or riparian corridors along upland and floodplain stream channels.

C. Streambank stabilization to prevent additional lateral erosion and streambed degradation, utilizing bioengineering techniques when feasible.

D. Construction of in-stream sediment retention basins.

E. Restore and/or create additional wetlands in the upland and bottomlands.

These recommendations are not all inclusive and may be utilized in conjunction with other proposed measures. It will take a combination of measures to address the project areas flooding and natural resource problems.

CONCLUSIONS

It is clear that a program to restore ecosystem health and integrity is needed in the American Bottoms. Declines in the quantity and quality of wetlands and other habitats that occur in the area are apparent. Fish and wildlife species that occur in the American Bottoms will benefit from ecosystem restoration efforts provided appropriate measures are implemented.

The issues addressed in this letter should be considered as planning progresses and potential projects are considered. Specifically, flood control projects should be aimed at addressing the source of the flood waters and sediment from upland areas in conjunction with bottomland wetland detention. These measures should be fully evaluated prior to any proposal for new levee or ditch construction.

Colonel Thomas J. Hodgini 6

We remain available to assist the Corps of Engineers in further project planning. Thank you for the opportunity to provide these comments.

Sincerely,

Joyce A. Collins
Assistant Field Supervisor

cc: IDNR (Malone, Sauer, Tecic)
NRCS (Harryman, Krone)
USEPA (Fenedick, Perrecone)

G.3.4 IDOA

Illinois Department of Agriculture

Bureau of Land and Water Resources • State Fairgrounds • P.O. Box 19281 • Springfield, IL 62794-9281
217/782-6297 • TDD 217/524-6858 • Fax 217/524-4882

March 2, 1999

Mr. Tim George, Environmental Manager
Planning, Programs, and Project Management Division
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: Draft Environmental Impact Statement (DEIS) for the
Interior Flood Control and Ecosystem Restoration Project
General Reevaluation Report
East St. Louis and Vicinity
Madison and St. Clair Counties, Illinois

Dear Mr. George:

The Illinois Department of Agriculture (IDOA) will continue to participate in the above referenced study and DEIS for the East St. Louis area and vicinity. Interested parties and agencies were asked to submit comments and concerns at either the February 1 Scoping Workshop or by the March 15, 1999 deadline. Our concerns are explained below.

IDOA's overall project interests include the impacts to and conversion of agricultural land. The secondary impacts are primarily from the placement of mitigation sites for affected wetlands. We know the best farmland (Prime farmland) is that which is being converted most rapidly. We are especially concerned that property purchased or intended for mitigation purposes will not include any Prime farmland capable of maintaining viable, long-term agriculture production.

While the IDOA would discourage the conversion of farmland that is viable for long-term agricultural production, there area some tracts that may be appropriate for conversion, particularly to wetlands, prairies, and woodlands. If farmland conversion is contemplated in the implementation of the American Bottoms Ecosystem Restoration Project, it would be wise to concentrate on those tracts of farmland that have little viability for long-term agricultural use. Such tracts might include:

(1) parcels that are small (less than 10 acres) and odd-shaped, making them hard to farm;
(2) parcels that have very poor access;
(3) parcels that flood frequently making it difficult to get a crop off the land every 2 of 3 years;
(4) parcels with poorer quality soils (Important farmland), and
(5) parcels that are located within or contiguous to urban areas.

There may be other types of farmland that would be suitable for conversion, but these would represent the majority.

We will continue to coordinate our efforts with the St. Louis Corps of Engineers on this proposal.

Sincerely,

Teresa J. Savko

Teresa J. Savko
Bureau of Land and Water Resources

G.3.5 USDI National Park Service

United States Department of the Interior

NATIONAL PARK SERVICE
Midwest Support Office
1709 Jackson Street
Omaha, Nebraska 68102-2571

IN REPLY REFER TO:
ER-99/108

MAR 09 1999

Ms. Deborah Roush
U.S. Army Corps of Engineers
Saint Louis District
1222 Spruce Street
Saint Louis, Missouri 63103

Dear Ms. Roush:

The National Park Service has reviewed the notice of intent to prepare an environmental impact statement (EIS) for the East St. Louis and Vicinity, Illinois, Interior Flood Control, and Ecosystem Restoration Project. We have no comments at this time, but look forward to reviewing the EIS when it is available.

Sincerely,

Sandra Washington
Chief, Planning & Compliance

cc:
Superintendent, Jefferson NEM

G.4 Scoping Meeting 1999

G.4.1 Letter

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO ATTENTION OF:

JAN 1 3 1999

Environmental Analysis Section
Planning, Programs, and Project Management Division

This is an open invitation to all interested parties to attend a scoping workshop to discuss and encourage the exchange of information regarding the U.S. Army Corps of Engineers, St. Louis District's General Reevaluation Study and Environmental Impact Statement for the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Project, Madison and St. Clair Counties, Illinois. This scoping workshop will initiate the public involvement process to ensure that all problems, needs, concerns, issues, resources, and potential solutions are considered in the study scope.

The workshop will be conducted on Monday, February 1, 1999, from 1 p.m. to 8 p.m. at the State of Illinois Building (Illinois Department of Transportation), 1100 Eastport Plaza Drive in Collinsville, Illinois (telephone 618-346-3100). A map showing the location of the meeting site is attached (see star). This informal meeting will provide the opportunity for any agency, organization, or individual to speak directly with representatives from the St. Louis District about their ideas and concerns or to ask for additional information. Representatives from the Metro-East Sanitary District (project cosponsor), Office of Water Resources of the Illinois Department of Natural Resources, and Madison and St. Clair Counties will also be present. Registration and comment forms will be provided at the workshop.

The study area encompasses most of the American Bottoms in Madison and St. Clair Counties, as well as adjacent uplands with tributaries that flow into this area (see attached map). The interior drainage system on the bottoms currently does not have sufficient capacity to handle local and upland runoff from rainfall events greater than five-year storms, and sediment from upland tributaries not only reduces the channel capacity of the drainage system but causes environmental degradation. The purpose of the reevaluation study is to investigate measures that blend flood control with ecosystem restoration. Measures to be investigated will be designed to restore and enhance natural habitats, with a focus on wetlands as temporary storage areas for stormwater. The goal will be to develop strategies

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for the control of various storm events, with emphasis on the 100-year event. Likewise, strategies will be investigated to significantly reduce sedimentation within the drainage system and environmentally sensitive areas. Further details about the study can be found in the District's Notice of Intent to prepare a Draft Environmental Impact Statement for this study (attached). This document has been submitted for publication in the Federal Register.

It is particularly important that all interested parties provide their comments and concerns in writing, and that these either be submitted the day of the workshop meeting, or mailed to the St. Louis District by March 15, 1999. Letters of comment and requests for information regarding this project should be directed to Mr. Timothy George, Environmental Manager, Planning, Programs, and Project Management Division, at the U.S. Army Corps of Engineers, St. Louis District, 1222 Spruce Street, St. Louis, Missouri 63103-2833 (telephone 314-331-8459, email Timothy.K.George@mvs02.usace.army.mil).

We have attempted to send this information to all agencies, private organizations, and individuals that may have an interest in the proposed project. If you know of individuals who may be interested but have not been contacted by us, please bring this invitation to their attention.

Sincerely,

Thomas J. Hodgini
Colonel, U.S. Army
District Engineer

3 Attachments

G.4.2 Forms

G.4.2.1 Comment Form

COMMENT FORM

East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Project
Public Scoping Workshop, February 1, 1999

Please Print

My Name: ________________________________ **Telephone Number:** ____________

Address: ____

Village/Town/City: __________________________ **State and Zip Code:** ____________

Your comments will assist the St. Louis District in preparing the General Reevaluation Report and Draft Environmental Impact Statement for this study.

You may complete this comment form this evening, or finish it later (mail it to the St. Louis District by March 15, 1999 – address on back of this page).

What **alternatives** (plans of improvement) should be addressed in this study? Why?

What **issues** should be addressed? Why?

What **significant resources** could potentially be affected, adversely or beneficially, by any improvement of the levee system? Why do you think such resources are significant?

Comment Form – Continued

Should particular **studies** be performed? Why?

Do you have any **other comments**?

Do you have any **questions** about this study that have not been answered?

Would you like to be included on the St. Louis District's mailing list for this study?

YES____ NO____

Thank you for taking the time to provide comments!

Mr. Tim George
Attn: CEMVS-PM-EA
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

G.4.2.2 Registration Form

REGISTRATION FORM

East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Project
Public Scoping Workshop, February 1, 1999

Please Print

My Name: ______________________________ **Telephone Number:** ____________

Address: ____

Village/Town/City: ________________________ **State and Zip Code:** ____________

Please check all applicable categories:

My geographic area of concern is:

___ entire study area (American Bottoms and adjacent uplands)

___ American Bottoms

___ uplands tributary to Bottoms

___ a particular watershed or drainage area (specify: ________________________)

___ a particular city/town/village (specify: ________________________)

___ a particular levee and drainage district (specify: ________________________)

___ Madison County ___ St. Clair County

___ other (specify: ________________)

I am a:

___ resident within the study area

___ business owner/employee within the study area

___ farmer within the study area

___ public official/representative (specify: ________________________)

___ agency official/representative (specify: ________________________)

___ organization representative (specify: ________________________)

___ other (specify: ________________)

If you know of others you think should be aware of this study, please print their names and addresses on the back of this form.

G.4.3 Public Comments 1999

MAR-11-1999 14:55 FROM USDA/SOIL (217)398-5310 TO 86183465162 P.02

USDA NRCS
Natural Resources Conservation Service

United States
Department of
Agriculture

1902 Fox Drive
Champaign, IL
61820

March 11, 1999

Colonel Thomas J. Hodgini
U. S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Colonel Hodgini,

The East St. Louis Interior Flood Control and Ecosystem Restoration Project is one of the vital components for the local people that addresses several resource concerns in the Metro East. The NRCS supports this effort as a cooperating agency and will continue to provide assistance working with the local Soil and Water Conservation Districts.

We are currently working with Ms. Deborah Roush of your staff to determine how the NRCS might assist in addressing the treatment needs for the upland watersheds. I am designating John Harryman, District Conservationist at our Belleville Field Office as the local point of contact for the study and the EIS development. John can be reached at (618) 235-2500, extension 104.

The natural resource issues are many and very complex in nature. It will continue to take an array of resources and significant teamwork form all interested parties to develop and implement viable solutions.

I look forward to meeting with you soon and continuing this partnership to address the concerns of the local people.

Sincerely,

WILLIAM J. GRADLE
State Conservationist

cc:
Tony Kramer, ASTC, Champaign
Bruce Bennett, ASTC-FOD, Marion
Bill Lewis, PTL, Champaign
John Harryman, DC, Belleville

bl:hodgini.doc

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER

G.5 Metro-East Regional Stormwater Committee Meetings Sample

METRO-EAST REGIONAL STORMWATER COMMITTEE MEETING
January 7, 2000

The regular meeting of the Metro-East Regional Stormwater Committee was held at the IDOT Building, Regional Room, 1100 Eastport Plaza, Collinsville, Illinois. It was called to order at 10:05 a.m. by Chairman, Nick Hamilos.

Others present were:

Dick Aten Public Works Department, City of Highland
Terry "Bones" Allen, Collinsville Township Supervisor
Kathy Andria, Conservation Alliance/ESL CAN
Melvin Balsters, Madison County Soil & Water Conservation District
Marvin Baleto, Madison SWCD
Dennis Carpenter, Village of South Roxane
Joe Durako, Waste Management
Gorden Gass, County Ditch
Virgil Gummersheimer, Monroe County Farm Bureau
Dennis Hartman, Village of Godfrey
John Harryman, NRCS
Tom Jett, Farm Bureau
Gene Knipping, Village of South Roxane
Rita Lee, IDNR-OWR
Charles Luehman, Nameoki Township
Joe Madlinger, CH2MHill
Leslie Michael, NRCS
Kenneth Mueller, County Ditch
Tim Palermo, City of Wood River
Jerry Rombach, HBA
Jim Roth, Hurst-Rosche Engineers
Deborah Roush, COE
Stephen Schaus, State Representative Jay Hoffman's Office
Jack Tolliver, Sand Road Committee, Edwardsville
Larry Trucano, Madison County
Bob Washburn, SIUE
Richard Worthen, Madison County Coordinator
Herbert Wodtke, M-KRBC

MINUTES

Motion was made by Larry Trucano and seconded by Terry Allen that the minutes from the November 5, 1999 be approved as written. There was no meeting in December. All ayes. Motion carried.

MRSC Meeting
January 7, 2000
Page 2

WATERSHED UPDATES

Canteen Creek. Deb Roush reported the project is underway. The project they are approaching this year goes from Fairmont City Bridge to the Horseshoe Lake Diversion Canal. The piece they are approaching right now with construction is the stretch from the Diversion Canal to Highway 55/70. The Canteen Creek Drainage District is still pursuing the real estate right of way. They are making progress and the documents that are coordinated have been submitted to the real estate folks. As soon as rights of way are obtained, a delivery order will be negotiated. The contract for Phase I was awarded 17 December and work is underway right now.

Dick Worthen asked what Deb meant when she said the Fairmont City Bridge. It is the bridge over Collinsville Road/Highway 40 by the racetrack.

The remainder of the project, Highway 40 all the way up to 157, has received archaeological clearance. There will be a ceremony when the second phase begins by the racetrack. Terry Allen mentioned not to forget to include Jim Fitzgerald when inviting individuals. He was a key factor in beginning the project.

Sand Road. Leslie Michael was not in attendance at the time of her report. Dick Worthen reported that there has not been any progress since the last report. Leslie reported this at the meeting Wednesday. The person working with the project has resigned from the agency so that pushes the time back also. Leslie arrived later in the meeting and gave same information to the committee.

INTERIOR FLOOD CONTROL (IFC) UPDATE

Deb Roush reported that alternatives that are under consideration were distributed at the last meeting. There was a very positive response. The portion of the environmental restoration project is what is being worked on at the present time. A third alternative was added to Judy Branch area which includes the acreage. There will be a public meeting on Wednesday, February 2, here after the board meeting between noon and 8 p.m. It will be a workshop with representatives at tables to answer questions and available for discussions. There will also probably be a continuous presentation of an overview of the project at the workshop. A draft report should be ready in September.

Kathy Andria asked about the presentation format. Deb said that this workshop will be informal but that later there will be more formal presentations with dialogue between the speakers and participants. These will be held when the ideas are more solidified.

Deb has also been asked to speak to the State Emergency Management people regarding IFC Project. She will be giving them a presentation next week.

G.6 Metro-East Regional Stormwater Committee Resolution on Resource Plan Issues.
Summary compilation of concerns from NRCS Resource Plans proposed for adoption on May 7, 1999

While in existence the Metro East Watershed Planning Office created "resource inventories" for nine watersheds in Madison, St. Clair, and Monroe Counties. This document is a summary of concerns compiled from those inventories. The list of concerns within each inventory was developed by the residents of the watershed who attended the meetings. This compilation is prepared for the use of the Metro East Regional Stormwater Committee to be an approved, temporary guide to concerns until a full fledged "comprehensive plan" with goals and objectives can be developed.

Concerns have been grouped in three areas: natural resources, cultural resources, and human resources.

G.6.1 Natural Resource Concerns

G.6.1.1 Natural Areas:

1) Protect existing natural areas of native vegetation, forest, wetlands, prairie, savannas, etc.
2) Enhance existing natural areas of native vegetation, forest, wetlands, prairie, savannas, etc.
3) Create additional green space and open space. 4. Protect natural streams.

G.6.1.2 Soil:

1) Stop sedimentation in ditches.
2) Control erosion from construction sites.
3) Protect streambanks from erosion.
4) Protect streams from scour erosion.
5) Stop soil erosion everywhere as best as possible

G.6.1.3 Animals:

1) Manage for wildlife enhancement.
2) Manage for control of negative impacts of wildlife upon crops, stormwater management, i.e. control of beaver, muskrat, ground hog, deer.

G.6.1.4 Water:

1) Manage water resources to prevent damages to property and people.
2) Manage water to repair damages from the past problems.
3) Clarify the role of Federal Emergency Management Agency and flood maps.
4) Protect wetlands.
5) Protect water quality.
6) Improve water quality.
7) Protect recreational activities related to use of water.
8) Improve recreational activities related to use of water.
9) Manage water quality for health and safety.

G.6.1.4 – Continued:

10) Manage water to maintain the natural condition as best as possible including solutions to problems.

11) Manage water resources to neutralize the impacts of urbanization.

12) Manage water resourc-es with a sensitivity to groundwater.

G.6.2 Cultural Resources :

1) Protect existing cultural sites such as Cahokia Mounds and other archeological sites.

2) Enhance the interpretive mission of cultural sites.

G.6.3 Human Resources:

1) Create a "comprehensive plan" by watershed for the region.

2) Create a management plan.

3) Assign permanent government responsibility for stormwater management to specific entities.

4) Coordinate all levels of government in stormwater activities including related plans such as zoning, land use, subdivision, and highway.

5) Provide information and education for private sector, public sector, and local officials.

6) Manage impacts ofurban development to neutralize the negative problems in downstr-eam area.

7) Enforce existing ordinances. 8. Develop uniform ordinances.

9) Create a stable source and appropriate levels of funding.

10) Manage for health and safety.

11) Manage with a concern for property values.

12) Manage with a concern for economic development

G.7 Public Meeting 2002

G.7.1 Letter

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO ATTENTION OF:

JAN 14 2000

Planning, Programs, and Project Management Division
Navigation and Flood Control Branch

Dear Interested Parties:

This is an open invitation to all interested parties to attend a workshop to discuss and encourage the exchange of information regarding the U.S. Army Corps of Engineers, St. Louis District's General Reevaluation Study and Environmental Impact Statement for the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Project, Madison and St. Clair Counties, Illinois. This workshop will continue the public involvement process begun in February 1999. The purpose of this workshop is to display project alternatives currently under investigation. The public is invited to review these plans to ensure that all problems, needs, concerns, issues, resources, and potential solutions are considered in the study's alternative development process.

The workshop will be conducted on Wednesday, February 2, 2000, from 12:00 p.m. to 8:00 p.m., at the State of Illinois Building (Illinois Department of Transportation), 1100 Eastport Plaza Drive in Collinsville, Illinois, (618) 346-3100. A map showing the location of the meeting site is attached. This informal meeting will provide the opportunity for any agency, organization, or individual to speak directly with representatives from the St. Louis District about their ideas and concerns or to ask for additional information.

The study area encompasses most of the American Bottoms in Madison and St. Clair Counties, as well as adjacent uplands with tributaries that flow into this area (see attached map). The interior drainage system on the bottoms currently does not have sufficient capacity to handle local and upland runoff from rainfall events greater than 5-year storms, and sediment from upland tributaries not only reduces the channel capacity of the drainage system but causes environmental degradation. The purpose of the reevaluation study is to investigate measures that blend flood control with ecosystem restoration. Measures to be investigated will be designed to restore and enhance natural habitats, with a focus on wetlands as temporary storage areas for stormwater

-2-

It is particularly important that all interested parties provide their comments and concerns in writing, and that these either be submitted the day of the workshop meeting, or mailed to the St. Louis District by March 15, 2000. Letters of comment and requests for information regarding this project should be directed to Mr. Timothy George, Environmental Manager, Planning, Programs, and Project Management Division, at the U.S. Army Corps of Engineers, St. Louis District, 1222 Spruce Street, St. Louis, Missouri 63103-2833 (telephone 314-331-8459, email Timothy.K.George@mvs02.usace.army.mil).

We have attempted to send this information to all agencies, private organizations, and individuals that may have an interest in the proposed project. If you know of individuals who may be interested but have not been contacted by us, please bring this invitation to their attention.

Michael R. Morrow
Colonel, U.S. Army
District Engineer

Attachment

G.7.2 Forms

G.7.2.1 Comment Form

COMMENT FORM

East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Project Public Workshop February 2, 2000

Please Print

My Name: ________________________________ **Telephone Number**: ____________

Address: ____

Village/Town/City: __________________________ **State and Zip Code**: ____________

Your comments will assist the St. Louis District in preparing the General Reevaluation Report and Draft Environmental Impact Statement for this study.

You may complete this comment form this evening, or finish it later and mail to the following address NLT March 15, 2000.

U.S. Army Corps of Engineers
St. Louis District
ATTN: CEMVS-PM-EA (Tim George)
1222 Spruce Street
St. Louis, Missouri 63103-2833

What **alternatives** appear to meet your desires for this project? Why?

Are there **areas** not addressed by displayed alternatives that you feel should be? Why?

What **additional issues** should be addressed? Why?

Comment Form – Continued

What **significant resources** could potentially be affected, adversely or beneficially, by any of the alternatives displayed? Why do you think such resources are significant?

Do you have any **other comments**?

Do you have any **questions** about this study that have not been answered?

Would you like to be included on the St. Louis District's mailing list for this study?

Yes____ No____

Thank you for taking the time to provide your comments!!!!!

G.7.3 Handouts.

G.7.3.1 Fact Sheet

Background. In the late 1960's, and again in the 1980's the St. Louis District was directed to study and define the need for interior flood control solutions in East St. Louis, Illinois and the surrounding vicinity. No major project was ever initiated because proposed fixes to the flooding were not economically feasible. In the 1984 report the insufficient benefit-to-cost ratio of the proposed solutions could be directly attributed to the predominately impoverished housing, agricultural and low value industry features of the area.

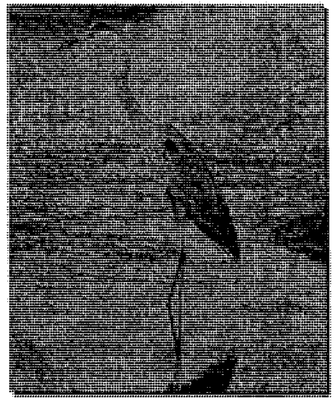
From 1993 to 1996 the area again suffered severe interior flooding - the Federal Government (Federal Emergency Management Agency (FEMA), U.S. Army Corps of Engineers (USACE), Natural Resource Conservation Service (NRCS) spent tens of millions of dollars to provide emergency disaster relief, clean existing drainage ditches, and buy-out frequently flooded areas. However, this work was only a temporary solution.

Congress once again funded the Corps to re-evaluate this problem in 1997. With some forward thinking, the Corps determined that an ecosystem approach to this problem could potentially not only resolve many of the flooding problems, but could be of great environmental significance.

Issues and Concerns. Overall, The East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Project has the potential of being a win-win situation by providing significant flood control using natural ecosystems to accomplish the major job of temporarily diverting and detaining peak rainfall events. The very number of past studies, and lack of system-wide action, have fostered an air of skepticism in the general public. With the Corps' history of concentrating solely on its flood control mission, the challenge (made by participating resource agencies) is to integrate ecosystem restoration into the overall study. Setting ecosystem restoration goals, objectives and performance criteria has been critical. To estimate the success of the ecosystem's restoration, the best available science must be brought to bear.

With areas of international cultural significance found throughout the study's boundaries, the State Historic Preservation Office has been an important advisor to the study team. In addition, agricultural concerns play a heavy role in the decision making process, as a large portion of the study area is comprised of very rich and unique agricultural areas (Horseradish Capital of the World).

Possible Solutions. In an on-going team effort to identify viable solutions to the complex issues facing the area, the District has partnered with Waterways Experiment Station (WES) and a number of the resource agencies, including the U. S. Fish and Wildlife Service (USFWS), the Environmental Protection Agency (EPA), the Natural Resource Conservation Service (NRCS), the Illinois Department of Transportation (IDOT), the Illinois Department of Natural Resources (IDNR), and the State Historical Preservation Office (SHPO), to ensure all stakeholder issues are considered. The District is developing a Hydrogeomorphic (HGM) model for assessing wetland functions in the project area, and is using a multi-species Habitat Evaluation Procedures (HEP) analysis to ensure that aquatic, wetland and terrestrial system changes are addressed. Concurrently, a detailed hydrological analysis of the area is being performed to determine the natural flood pulse of the area. These efforts are then being evaluated for their potential flood damage reduction benefits, in order to provide a complete systematic picture of potential solutions.



Currently, several potential alternatives appear promising. These include combinations of different sediment detention scenarios (upland vs bottoms), channel/canal configurations, and restoration/development of some 4-5,000 acres of habitat areas which would concurrently provide for the temporary diversion and detention of rainfall events. These alternatives focus on areas that provide suitable soils and hydrology necessary to reconnect a bottomland flood pulse. Nine bottom areas are currently being analyzed further to determine their viability, Old Cahokia Creek, Judy's and Burdick Branch, Brushy Lake, Spring Lake-Indian Lake-St. Clair Farms, Schoenberger, Mullens Slough, Cahokia Mounds, Dobrey Slough and Elms Slough. One hundred and eighty plus upland dry detention basins are also being analyzed for their ability to remove sediment from the water system in the bluffs while providing a stabilizing feature for stream banks. The District is writing a programmatic Environmental Impact Statement (EIS), which has involved, and will continue to involve large-scale public communications and involvement. In a further effort to ensure a comprehensive study, both the EPA and NRCS are cooperating agencies on this EIS. Visit our WEB Site at www.mvs.usace.army.mil then go to Project Management and you will see the site for this project.

Benefits. When completed, the study will propose restoration of a presettlement type hydrology (flood pulse) to the project area. As a direct result, an increase in biodiversity can be expected through the reestablishment of prairie areas, forested wetlands, marshes, and meandering streams. The project will directly improve water quality by reducing sediment loads throughout the ecosystem. As a result the local area can expect improved flood protection while developing and protecting significant environmental resources, preserving open space and creating an overall improved environment for the people of the area.

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G.7.3.2 Alternative Plans

G.7.3.2.1 Dobrey Slough.

Location. The project area is north of Horseshoe Lake, near Granite City and Pontoon Beach, Madison County. It lies north of Pontoon Road and east of Maryville Road. There is no upland component because there are no upland tributaries draining into Dobrey Slough. The project addresses only surface flooding and not below-ground flooding due to localized high groundwater conditions.

Purpose. The purpose of this scenario is two-fold: 1) to restore an area on the floodplain that supports natural plant and animal communities, with a flood regime as similar to presettlement (ca. 1800) conditions as practicable; 2) to reduce flood damages in the residential neighborhoods adjacent to Dobrey Slough, in the Long Lake watershed. Dobrey Slough is a relatively small historic slough of the Mississippi River without any significant natural drainage ways going in or out of it. Historic vegetation of the slough apparently was non-woody.

Features Under Evaluation. A total of 3 different action alternatives are being evaluated. Each action alternative shares these features:

1) Establish a habitat area with the existing "slough" (marsh) serving as its core;

2) Restore existing marsh and create new marsh within the habitat area, to utilize stormwater events delivered by local runoff; excavation would be required to create new marsh, and existing drainage structures located under the railroad embankment would need to be modified;

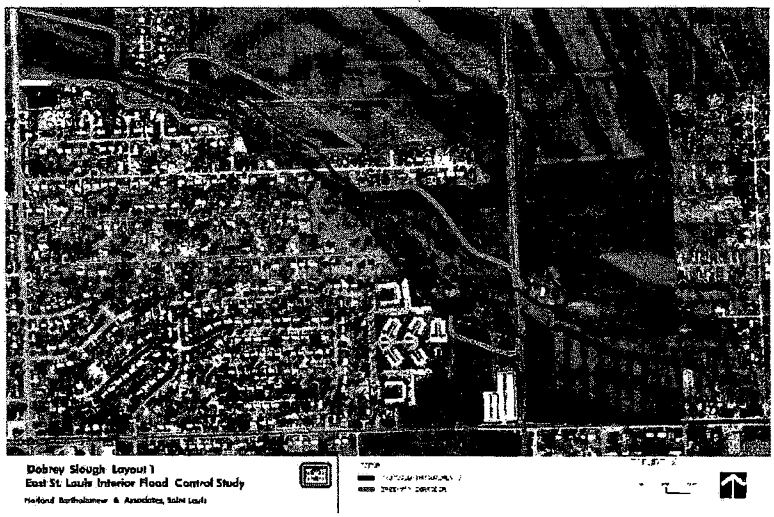
3) Create a forested corridor within the habitat area around the existing marsh – on the west side of the railroad embankment, trees would be planted where they currently do not occur in undeveloped areas. This forested corridor would not only serve as habitat, but it would act as a filter strip to enhance water quality in the marsh.

In addition to the shared features, the action alternatives vary according to the following parameter:

1) Width of forested corridor – widths of about 165 feet (50 meters), 245 feet (75 meters), and 330 feet (100 meters) are being considered, where compatible with existing development.

NOTE: Map displays for this project area are not surveyed engineering designs - they are notional.

G.7.3.2.1 Dobrey Slough-Continued



G.7.3.2.2 Old Cahokia Creek

Location. The project area is in Madison County. The floodplain component lies parallel to the bluff, and extends from north to south from the Cahokia Creek Diversion Channel to the south side of I-270. It consists of remnants of the historic Cahokia Creek and its adjacent floodplain. The "Bluff 1" watershed, to the north of Judy's Branch, comprises the upland component.

Purpose. The purpose of this scenario is three-fold: 1) to restore a portion of Cahokia Creek on the floodplain to a free-flowing stream, with an adjacent forested corridor supporting natural plant and animal communities, and a flood regime as similar to presettlement (ca. 1800) conditions as practicable; 2) to minimize upland erosion and manage sedimentation in the "Bluff 1" watershed; 3) to reduce flood damages in the bottoms in the County Ditch watershed, with a focus on Sand Road and vicinity.

Features Under Evaluation. A total of 18 different action alternatives are being evaluated. Each action alternative shares these features:

1) Reopen a portion of the Cahokia Creek channel on the floodplain – segments of historic channel that have been filled over the years would be reopened, and existing channel areas would be excavated to remove accumulated sediment, to recreate a floodplain stream that once flowed from north to south;

2) Create a continuous forested corridor along the reopened channel – trees would be planted where they currently do not occur on both sides of the creek;

3) Construct an earthen hydraulic feature along the west side of the reopened channel – this feature, located along the west edge of the forest on the west side of the creek, would allow for a riverine overflow regime to be re-established while restricting overflow from the creek to the forested corridor and adjacent lands to the east; remnants of an old berm still exist in some areas.

In addition to these shared features, the action alternatives consist of various combinations of features from the following 4 parameters:

1) Upland vs. bottomland sediment detention – upland sediment would be detained either in the uplands, by constructing 10 new dry detention basins in the "Bluff 1" watershed, or in the bottoms in existing ditches and in the restoration area;

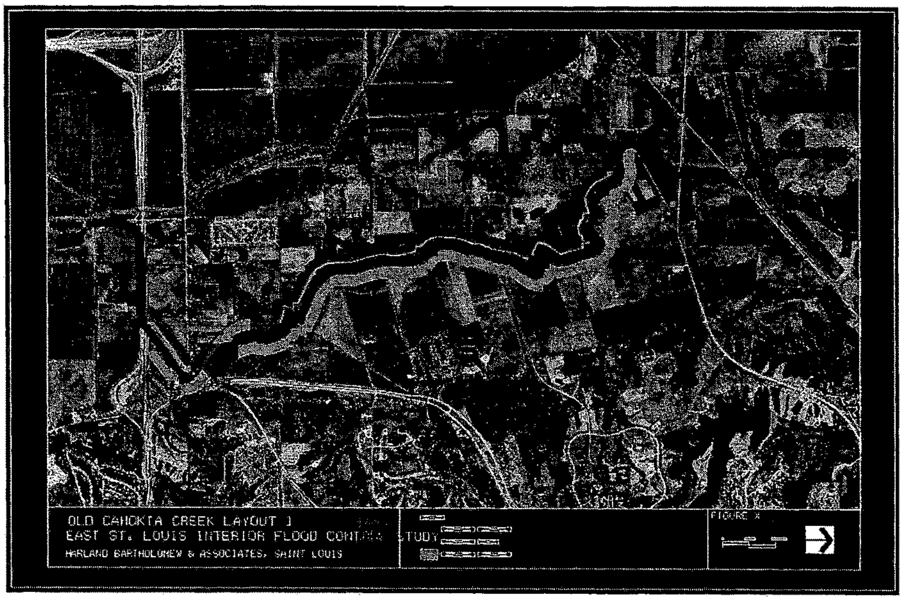
2) Length of channel restoration – two lengths of channel restoration are being considered; from the south end of the project area, the shorter one extends north along the creek for a distance of about 2.9 miles; the longer option extends all the way to the diversion channel for a distance of about 4.2 miles;

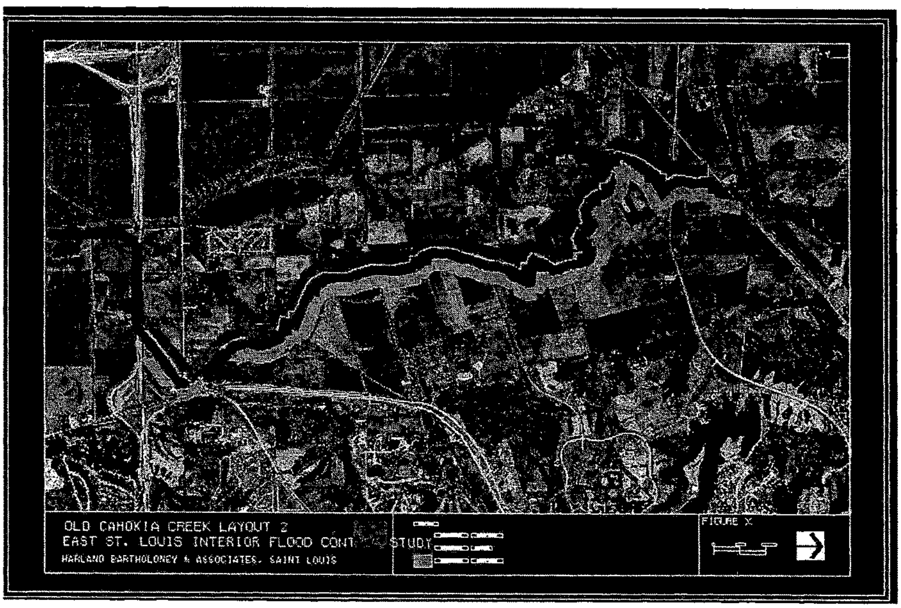
3) Augmentation vs. no augmentation of stream flows – for the longer channel alternative, a new pump station built at the diversion channel would be used to augment low stream flows for environmental purposes;

4) Width of forested corridor – on *each* side of the creek, widths of about 165 feet (50 meters), 245 feet (75 meters), and 330 feet (100 meters) are being considered.

NOTE: Map displays for this project area are not surveyed engineering designs - they are notional.

G.7.3.2.2 Old Cahokia Creek – Continued





G.7.3.2.3 Elm Slough

Location. The project area is northeast of Horseshoe Lake in Madison County. Route 111 bounds it on the west, Route 162 to the north, and I-255 to the east. There is only a floodplain component. No upland component exists because only two floodplain tributaries, Long Lake and Mitchell Ditch, drain into this area.

Purpose. The purpose of this scenario is two-fold: 1) to restore an area on the floodplain that supports natural plant and animal communities, with a flood regime as similar to presettlement (ca. 1800) conditions as practicable; 2) to reduce flood damages within the Long Lake watershed.
Much of the project area is an old meander scar of the Mississippi River, and forest was the predominant type of vegetation two centuries ago.

Features Under Evaluation. A total of 5 different action alternatives are being evaluated. Each action alternative shares these features:

1) Create a 670-acre forested habitat area, to utilize stormwater events delivered by Long Lake and Mitchell Ditch combined, plant trees where they do not currently occur, and construct earthen hydraulic features around the perimeter of the habitat area where necessary. To make hydrologic conditions in a large area of the newly planted wetland forest similar to those of the existing wetland forest, an area of about 175 acres will be excavated to temporarily pond water;

2) Modify the existing drainage pattern of Long Lake and Mitchell Ditch on the south side of Route 162 – the existing Mitchell/Long Lake Ditch on the south side of Route 162 would be replaced with two new "funnel"-shaped waterways, one for Long Lake, the other for Mitchell Ditch, that would carry stormwater from these two floodplain tributaries south into Elm Slough in a sheet-flow manner; earthen hydraulic features would be constructed along the edges of these waterways to ensure that stormwater would be restricted to the habitat area; culverts under Route 162 and the adjacent railroad embankments would be modified;

3) Plant vegetation within the two new drainageways – grassy vegetation would be planted inside the "funnel"-shaped areas to act as a filter and intercept sediment carried by stormwater.

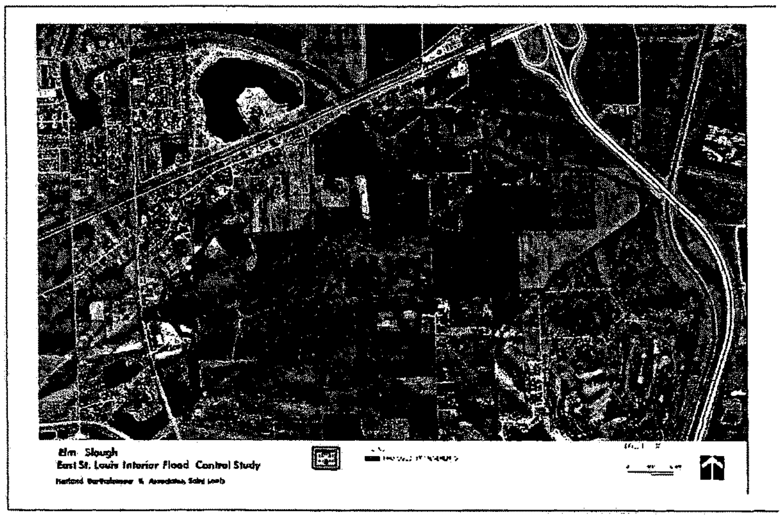
In addition to the shared features, the action alternatives consist of various combinations of features from the following 2 parameters:

1) Intensity of improvement to existing forest – to replace underrepresented tree species, two levels of intensity would be considered, simple and intensive. Simple improvements would consist of selective thinning and planting of mast tree species in the existing higher forest; intensive improvements would involve drainage of existing dead (drowned) timber and plantings of appropriate tree species. No improvements are also being considered;

2) Presence or absence of prairie buffers – a vegetative buffer consisting of prairie plantings would be established where sheet flow would enter Elm Slough, before the main forested habitat area, to intercept additional sediment carried by flows from Long Lake and Mitchell Ditch.

NOTE: Map displays for this project area are not surveyed engineering designs - they are notional.

G.7.3.2.3 Elm Slough - Continued



G.7.3.2.4 Judy's/Burdick Branch

Location. The project area is in Madison County. The floodplain component is southeast of the junction of I-255 and Route 162, at the confluence of Judy's Branch, Burdick Branch, and Cahokia Canal. The watersheds of Judy's Branch, Burdick Branch, and a portion of the "Bluff 1" tributary comprise the upland component.

Purpose. The purpose of this scenario is three-fold: 1) to create an area on the floodplain that supports natural plant and animal communities, with a flood regime as similar to presettlement (ca. 1800) conditions as practicable; 2) to minimize upland erosion and manage sedimentation in the Judy's, Burdick, and "Bluff 1" watersheds; 3) to reduce flood damages in the bottoms within the Cahokia watershed.
The floodplain component lies at the southern end of historic Rattan's Prairie, a 15,000-acre wet prairie once located in the northeast part of the American Bottoms.

Features Under Evaluation. A total of 16 different action alternatives are being evaluated. Each action alternative shares these features:

1) Create a floodplain habitat area with an earthen hydraulic feature, to utilize stormwater events delivered by Judy's and Burdick Branches combined;

2) Modify the existing levee along the south side of Burdick Branch to ensure delivery of stormwater events from the Judy's and Burdick tributaries into the new habitat area;

3) Create a 330-foot (100-meter) wide prairie buffer around the perimeter of the habitat area's earthen hydraulic feature.

In addition to the shared features, the action alternatives consist of various combinations of features from the following 4 parameters:

1) Upland vs. bottomland sediment detention – upland sediment would be detained either in the uplands by constructing a total of 28 new dry detention basins (23 in Judy's Branch, 4 in Burdick Branch, 3 in "Bluff 1" watershed), or in the bottoms in the channels of Judy's and Burdick Branches, and in a sediment detention basin within the new habitat area;

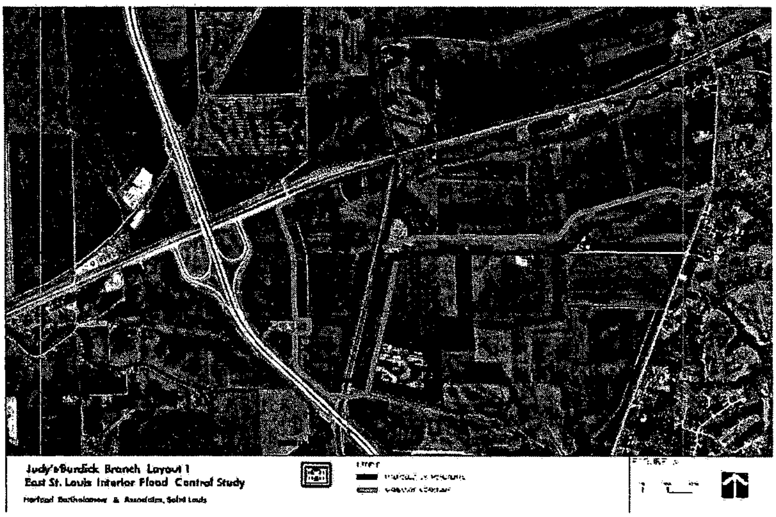
2) Size of habitat area – small (131 acres), medium (230 acres), and large (350 acres) areas are being considered to provide a variety of habitat options and hydrologic regimes, given existing urban constraints; marsh would be created in the small and medium areas, requiring extensive excavation in the former, and moderate excavation in the latter; prairie would be created in the large area, with essentially no excavation needed;

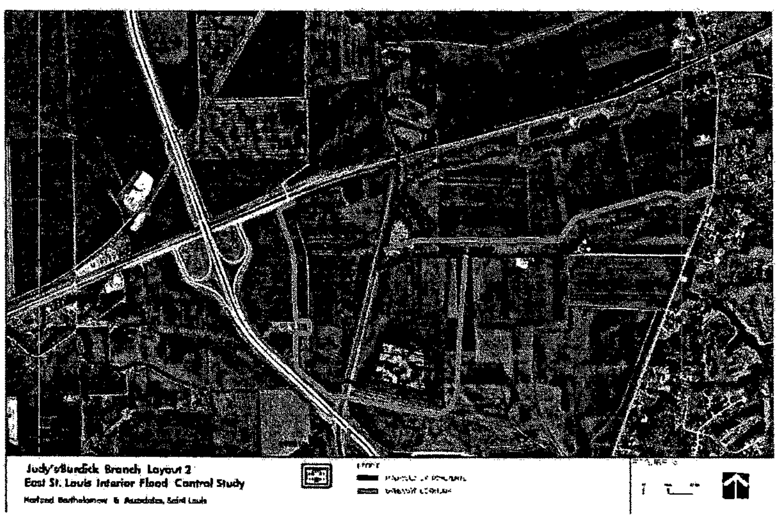
3) Restore the historic Cahokia Creek channel within the habitat area –a channel would be excavated to replace the historic channel that has been filled in, to recreate a floodplain stream that once flowed from north to south; this applies only to those alternatives with upland sediment detention;

4) Create a 330-foot (100-meter) wide forested corridor along the north side of Burdick Branch, extending from Cahokia Canal to Route 157.

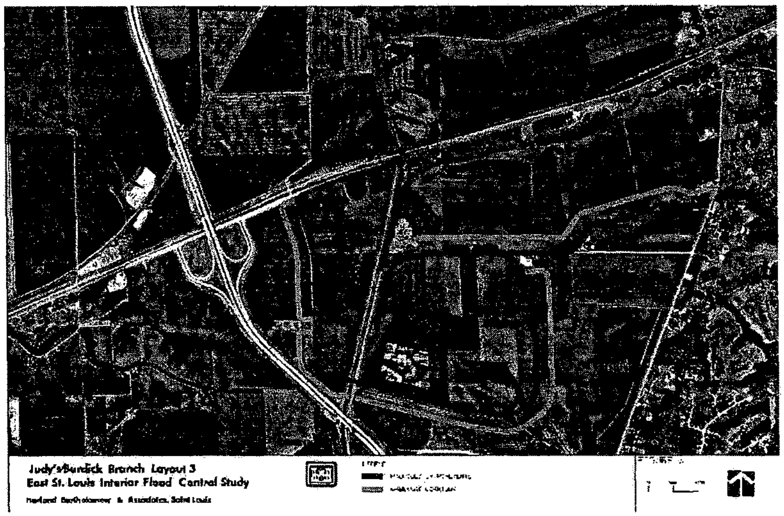
NOTE: Map displays for this project area are not surveyed engineering designs - they are notional.

G.7.3.2.4 Judy's/Burdick Branch - Continued





G.7.3.2.4 Judy's/Burdick Branch - Continued



G.7.3.2.5 Brushy Lake

Location. The project area is in Madison County. The floodplain component is east of Horseshoe Lake, and is bounded by Cahokia Canal on the west, Route 157 on the east, I-55/70 on the south, and Horseshoe Lake Road on the north. The Schoolhouse Branch and Snyder Ditch ("Bluff 3") watersheds comprise the upland component.

Purpose. The purpose of this scenario is three-fold: 1) to restore an area on the floodplain that supports natural plant and animal communities, with a flood regime as similar to presettlement (ca. 1800) conditions as practicable; 2) to minimize upland erosion and manage sedimentation in the Schoolhouse Branch and "Bluff 3" watersheds; 3) to reduce flood damages within the Cahokia watershed.
Much of the floodplain component is an old meander scar of the Mississippi River. Two centuries ago, Cahokia Creek flowed through this area, and forest was the predominant type of vegetation.

Features Under Evaluation. A total of 6 different action alternatives are being evaluated. Each action alternative shares these features:

1) Create a 710-acre forested habitat area on the floodplain, to utilize stormwater events delivered by Schoolhouse Branch and Snyder Creek combined, including planting of trees where they do not currently exist;

2) Restore the historic Cahokia Creek channel within the habitat area – segments of channel that have been filled would be reopened, and existing remnants would be excavated to remove accumulated sediments, to recreate a floodplain stream that once flowed from north to south.

3) Modify the existing channels and levees of Schoolhouse Branch and Snyder Ditch to ensure delivery of stormwater events from these two bluff tributaries into the new habitat area, using the current channel conditions of grassy sideslopes and earthen bottom.

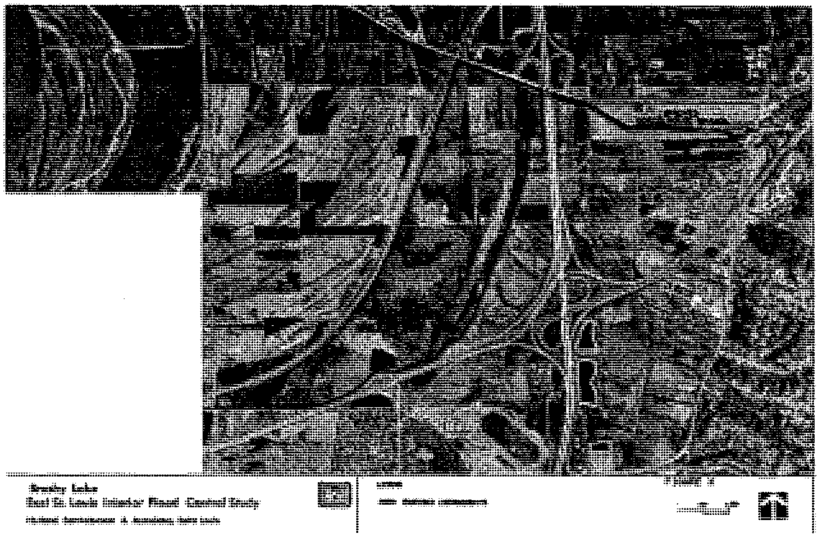
In addition to the shared features, the action alternatives consist of various combinations of features from the following 2 parameters:

1) Upland vs. bottomland sediment detention – upland sediment would be detained either in the uplands, by constructing a total of 15 new dry detention basins (14 in Schoolhouse Branch watershed, 1 in "Bluff 3"watershed), or in the bottoms in the channels of Schoolhouse Branch and Snyder Ditch, and in a sediment detention basin within the new habitat area;

2) Presence or absence of prairie filter – under the bottomland sediment detention option, a 330-foot (100 meter) wide vegetative buffer would be established in the habitat area outside the detention basin, and would consist of prairie plantings to intercept sediment carried by stormwater overtopping the basin.

NOTE: Map displays for this project area are not surveyed engineering designs - they are notional.

G.7.3.2.5 Brushy Lake - Continued



G.7.3.2.6 Spring Lake

Location. The Spring Lake project area is the largest of all those under consideration, and it spans both Madison and St. Clair Counties. The floodplain component consists of three major areas, in addition to Harding Ditch:

1) *Cell 1* (bounded by Forest Boulevard to the north, I-255 to the east, Bunkum Road to the south),

2) *St. Clair Farms* (bounded by I-64 to the north, Harding Ditch and I-255 to the east, St. Clair Avenue to the south),

3) *Indian Lake* (bounded by I-55/70 to the north, Route 111 to the east, Collinsville Road to the south, Route 203 to the west).

The watersheds of Canteen Creek and Little Canteen Creek comprise the upland component.

Purpose. The purpose of this scenario is three-fold: 1) to restore an area on the floodplain that supports natural plant and animal communities, with a flood regime as similar to presettlement (ca. 1800) conditions as practicable; 2) to minimize upland erosion and manage sedimentation in the Canteen and Little Canteen Creek watersheds; 3) to reduce flood damages within the Cahokia and Harding watersheds.

The three floodplain areas lie in separate historic meander scars of the Mississippi River. Two centuries ago, the principal type of vegetation occurring in these areas appears to have been marsh (Cell 1), prairie (St. Clair Farms), and forest (Indian Lake).

Features Under Evaluation. A total of 9 different action alternatives are being evaluated. Each action alternative shares these features:

1) Establish the floodplain areas Cell 1 (370 acres), St. Clair Farms (180 acres), and Indian Lake (620 acres) as habitat areas, to utilize stormwater events from Canteen and Little Canteen Creeks, and construct earthen hydraulic features where necessary around these areas. At Indian Lake, remnants of Cahokia Creek would be reopened to create a flowing floodplain stream, and trees would be planted along both sides of the channel where they currently do not exist, to create a continuous forested corridor 330 feet (100 meters) wide. Impaired drainage at the northern end would be improved and standing water removed to allow forest to become reestablished;

2) Create a 330-foot (100-meter) wide forested corridor on both sides of Harding Ditch, between Cell 1 and St. Clair Farms;

3) Reestablish forest in dead timber north of Forest Boulevard within the Cahokia Mounds State Historic Site – permanent standing water within a 35-acre tract of dead (drowned) timber would be drained and appropriate tree species planted;

4) Construct a new Canteen Creek relief channel, to ensure that stormwater from the Canteen Creek watershed enters the Harding Ditch system, and eventually the habitat areas; the channel would have concrete sides and bottom, and an earthen levee along both sides;

5) Modify Harding Ditch, from Route 157 to Cell 1, and from Cell 1 to St. Clair Farms, to ensure that stormwater events from Canteen and Little Canteen Creeks reach the habitat areas, the channels would have grassy sides and an earthen bottom, and an earthen levee along both sides;

G.7.3.2.6 Spring Lake - Continued

6) Construct a new "Fairmont City Ditch", from Cell 1 to Indian Lake, to provide the hydraulic connection from Canteen Creek back to Cahokia Canal; the channel would have grassy sides and an earthen bottom, and an earthen levee along both sides only in low areas.

In addition to the shared features, the action alternatives consist of various combinations of features from the following 3 parameters:

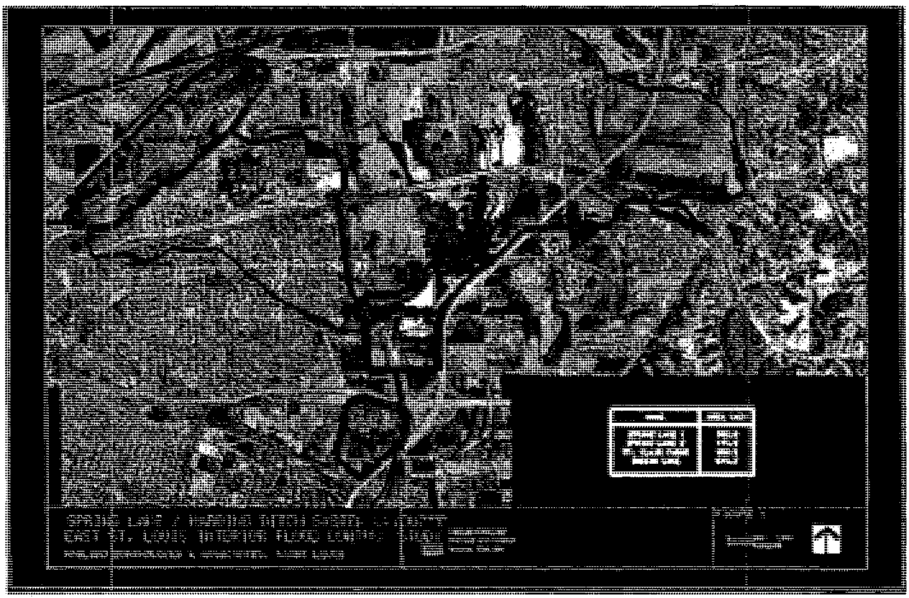
1) Upland vs. bottomland sediment detention – upland sediment would be detained either in the uplands, by constructing a total of 58 new dry detention basins (37 in Canteen Creek watershed, 21 in Little Canteen Creek watershed), or in the bottoms in the channels of Harding Ditch and Canteen Creek; and in the habitat area at Cell 1;

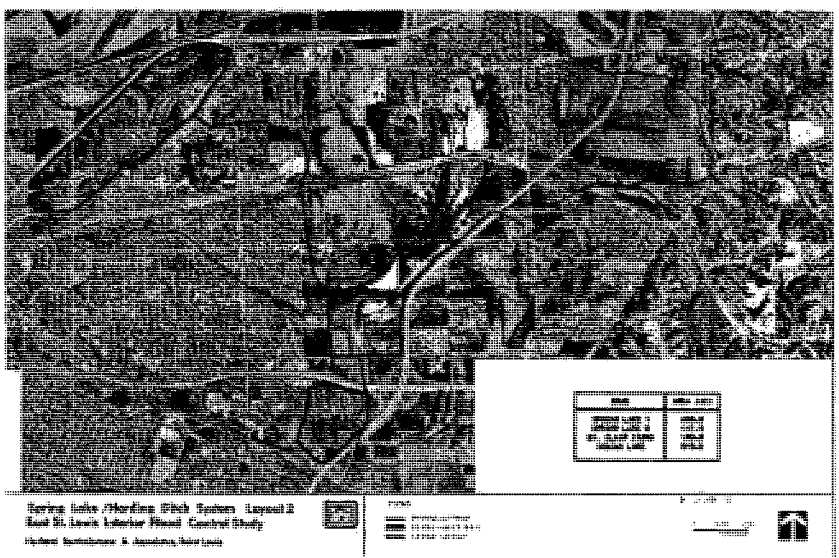
2) Presence or absence of a new "floodplain" along "Reach 3B" of Harding Ditch, by setting back the existing levees along a 2,000-foot long reach of Harding Ditch, a "floodplain" area would be established;

3) Type of vegetation within the habitat areas – a variety of habitat options and hydrologic regimes are being considered at some areas: *Cell 1* - marsh (requiring extensive excavation), or marsh and existing forest (requiring minimal excavation; *St. Clair Farms* - prairie or forest (requiring no excavation), or marsh (requiring minimal excavation); *"Reach 3B" of Harding Ditch* - under the "floodplain" option, prairie would be planted in the "floodplain" area; *Indian Lake* - would remain constant across all alternatives.

NOTE: Map displays for this project area are not surveyed engineering designs - they are notional.

G.7.3.2.6 Spring Lake - Continued





G.7.3.2.7 Cahokia Mounds

Location. Cahokia Mounds State Historic Site, located in the bottoms of Madison and St. Clair Counties, is the site for this scenario. There is no upland component.

Purpose. The purpose of this scenario is to restore an area on the floodplain that supports prairie plant and animal communities as similar to presettlement (ca. 1800) conditions as practicable.

The project area lies within historic Cold Prairie, a 15,000-acre prairie once found in the southeast part of the American Bottoms.

Features Under Evaluation. A total of 6 different action alternatives are being evaluated. Each action alternative includes the following feature:

1) Restore a total of 525 acres of high quality tallgrass prairie, in areas currently used for hay production in the Cahokia Mounds State Historic Site. Prairie plant species to be used would be those adapted to mesic and wet-mesic conditions.

In addition, the action alternatives consist of various combinations of the following 2 parameters:

1) Rate of restoration – replacement of hay production areas with prairie plantings would be completed within a 5- or 10-year time period; in terms of area, these rates correspond to an average of 105 or 52.5 acres planted per year.

2) Type of maintenance for prairie vegetation – three maintenance options are being considered. In order to maintain the integrity of prairie plant communities, dead plant materials need to be removed periodically. The options are based on prescribed burns or mowing.

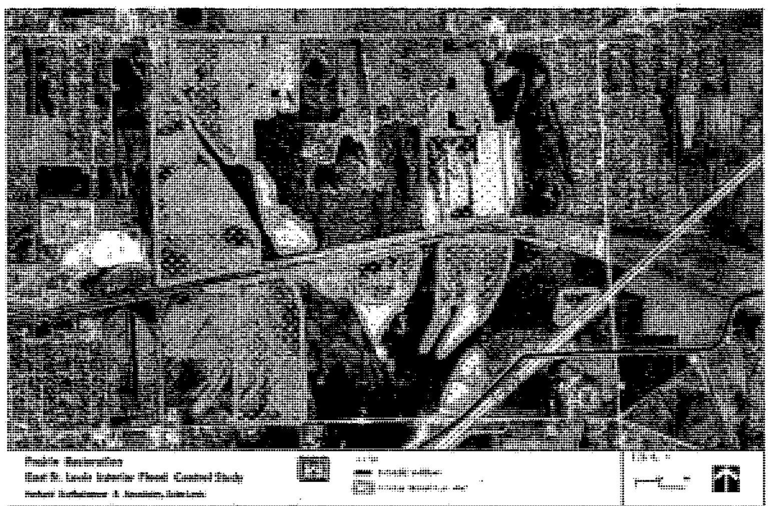
a) Burn – burning only. The entire prairie is burned every 3 years on a rotational cycle (a portion is treated every year);

b) Burn/mow – burning and mowing. The entire prairie is mowed once every 2 to 3 years, and burned once every 10 years. Both treatments are on a rotational cycle;

c) Mow – mowing only. The entire prairie is mowed once every 3 years on a rotational cycle.

NOTE: Map displays for this project area are not surveyed engineering designs - they are notional.

G.7.3.2.7 Cahokia Mounds - Continued



G.7.3.2.8 Wedgewood

Location. The project area is in St. Clair County. The floodplain component is in East St. Louis, and lies south of I-64 and Metrolink, immediately west of Harding Ditch, and straddles I-255 and Summit Avenue. The watershed of Schoenberger Creek comprises the upland component.

Purpose. The purpose of this scenario is three-fold: 1) to restore an area on the floodplain that supports natural plant and animal communities, with a flood regime as similar to presettlement (ca. 1800) conditions as practicable; 2) to minimize upland erosion and manage sedimentation in the Schoenberger Creek watershed; 3) to reduce flood damages within the Harding watershed.

The area of the floodplain component is located in the southern portion of historic Cold Prairie that interfaced with forest.

Features Under Evaluation. A total of 4 different action alternatives are being evaluated. Each action alternative shares these features:

1) Create a 125-acre floodplain habitat area with an earthen hydraulic feature, to utilize stormwater events delivered by Schoenberger Creek;

2) Modify the existing levee along the west side of Harding Ditch, to ensure stormwater from Schoenberger Creek enters the new habitat area;

3) Close Summit Avenue within the new habitat area, extending from Kings Highway on the west to Harding Ditch on the east, so as to form a contiguous habitat area.

In addition to the shared features, the action alternatives consist of various combinations of features from the following 2 parameters:

1) Upland vs. bottomland sediment detention – upland sediment would be detained either in the uplands, by constructing 24 new dry detention basins in the watershed of Schoenberger Creek, or in the bottoms in the Schoenberger Creek ditch leading to Harding Ditch, and in a sediment detention basin within the new habitat area;

2) Type of vegetation within the habitat area – a variety of habitat options and hydrologic regimes are being considered; these include wet prairie or forest (requiring no excavation), and marsh (requiring excavation).

NOTE: Map displays for this project area are not surveyed engineering designs - they are notional.

G.7.3.2.8 Wedgewood - Continued

G.7.3.2.9 Mullens Slough

Location. The project area is in St. Clair County in the southeast corner of the American Bottoms, near Centreville. The floodplain component lies between the bluff and Canal No. 1/Harding Ditch. The lake-like body of water there is referred to as Mullens Slough. The Powdermill and "Bluff 6" watersheds comprise the upland component.

Purpose. The purpose of this scenario is three-fold: 1) to restore an area on the floodplain that supports natural plant and animal communities, with a flood regime as similar to presettlement (ca. 1800) conditions as practicable; 2) to minimize upland erosion and manage sedimentation in the Powdermill and "Bluff 6" watersheds; 3) to reduce flood damages within the Powdermill/Canal No. 1 watershed.

In the floodplain, much of the project area lies in an old meander scar of the Mississippi River. The historic Pittsburg or Big Lake occupied this area, and Mullens Slough now lies within its footprint. Prairie once extended south and west of this historic backwater lake.

Features Under Evaluation. A total of 6 different action alternatives are being evaluated. Each action alternative shares these features:

1) Establish a 310-acre floodplain habitat area – to utilize stormwater events delivered by the Powdermill watershed; this area includes the 205-acre Mullens Slough

2) Create overwintering fisheries habitat in Mullens Slough – a series of deep pools (water depth greater than 8 feet) would be created by excavation to provide suitable conditions for winter survival;

3) Create islands in Mullens Slough – material excavated to create overwintering habitat would be placed in the lake to make a series of islands, which would be planted to prairie

4) Improve habitat structure in Mullens Slough – woody debris would be added to the lake, and various aquatic plant species would be planted around its perimeter;

5) Restore floodplain prairie habitat – within the new habitat area, prairie would be planted on a 31-acre floodplain area to the south of Mullens Slough.

6) Create a 17-acre marsh area (cell 1) – stormwater from Powdermill Creek would pass through this area before it reaches Mullens Slough;

7) Improve tree species diversity in existing forest along Canal No. 1 and Mullens Slough, by selective thinning and planting of mast tree species.

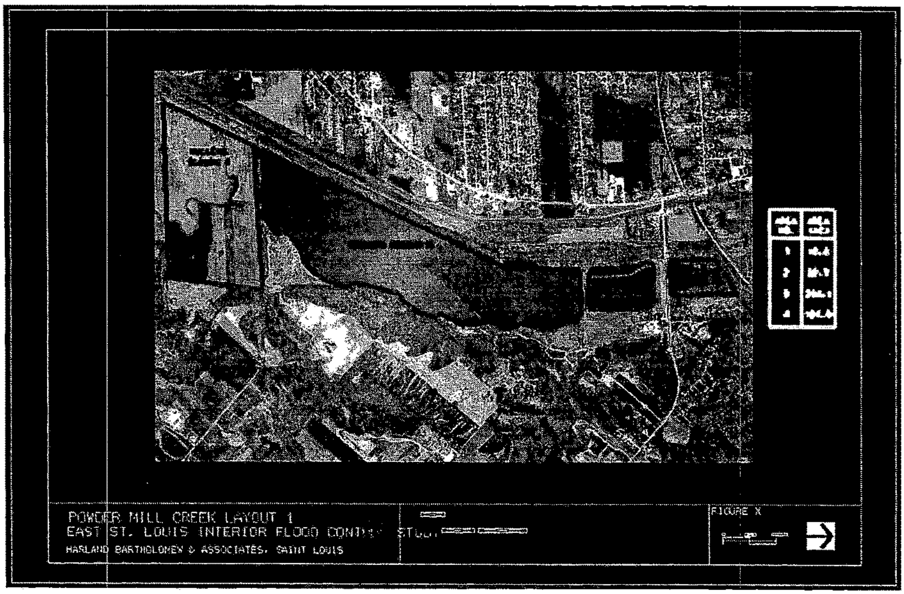
In addition to the shared features, the action alternatives consist of various combinations of features from the following 2 parameters:

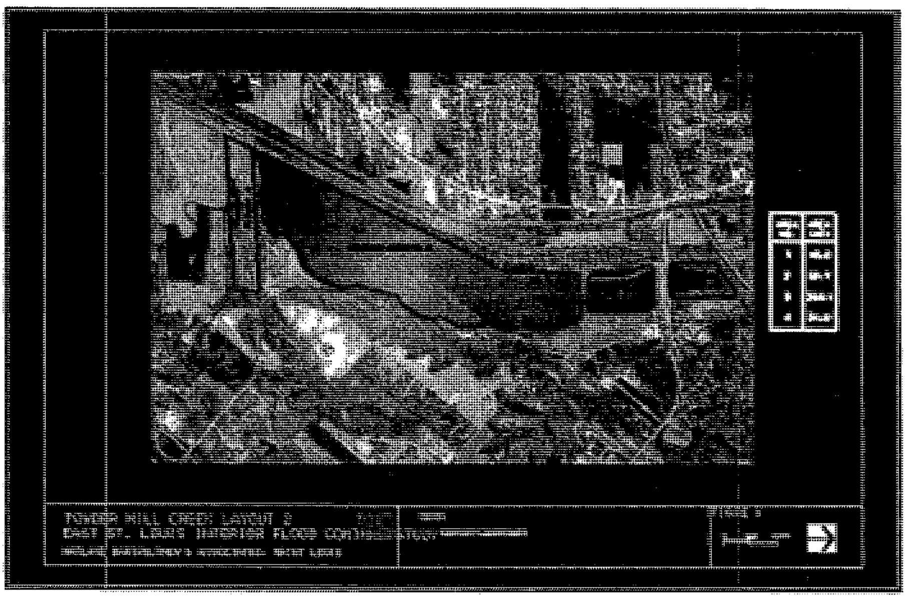
1) Upland vs. bottomland sediment detention – upland sediment would be detained either in the uplands, by constructing 20 new dry detention basins (14 in Powdermill watershed, 6 in "Bluff 6" watershed), or in the bottoms in the channels of the upland tributaries, in a 17-acre detention basin (cell 1), and in a second 23-acre detention basin (cell 2) just downstream of it;

2) Type of maintenance for prairie vegetation – three maintenance options are being considered: burn, burn/mow, and mow (the fact sheet for Cahokia Mounds scenario has further details).

NOTE: Map displays for this project area are not surveyed engineering designs - they are notional.

G.7.3.2.9 Mullens Slough - Continued





G.7.4 Compiled Comments. East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration project comments received as a result of the 2 February 2000 public workshop.

The following is a compilation of comments received in response to the workshop, which was conducted on 2 February 2000 in Collinsville, Illinois. These comments have been categorized for consolidation of similar issues and concerns expressed by the public.

(Areas not adequately addressed) Use system that is in place now

1) Fix existing system of canals and levees to handle storm events.
2) Clean out Horseshoe Lake and take Canteen and Cahokia Canal to it
3) Consider McDonough Lake area as an alternative site
4) Improve existing drainage ditches
5) Restore Lakes at Grand Maria to provide storage areas
6) Clean out Canal No. 1
7) Require builders to collect and contain runoff from new development in the bottoms
8) Stop development in low lying areas that are subject to flooding
9) Bluff area communities should be required to control water runoff

(Significant Resource) Concerns for impact of project on farming and farm families

1) Loss of farmland as a result of the project would cause a significant economic impact on residents
2) Taking prime farmland out of production will impact our ability to continue to meet the demands of a growing population for food.
3) In favor of sacrificing as little land as possible to do the most good.
4) Plan II and III of Judy's/Burdick Branch impact significant horseradish acreage
5) Concerned over extent of area consumed by forested corridors. It appears excessive if land is presently in use.
6) Spring Lake Alternative has a major detrimental impact to horseradish production for the State of Illinois
7) Viability of forested corridors in the bottoms is questioned with the experience St Clair County had with the lose of trees planted in the bottoms

Specific comments about alternatives

1) Avoid Booker T. Washington Cemetery with Mullen Slough Alternative
2) Elm Slough Alternative is too aggressive and not required to the extent being considered
3) Improvements to Dobrey and Elm Slough would spur development that would compound the problems
4) Avoid Sunset Hill Camp with Cahokia Creek Alternative
5) Develop test sediment basins to prove assumptions
6) Concern over Brushy Lake Alternatives impact on the water treatment facility located in Collinsville.
7) Interested in the potential use of Wedgewood FEMA buyout area in the project plan
8) The impact of ground water needs to be considered in the development of alternatives

G.7.4 Compiled Comments – Continued

9) Oppose merging Canteen and Harding Watershed not a practical or economic plan
10) Dobrey Slough Alternative 1 is preferred alternative because that is the natural way to handle the problem
11) Stop drainage out of Long Lake at Merz Lane and Hwy 162
12) Consider problem of Quiet Valley drainage in Pontoon Beach
13) Consideration of archeological resources of the total area should be afforded the same consideration as those adjacent to the Cahokia Mounds
14) Interested in horse friendly trail system consideration
15) Upland detention is a critical component
16) Old Cahokia Creek Alternative needs to incorporate a farm crossing
17) Concerned about the pumping station option with the Old Cahokia Creek Alternative
18) Critical that deep holes remain in the Old Cahokia Creek bed when restored
19) New Dobrey Slough ditch to Horseshoe Lake provides the best plan and could drain Long Lake and Mitchell ditch area

Other Comments
1) Support reforestation projects
2) Favor environmental restoration of American Bottoms
3) Agree with development of dry detention basins on the bluffs
4) Desire emphasis on bicycle and pedestrian use/access to areas as a feature of the restoration project where feasible
5) Support idea of preserving wetlands in the area
6) Plan is an attempt by the Corps of Engineers to get them more federal money for a project by exploiting the environmental angle
7) Concerned about the control of mosquitoes in project areas
8) Areas identified for reforestation would put animals, humans and travelers at risk
9) Areas would attract unregulated hazardous dumping and impossible area to patrol
10) Concern over water being held in backyards that is prevented from reaching Long Lake because of damaged culverts
11) Concern about the ability of alternatives to handle the high sediment loads without excessive maintenance

(Additional Issues) Study management comments
1) Stormwater management and stormwater legislation need to also be addressed
2) Identify causes of flooding in East St. Louis using materials submitted by ESL CAN and determine their ability to be incorporated into the current study
3) Have a larger meeting facility next time
4) Provide a formal presentation on the overall project
5) Have public meeting in East St. Louis
6) We are directly involved in this group of proposals, yet we were not informed of these directly by you

G.7.4 Compiled Comments – Continued

Questions

1) Couldn't land-owners be given incentives to improve existing forest on their properties and assistance to upgrade and beneficially harvest the forest?

2) How is flooding and destroying productive farm ground environmentally beneficial?

3) Would farmers and landowners be adequately compensated

4) Is this one of many other meetings to be held

5) Where will local cost share be derived

6) Additional advantages of the wider forested corridors have not been adequately explained. What species do these favor?

G.7.5 Response Letters

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO ATTENTION OF

FEB 28 2000

Planning, Programs, and Project Management Division
Project Management Branch for Flood Control and Support for Others

Mr. Nick Hamilos
Madison County Board
Chairman Metro East Regional Storm Water Committee
570 Glen Crossing Road
Glen Carbon, IL 62034

Dear Mr. Hamilos:

I am writing in response to your request for information regarding the McDonough Lake area and why it did not appear as a recommended alternative of the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Study.

As you are aware, three criteria have been consistently utilized to evaluate the potential for an area to serve as an alternative. They are the area's current environmental condition, its proximity to existing flood control systems, and the drainage area it would address.

The first criterion is related to existing habitat quality and the potential environmental benefits that could be anticipated by improving the quality of an area through some particular treatment. Under this criterion, urban areas and farm land have little to no existing habitat value and therefore great potential for improvement, whereas existing habitat has quality of some degree with relatively less potential for improvement. The second criterion, proximity to the existing flood control system, assesses the potential for an area to be reconnected to existing ditch systems in the bottoms and serve as a temporary diversion and detention area for storm events in a cost efficient manner. Lastly, the drainage area assesses the watershed that could be addressed by the particular area and the significance of both environmental improvements and flood damage reduction benefits within that drainage area.

The McDonough Lake area was assessed in March 1999 to gather environmental baseline data for our study. We used two procedures, one for habitat quality (Habitat Evaluation Procedures) and the other for wetland functions (Hydrogeomorphic Method). We visited the lake itself and several adjacent forested sites. Compared to other wetlands in the MetroEast, the McDonough Lake area has relatively high quality. Yet, the area has experienced degradation due to a number of factors, including past hydrologic changes and intense selective cutting in the forest. Historically, Cahokia Creek flowed through the McDonough Lake area, but it was replaced by Cahokia Canal. Environmentally, it would be beneficial to recreate a flow-through system. The lake could be

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improved for fisheries by providing deepwater overwintering habitat, and hard mast tree seedlings could be planted in the forest. However, in our view these potential benefits are not extensive enough to offset the area's high cost of acquisition.

The lake is not in close proximity to the existing flood control system, and Cahokia Canal lies on the opposite side of I-255. Additional channelization would be required to adequately connect this area as a part of the flood plain hydrology. Likewise, the upland watershed that drains directly into the McDonough Lake area is quite small, and does not deliver flows large enough to require consideration for flood protection or flood plain reconnection.

We did briefly consider a scenario for restoration of the historic Cahokia Creek through the McDonough Lake area. It involved the movement of waters from Judy's and Burdick Branch into a restored channel north of McDonough Lake, passing through McDonough Lake and out through Cahokia Canal. However this scenario impacted more residents, required the acquisition of more land and appeared to derive less habitat benefits than the alternatives currently under consideration at Judy's and Burdick Branch. This is not to say the area is not important and that Madison County would not be well served by preserving the areas that are currently providing quality habitat. It only says that the area did not provide habitat outputs in a manner as cost effective as other areas currently being considered.

If you have additional questions please contact me at 314-331-8033, or if you think this would be an appropriate topic to present in more detail to the Technical Committee of the Stormwater Committee, please let me know and we will get it on the agenda. Your continued support of this effort is appreciated and we welcome your input.

Sincerely,

Deborah L. Roush

Deborah L. Roush
Project Manager

G.7.5 Response Letters - Continued

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF

FEB 29 2000

Planning, Programs, and Project Management Division
Project Management Branch for Flood Control and Support for Others

Mr. George Chance
Mayor, City of Caseyville
10 West Morris Street
Caseyville, IL 62232

Dear Mr. Chance:

We appreciate very much your taking the time to participate in the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Study Public Workshop held 2 February 2000. I am writing in response to your concerns voiced at that meeting and through the return of your Comment Form. My offer made to meet with any group or groups you determine desirable in order to fully apprise the public about the alternatives under consideration and their implications to your area is a standing one, and I am available at your request.

In arriving at the Spring Lake Alternative displayed at the workshop, a tremendous amount of hydraulic analysis was made in order to find the best and most feasible alternative to serve both the Caseyville and State Park Place areas. Dozens of scenarios were investigated, all of which produced less flood damage reduction benefits and more adversely impacted archeologically sensitive land or unique agricultural land. The current alternative does bring significantly more water temporarily into the Harding Watershed but is accompanied by complete channel alterations that would ensure these flows are contained and controlled. These channel improvements would make the Harding system from Highway 157 at Caseyville a levee quality system as opposed to the spoil bank system currently in place. Portions of the new channel could be concrete and the capacity of the system would be dramatically increased. However, under a scenario comparative to the existing channel configuration of a grass-lined trapezoid, the current channel bottom width of between 15-20 feet would go to a bottom width of between 78 and 106 feet. Currently a variety of channel configurations are being costed in order to determine the most efficient system to recommend.

The Spring Lake Alternative as planned would provide 100 year flood protection to the Caseyville and State Park Place areas from interior flooding events. Under this plan waters in excess of the 100 year storm event would spill across the area in between the Canteen Creek and the Harding Ditch thereby eliminating any exposure of Caseyville to higher events which could be experienced by Canteen Creek. In addition to providing flood protection this alternative provides approximately 550 acres of habitat restoration to the St. Clair County area. As this study plan progresses we will be happy to share additional engineering data, all of which will be ultimately

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documented in our draft study plan due out for public comment in the fall.

Under no circumstance would we recommend a plan that would have the potential of endangering an area to an extent greater than that they currently face. Again please call on me at anytime if you have questions or would like me to meet with you or anyone you deem necessary. I can be reached at 314-331-8033 and look forward to hearing from you.

Sincerely,

Deborah L. Roush

Deborah L. Roush
Project Manager

CF:
Mr. Phil Carlton
Superintendent of Streets and Parks
10 West Morris Street
Caseyville, IL 62232

G.7.5 Response Letters - Continued

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO ATTENTION OF:

Planning, Programs, and Project Management Division
Project Management Branch for Flood Control and Support for Others

Ms. Frankie Seaberry
Mayor, City of Centerville
5800 Bond Avenue
Centerville, IL 62207

Dear Ms. Seaberry:

We appreciate very much your taking the time to participate in the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Study Public Workshop held 2 February 2000. I am writing in response to your concerns voiced at that meeting. An on site visit was made to the Centerville area on 16 February 2000 in order to evaluate the localized flooding being experienced there. During this visit specific problem areas were evaluated to determine whether or not a new alternative should be explored under the ongoing study that might provide a potential solution.

The site visit revealed that Centerville has a number of problem areas remaining but has made significant strides in their ongoing effort to provide adequate drainage for the area residents. Additionally, it was confirmed that recent actions to clean existing drainage ditches such as Steiger and Harding, has provided positive results for the area. However, three major problems were noted during the on site visit.

Bluff Avenue by the Dale Behavioral School experiences flash flooding from the adjacent bluff area during interior storm events. There is little available detention on the School side of Bluff Avenue to adequately divert storm water and inadequate drainage to carry it rapidly out of the area. This problem, though, is not new, as it was addressed in a July 1975 report "Interim Drainage Improvement Plan for Central Metro-East Area" by the Department of Transportation Division of Highways as Project No. 5. Several of the projects identified in this report were executed but Project No. 5 project has not.

The 63rd Street area adjacent to Interstate 255 experiences interior flooding due to inadequate drainage leaving the area. The area is currently drained through a series of small ditches and culverts to Harding Ditch. These ditches and culverts are inadequate to carry the flows to the Harding system and an economical solution to increasing drainage from the area to Harding ditch is restricted by Interstate 255. During construction of Interstate 255, the drainage system that was in place at the time was maintained and new drainage was provided to account for any additional runoff from the Interstate itself. This roadway drainage system is working as designed. However, the Interstate serves as a barrier between Harding Ditch and the remaining area. Any undertaking to increase the flow between 63rd Street and Harding Ditch would be very expensive now as a result of

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Interstate 255 and will be a difficult hurdle for this community to overcome without significant outside assistance.

Drainage from north of 51st Street adjacent to Interstate 255 is connected to a ditch, which is tributary to the Blue Waters Ditch system, through a culvert under Interstate 255. The flow line of this pipe is set at an elevation that causes ponding to form before the water depth is sufficient to flow through the culvert and therefore drain the area. As a result low lying areas adjacent to Interstate 255 flood. A fix to this problem under Interstate 255 does not appear to be as economical as providing a ditch flowing south, parallel along 51st Street, to carry this water out of the area and into the Blue Waters Ditch system at a different location. You indicated that the Illinois Department of Transportation knows this is an outstanding problem that they have committed to fix; however, you stated that no indication of when this would occur has been given to your office. This is another area where outside assistance appears to be appropriate.

The type and extent of damages being suffered in each of these areas, when compared to the cost of their elimination, does not appear to meet the benefit to cost ratio they would have to attain in order to become apart of a recommended plan under the current Corps study. Additionally, the area is not situated in a manner that would allow ecosystem restoration techniques to be used to achieve related flood damage reduction goals. Alternatives being investigated further up the Harding Watershed would however protect the Centerville area from experiencing flooding from the existing Harding system.

Again, I appreciate your interest and participation in our planning efforts for the greater Metro-East area. If you have any additional questions please contract me at 314-331-8033.

Sincerely,

Deborah L. Roush

Deborah L. Roush
Project Manager

CF:
Mr. Mel Allison
Office of Water Resources
3215 Executive Park Drive
Springfield, IL 62703

Mr. James L. Easterly
District Engineer, District 8
Illinois Department of Transportation
1102 East port Plaza Drive
Collinsville, Illinois 62234-6198

Ms. Penni S. Livingston
Assistant State's Attorney
St. Clair County Building
#10 Public Squar
Belleville, Illinois 62220

G.7.5 Response Letters - Continued

13 March 2000

Planning, Programs, and Project Management Division
Project Management Branch for Flood Control and Support for Others

Bilbrey and Hylla
8724 Pin Oak Road
Edwardsville, IL 62025

Dear Mr. Hylla:

As a result of comments received prior to and during the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Public Workshop, held on 2 February 2000, a site visit was made to the Arlington area on 9 February, in order to evaluate the localized flooding being experienced there. During this visit the drainage system in place was evaluated to determine whether or not a new alternative should be explored under the ongoing study that might provide a potential solution for this area.

The site visit revealed that the area drains to the Cahokia Canal through two separate channel systems with their own pumping stations. Pumping stations were apparently installed during the initial land development period in order to provide interior drainage to the area. Part of the drainage system includes a flow through connection of the private golf courses lake system. These lakes are ground water fed and therefore fluxuate with the ground water table, making control of their storage capacity dependent on constant pumping during some high water periods when interior rains are being experienced. Pumping station discharge pipes are at the top of the drainage canal thereby providing a method to extricate water at all times into the canal irrespective of other interior events being experienced in the bottoms area. It appears that a gravity drain with flap gate at the southern pump station is no longer operational and would if repaired provide drainage without the necessity of pumping during Cahokia Canal low water periods. Soils comprising the pilot channel area of the subdivision leading to the pump station are sandy and seem to slough easily making maintenance a routine requirement.

The current drainage system if fully maintained and operational, appears to be just adequate for the development that is in place. However, if there are plans for future development that would create additional impervious surfaces within this drainage area, this includes additional new home construction, care needs to be taken to ensure adequate temporary detention and storage is provided with such development that will augment and compliment the existing system. Additional development without this consideration will exceed the capacity of the existing interior drainage system. Any design of future lakes to serve as a drainage control system should be carefully analyzed with consideration given to lining them with clay and filling them artificially in order to provide for more predictable storage.

Since there is an adequate drainage system currently available to the Arlington area and maintenance and operation are the only two concerns regarding its adequacy to handle interior drainage, it is not feasible to search for additional alternatives under the scope of the current study. The development of the Elms Slough alternative will provide some relief to the Arlington area by restricting the possibility of interior drainage from other areas, such as Mitchell Ditch and Long Lake, from reaching Arlington and thereby exacerbating the drainage already being handled by the Arlington system.

Arlington would be well served by a strong association of home owners who could ensure that their future needs are considered as the area continues to develop while also ensuring that already in place systems are properly maintained and operational for the entire areas well being. Questions regarding this information should be directed to the undersigned at 314-331-8033.

Sincerely,

Deborah L. Roush
Project Manager

CF:
Mr. Kevin Sykes
92 Shirlwin
Granite City, IL 62040

Mr. Larry Trucano
Collinsville Township Highway Department
1407 North Bluff Road
Collinsville, IL 62234

Mr. Randy Presswood
#1 Dublin
Pontoon Beach, IL 62040

G.7.5 Response Letters - Continued

16 March 2000

Planning, Programs, and Project Management Division
Project Management Branch for Flood Control and Support for Others

Mr. Tom Jett
Farm Bureau
Belleville, IL 62222

Dear Mr. Jett:

Reference your request for information on the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Project. I am enclosing for your use copies of the alternative maps that were displayed at the Public Meeting conducted on 2 February 2000 in Collinsville, IL.

Please be advised that these are planning documents supporting a reevaluation report and as such should not be construed to represent the final real estate requirements for some future project. Based on your request I would be happy to participate in a discussion with parties whom may have an interest in the project, its scope or intent. Questions regarding this information should be directed to the undersigned at 314-331-8033.

Sincerely,

Deborah L. Roush
Project Manager

G.8 Wedgewood Correspondence

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

20 June 2000

Planning, Programs and Project Management Branch
Project Management Branch for Flood Control and Support for Others

Ms. Deborah Powell
Mayor, City of East St. Louis
301 River Park Drive
East St. Louis Municipal Building
East St. Louis, Illinois 62201-3022

Dear Ms. Powell:

This letter is in response to a request made by you and others for an analysis of the Wedgewood Federal Emergency Management Agency (FEMA) buy out area and its possible incorporation as an alternative into the ongoing East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Study. The purpose of this analysis was to evaluate the possibility of joining hydrologically this buy out area to the flood plain flood pulse in an effort to create a highly functional habitat area which provides needed temporary detention for storm water from the Schoenberger Creek and Harding Ditch.

The Wedgewood buy out area is currently segmented by both Interstate 255 and Summit/Marybell Road which divide it into four quadrants, two quadrants on each side of I-255. Additionally, it sits as the lowest piece of property in the area and currently receives run off from the surrounding residential area. Our investigation indicates that this area receives storm water via a sewer line that use to be evacuated into the Harding Ditch by means of a pump station. This station is no longer in existence. As a result storm water ponds in the area and when Harding Ditch over tops the area is flooded.

At the Wedgewood location the top of the spoil bank for Harding Ditch sits at 422.5 while Summit Road sits at only 413 and the adjacent land is at elevation 412. Water escaping the Harding system reaches the two quadrants on the West side of I-255 by flowing through the Marybell/Summit underpass. A review was made of the feasible use of one quadrant, two quadrants and the four quadrants.

The use of one quadrant was not feasible because of its small size only 16.2 acres. The use of two quadrants could provide for the detention of some positive capacities but less than a 25 year event. The use of two quadrants requires the closing of the Summit/Marybell Road. The closing of this road makes the use of all four quadrants available with water being able to pass between Harding Ditch and I-255 through what is the existing road opening. The use of all four quadrants could provide for the detention of capacities approaching the 100 year event and thereby provide a viable diversion area for Schoenberger Creek while creating a high quality habitat area.

-2-

The purpose of this letter is to inform all interested parties of the possibility that this might be a viable alternative for consideration under the East St. Louis and Vicinity Interior Flood Control Study if there is a willingness on the part of the public and appropriate governmental agencies to close Summit/Marybell Road. We understand that this may be an important thoroughfare, which is not feasible to consider closing. Before coordinating in earnest with the Federal Emergency Management Agency regarding their willingness to permit the construction of substantial berms around this area, we were asked to determine the acceptability of closing the roadway. Additionally, before we expend additional engineering effort to analyze the existing drainage in the area and the potential positive and negative impacts of using this area we need assurance that the closing of this thoroughfare might be considered if the benefits were great enough. Informal discussions with several interested parties leads us to believe that there is a willingness depending on benefits gained to consider the closure of this road. Confirmation is requested as soon as possible in order for the analysis process to proceed on our required study schedule. Any questions regarding this request should be directed to the undersigned at 314-331-8033.

Sincerely,

Deborah L. Roush

Deborah L. Roush
Project Manager

Copy Furnished:
CEMVS-HH (Ron Dieckmann)

Mr. Curtis Galloway
City Manager
301 River Park Drive
East St. Louis Municipal Building
East St. Louis, Illinois 62201-3022

Metro East Sanitary District
ATTN: Mac Warfield
Executive Director
P.O. Box 1366
Granite City, IL 62040

Illinois Department of Natural Resources
Office of Water Resources
ATTN: Mel Allision
3215 Executive Park Drive
Springfield, IL 62703

Natural Resource Conservation
Service, ATTN: John Harryman
2031 Mascoutah Road
Belleville, Illinois 62220

Illinois Department of Transportation
Mr. James L. Easterly
District Engineer, District 8
1102 East port Plaza Drive
Collinsville, Illinois 62234-6198

Mr. Bill Polka
County Engineer
1415 N Belt W
Belleville, IL 62226

Mr. Mike Mitchell
Director, of Building and Zoning
10 Public Square
Belleville, IL 62220

G.8 Wedgewood Correspondence - Continued

Illinois Department of Transportation

Division of Highways / District 8
1102 Eastport Plaza Drive / Collinsville, Illinois / 62234-6198

July 14, 2000

Closure Of Summit Avenue-Marybelle Avenue In East St. Louis In The Vicinity Of Harding Ditch

Ms. Deborah L. Rousch
Project Manager
Department of the Army
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Ms. Rousch:

We are in receipt of a copy of a letter you sent to Mayor Deborah Powell of the city of East St. Louis. We applaud your efforts to improve flood control in East St. Louis and the American Bottoms in general. Your proposal includes the closure of Summit Avenue-Marybelle Avenue near Harding Ditch. Summit Avenue-Marybelle Avenue is under the jurisdiction of the Department in that area. According to our records, the designation of this highway changes from Summit Avenue to the west to Marybelle Avenue to the east between Bre-Mar and 69th Streets (at Nobile St.).

It is unusual to encounter a request for closing a state-maintained highway under these circumstances. Most of our policies involve closing local roads or streets where they intersect an access-controlled highway. In other cases, some local facility may be closed where it intersects a state highway for the safety and convenience of the traveling public. In any case, the process involves coordination with local officials, as well as public involvement.

At this time, we are evaluating the effects of such a closure. The benefits of the flood control must be weighed against the adverse travel costs and effects of emergency access due to the closure. We will formulate our approach to this matter and advise you as soon as possible. Due to the unusual nature of this request, please allow 30 days for our response.

Ms. Deborah L. Rousch
Page 2
July 14, 2000
Ms. Deborah L. Rousch

In the meantime, we would be happy to participate in any informational meetings convened by the Corps. We appreciate your bringing this proposal to our attention and for giving us the opportunity to respond.

Sincerely,

James L. Easterly, P.E.

Mary C. Lamie

Mary C. Lamie
Program Development Engineer

cc: Mayor Deborah Powell
Kent L. Muskopf
Tom Siekmann

MP: S:\Prs\Wp\Summit Avenue-Marybelle Avenue\At Harding Ditch\Road Closure.doc

G.9 Agency Coordination

G.9-1 USFWS

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Marion Illinois Suboffice (ES)
8588 Route 148
Marion, IL 62959
(618) 997-3344

June 5, 2001

Colonel Michael R. Morrow
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

ATTN: Tim George, CEMVS-PM-EA

Dear Colonel Morrow:

This constitutes our Draft Fish and Wildlife Coordination Act Report (DFWCAR) for the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project. This study is being conducted under the authority of Section 206 of the Water Resources Development Act of 1996. This report is prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 stat. 401, as amended; 16 U.S.C. 661 et. seq.); and the Endangered Species Act of 1973, as amended. It is provided in partial fulfillment of the reporting requirements of the Fish and Wildlife Service (Service) under Section 2(b) of the Fish and Wildlife Coordination Act.

This report describes existing fish and wildlife resources in the project area and adjacent areas subject to potential impact by structural development and identifies associated resource problems with emphasis on those related to or likely to be affected (positively or negatively) by water and land resource development. The report describes impacts to fish and wildlife resources associated with the proposed plan. It also includes recommendations to achieve maximum benefits to fish and wildlife resources. If adverse impacts due to construction are identified during future planning, recommendations for mitigation will be provided at that time.

Description of the Project Area

The proposed project site is located in the floodplain of the Mississippi River in an area known as the American Bottoms, including sections of both Madison and St. Clair Counties, Illinois. Situated just downstream from the Mississippi's confluence with the Missouri River and the Illinois River, this area receives most of the drainage from the Upper Mississippi River basin.

Colonel Michael R. Morrow 2.

The American Bottoms is a vast floodplain formed by the erosive force of the historically meandering Mississippi River. As the Mississippi River carved out the American Bottoms, it left behind a maze of meander loops resulting in diverse geomorphic microenvironments, including an array of wetlands. This unique formation resulted in a diverse and natural resource-rich environment. The American Bottoms' position within the Mississippi River flyway has also increased its value by providing a resting and feeding area for countless migrating birds.

This project also includes the bluff and upland areas east of the American Bottoms that drain directly into the floodplain. These uplands are characterized by rapidly growing urban areas and steep intermittent streams with forested corridors. The following streams currently drain into the American Bottoms: Judy's Branch, Burdick's Branch, School House Branch, Big Canteen Creek, Little Canteen Creek, Schoenberger Creek, Powdermill Creek, and six unnamed streams referred to as Bluff 1-6 in this study. Urban development has caused an increase in the amount and velocity of stormwater draining into the American Bottoms. This has resulted in increased flooding and an altered hydrological regime in many wetlands located in the American Bottoms. An indirect effect has been increased erosion, particularly in stream channels, that has also led to degradation of many wetlands in the American Bottoms.

Resource Problems and Opportunities

Today the Mississippi River is isolated from most of this floodplain by a system of levees. Many of the former wetlands have been drained and filled to make way for development. Isolating the river from the floodplain prevents the natural reformation of floodplain wetlands and can inhibit a wetland's ability to provide flood storage, sediment control/erosion reduction, pollution control and wildlife habitat. Destroying wetlands and preventing the formation of new wetlands has led to a dramatic loss of wetland habitats in the American Bottoms. Even though draining of wetlands has been effective, many low spots in the Bottoms area are still prone to flooding. Restoring the habitat and floodplain hydrology to these and other drained and degraded wetlands would have significant environmental benefits including flood storage, groundwater recharge, sediment control/erosion reduction, pollution control, recreation, and valuable wildlife habitat.

The upland stream channels and associated riparian corridors which enter the American Bottoms have also been significantly degraded, largely due to commercial and residential developments. Aquatic habitat for fish has been lost due to channel degradation. Migratory bird habitat has been lost due to erosion and development. The filtering and nutrient cycling capability of these areas have been significantly modified. Controlling erosion, reducing water velocity and discharge and restoration of the riparian corridor will have many significant environmental benefits, including improving fish and wildlife habitat, reducing sedimentation in wetlands and improving water quality.

Colonel Michael R. Morrow 3.

Description of the Project

In 1998 Congress authorized the U.S. Army Corps of Engineers to evaluate an ecosystem approach to resolve flooding problems and ecosystem restoration in East St. Louis and the surrounding areas. To address both ecosystem restoration and reduce flooding the proposed project includes the development and restoration of nine large habitat areas, some of which will provide temporary storage of flood water during heavy rains. Restoration and flood control will also be teamed together in the adjacent upland streams. A combination of dry-detention basins and other stream stabilizing actions are expected to reduce in-stream erosion and damages resulting from swift flood waters. Reducing in-stream erosion and the speed of flood water should result in higher quality stream habitat and decrease the amount of sediment deposited in the floodplain.

Federally Threatened and Endangered Species

In accordance with Section 7(c) of the Endangered Species Act, we have determined that the following federally-listed species may occur in the project areas. No designated critical habitat occurs within the project areas.

The threatened bald eagle (*Haliaeetus leucocephalus*) is listed as breeding and wintering in Madison and St. Clair Counties, Illinois. During the winter, this species feeds on fish in the open water areas including those created by dam tailwaters, the warm water effluents of power plants, municipal and industrial discharges, or in power plant cooling ponds. The more severe the winter, the greater the ice coverage and the more concentrated the eagles become. They roost at night in groups in large trees adjacent to the river in areas that are protected from the harsh winter elements. They perch in large shoreline trees to rest or feed on fish. Bald eagles nest in large trees with an unobstructed view of the surrounding area. There is no critical habitat designated for this species in Illinois. The eagle may not be harassed, harmed, or disturbed when present nor may nest trees be cleared.

The least tern (*Sterna antillarum*) is listed as endangered in Madison County, Illinois. It nests on bare alluvial or dredge spoil islands and sand/gravel bars in or adjacent to rivers, lakes, gravel pits and cooling ponds. It nests in colonies with other least terns and sometimes with the piping plover. This species forages in shallow water areas along the river and in backwater areas, such as, side channels and sloughs. Foraging habitat must be located in close proximity to nesting habitat. It must not be harmed, harassed or disturbed when present.

The gray bat (*Myotis grisescens*) is listed as endangered in Madison County, Illinois, where it inhabits caves during both summer and winter. This species forages over rivers and reservoirs adjacent to forests. A search for this species should be made prior to any cave impacting activities.

Colonel Michael R. Morrow 4.

The endangered Indiana bat (*Myotis sodalis*) is listed as occurring in Madison and St. Clair Counties, Illinois. Potential habitat for this species occurs statewide, therefore, Indiana bats are considered to potentially occur in any area with forested habitat. Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula include caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. Females form nursery colonies under the loose bark of trees (dead or alive) and/or cavities, where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. A single colony may utilize a number of roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near the winter hibernacula during the summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females. The species or size of trees does not appear to influence whether Indiana bats utilize a tree for roosting provided the appropriate bark structure is present. However, the use of a particular tree does appear to be influenced by weather conditions such as temperature and precipitation. During the summer, the Indiana bat frequents the corridors of small streams with well-developed riparian woods as well as mature upland forests. It forages for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of crop lands, along wooded fence rows, and over farm ponds and in pastures. It has been shown that the foraging range for the bats varies by season, age, and sex and ranges up to 81 acres (33 ha). To avoid impacting this species, tree clearing activities should not occur during the period of April 1 to September 30. If a proposed action occurs within a 5-mile radius of a winter hibernacula, tree clearing should be prohibited from April 1 to November 15. If it is necessary to clear trees during this time frame, mist net surveys may be necessary to determine if Indiana bats are present. A search for this species should be made prior to any cave impacting activities.

The endangered pallid sturgeon (*Scaphirhynchus albus*) is found in the Mississippi River downstream of the Melvin Price Locks and Dam. Pallid sturgeon are adapted to large rivers with extensive micro-habitat diversity, turbid water, braided channels, irregular flows and flood cycles. Little is known of its micro-habitat preferences, however, it is suspected that sand/gravel bars and the mouths of major tributaries may be utilized for spawning. This species feeds on aquatic invertebrates and small fish.

The decurrent false aster (*Boltonia decurrens*) is listed as threatened in Madison and St. Clair Counties, Illinois. It is considered to potentially occur in any county bordering the Illinois River and the counties bordering the Mississippi River between the mouths of the Missouri River and the Ohio River. It occupies disturbed alluvial soils in the floodplains of these rivers.

The Illinois cave amphipod (*Gammarus acherondytes*) is listed as endangered in St. Clair County, Illinois. It is currently known to occur in only three cave streams of the Illinois sinkhole plain in southwestern Illinois. The contamination of groundwater is probably the greatest threat to this species.

In accordance with Section 7(c), the Federal agency responsible for actions authorized, funded or carried out in furtherance of a construction project that significantly affects the quality of the human environment is required to conduct a biological assessment. The purpose of the assessment is to identify listed or proposed species likely to be adversely affected by its action and to assist the Federal agency in making a decision as to whether it should initiate consultation. The biological assessment is to be completed within 180 days of initiation and before contracts are entered into or construction begun.

When conducting a biological assessment, the following steps should be taken:

1. Conduct an on-site inspection of the area affected by the proposed activity or program. This may include a detailed survey to determine if species are present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of populations.

2. Interview recognized experts on the species at issue, including those within the Fish and Wildlife Service, State conservation department, universities and others who may have data not yet found in scientific literature.

3. Review literature and other scientific data to determine the species' distribution, habitat needs and other biological requirements.

4. Review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration for the cumulative effects of the proposal on the species and its habitat.

5. Analyze alternative actions that may provide conservation measures.

Section 7(d) of the Endangered Species Act underscores the requirement that the Federal agency and permit or license applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which in effect would deny the formulation or implementation of reasonable alternatives regarding their actions on any endangered or threatened species.

State Threatened and Endangered Species

When reviewing land and water development projects the Service solicits information from state natural resource agencies regarding state-listed threatened and endangered species that may occur in a project area. Protecting state-listed species is an important step in ensuring they do not become federally-listed. For more information regarding the below listed species please contact the Illinois Department of Natural Resources.

Colonel Michael R. Morrow 6.

This proposed project includes work in and near floodplain wetlands. Several state threatened or endangered migratory birds rely heavily on such habitats. State-listed migratory birds that may be found in the project area include the Pied-billed Grebe, Common Moorhen, Least Bittern, Snowy Egret, Little Blue Heron, Black-Crowned Night Heron, and Yellow-Crowned Night Heron. Not only should the site be surveyed for the presence of these birds, but also for nests and/or rookeries.

Habitat Evaluation Analysis: Methods

Habitats in each of the nine habitat areas, including their associated upland stream work, were analyzed using Habitat Evaluation Procedures (HEP). HEP analyses produce a rating of habitat quality for different habitat types based on the habitats' suitability for a suite of selected wildlife species. This rating is referred to as a Habitat Suitability Index (HSI). The HSI, a value ranging from 0.1 to 1.0, measures the existing, future without project, and future with project habitat conditions. This value, when multiplied by the acres of each habitat in the project area, provides a measure of available habitat quality and quantity known as habitat units. These habitat units are then converted to Average Annual Habitat Units (AAHU's) for each species evaluated to reflect the expected habitat conditions over a fifty-year project life. This analysis was conducted by an interagency team with members representing the Corps of Engineers, Illinois Department of Natural Resources, U.S. Environmental Protection Agency, Natural Resource Conservation Service, and the Service.

Wildlife species selected to calculate HSI values include: black crappie, Eastern meadowlark, fox squirrel, great blue heron, marsh wren, mink, slider turtle, white crappie, and wood duck. This suite of species was selected based on their different habitat needs. It is necessary to have one or more species to represent each habitat type located in the study area. Relative Value Indices (RVI) were also assigned to each species. RVI's are used to express value judgments made during a resource planning effort. RVI's are based on the abundance or scarcity, vulnerability, replaceability, aesthetic value, and management efforts afforded to each species and its associated habitat. The AAHU's for each species is multiplied by its assigned RVI to reflect the above listed value judgments.

Baseline data was collected from the various habitat areas to determine the existing habitat quantity and quality, or habitat units, of each area. In order to predict the future without project conditions of the nine habitat areas, various assumptions were made regarding development rates over the next fifty years. AAHU's were then calculated to reflect the without project habitat conditions over the next fifty years. To predict the future with project conditions the interagency team of biologists made predictions on how different project alternatives in each habitat area would affect conditions over the next fifty years.

Table 1

Species	Relative Value Index (RVI)
black crappie	4.00
Eastern meadowlark	4.00
fox squirrel	0.50
great blue heron	0.75
marsh wren	0.75
mink	1.00
slider turtle	1.00

Each of the nine habitat areas had several different project alternatives evaluated. AAHU's were then calculated for each of the different project alternatives in each of the habitat areas. Alternatives within each habitat area were then compared to determine which one produced the greatest number of AAHU's, or the greatest quantity and quality of habitats. In five out of the nine habitat areas the alternative that produced the greatest number of AAHU's was selected as the preferred alternative. Selection of preferred alternatives for the remaining four habitat areas was based on feasibility of alternatives, new information, and cost. Each of the habitat areas and the rationale used to select preferred alternatives are described in the "Habitat Evaluation Analysis: Results" section of this report.

Habitat Evaluation Analysis: Results

The Habitat Evaluation Analysis conducted by the Waterways Experiment Station, with input from the interagency biology team, predicted that habitat quality and quantity will be significantly increased in all nine habitat areas by the proposed project. Results of this analysis are presented in Table 2 and Charts 1-10 of this section. Results for each of the nine habitat areas are broken out by species to demonstrate the low occurrence of habitat loss for any individual species. The charts reveal a consistent effort to maintain and enhance the existing or without project habitat types represented by the nine different species.

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Table 2: Net AAHU's With Project

Site Name	AAHU's Without Project	AAHU's With Project	Net AAHU's
Cahokia Mounds	802.08	1651.3	849.22
Judy's/Burdick Branches	51.96	1203.92	1151.96
Elm Slough	341.69	1086.44	744.75
Dobrey Slough	8.66	94.56	85.9
Mullens Slough	490.91	1365.76	874.85
Old Cahokia Creek	121.63	323.49	201.86
Brushy Lake	471.02	1393.69	922.67
Spring Lake	1388.86	3954.34	2565.48
Wedgewood	134.15	419.48	285.33

Colonel Michael R. Morrow 9.

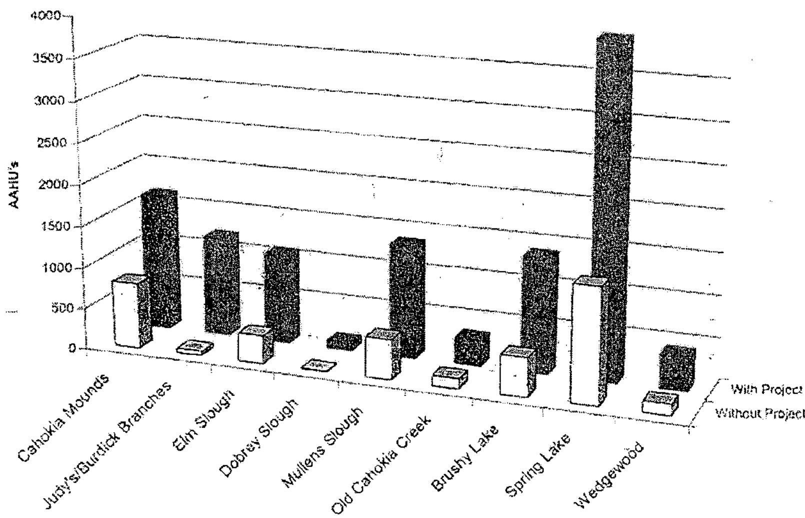

Chart 1: All Habitat Areas

Chart 1 shows the total AAHU's (all species added together) for future without and future with the project over a fifty-year project life at each of the nine habitat areas. Habitat Evaluation Analysis predicted that with the proposed project actions the quality and quantity of habitats in each of the nine habitat areas will be increased. For all habitat areas with alternatives that included upland stream work, an alternative supporting the upland work was selected as the preferred alternative.

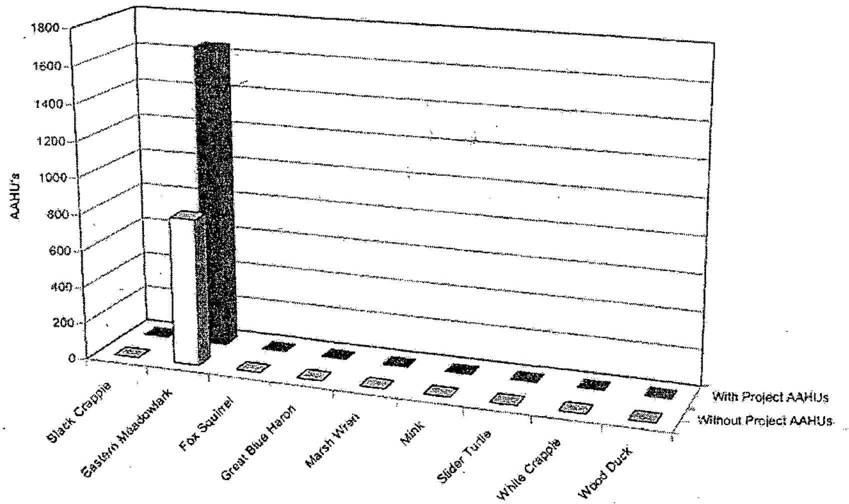

Chart 2:. Cahokia Mounds

Cahokia Mounds habitat area is located on the Cahokia Mounds State Historic Site, in the floodplain of Madison and St. Clair Counties. This habitat area is not directly connected to any upland streams so there is no associated upland work. The selected alternative will, over a 10-year time period, restore a total of 525 acres of high quality tall grass prairie in areas currently used for hay production. The alternative that produced the greatest number of AAHU's would have completed the conversion from hay to prairie in just a 5-year period. A 10-year plan was selected due to seed availability and cost. The AAHU chart indicates this area will provide quality habitat for prairie dwelling species like the Eastern meadowlark.

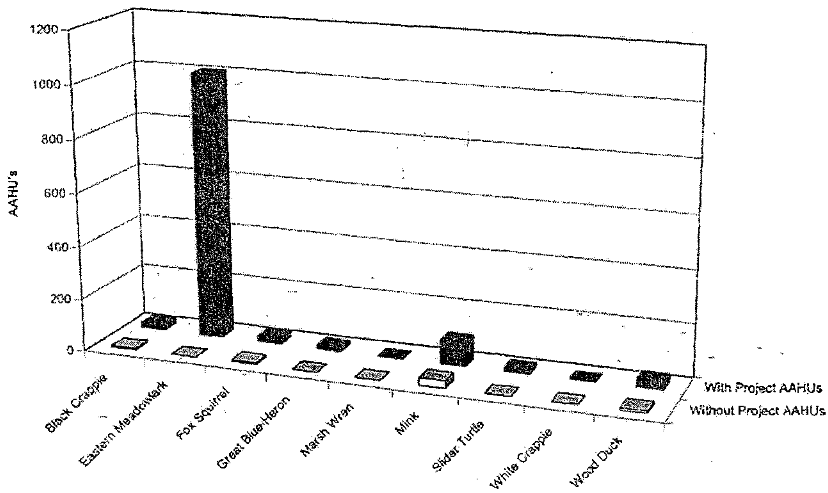

Chart 3: Judy's/Burdick's Branches

This habitat area is in Madison County at the confluence of Judy's Branch, Burdick's Branch, and the Cahokia Canal. The watersheds of Judy's Branch, Burdick's Branch, and a portion of the "Bluff 1" tributary comprise the upland stream work area. The selected alternative produced the greatest number of AAHU's and will result in a 350-acre habitat area, including wet prairie habitats and a restored stream.

Colonel Michael R. Morrow 12.

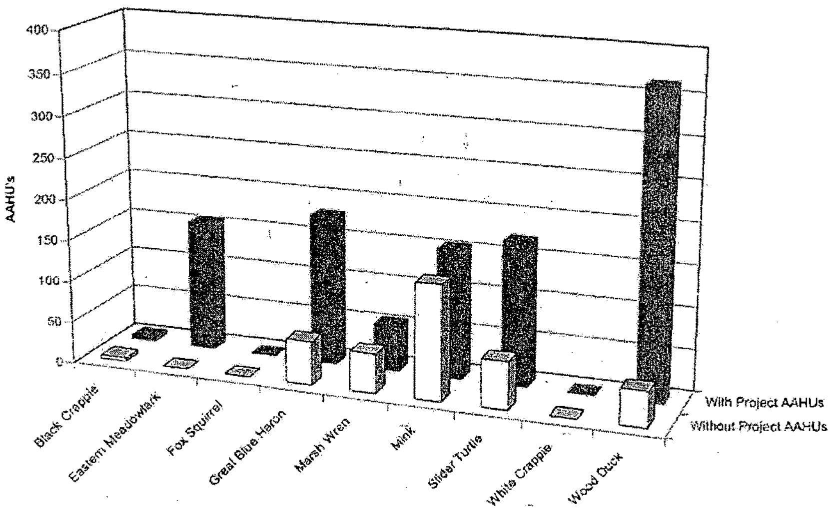

Chart 4: Elm Slough

Elm Slough is northwest of Horseshoe Lake in Madison County. This habitat area is not directly connected to any upland streams so there is no associated upland work. The selected alternative produced the greatest number of AAHU's and will result in a 670-acre habitat area including forested wetlands, scrub-shurb wetlands, and prairie. The AAHU chart indicates this area will provide quality habitats for both wetland and prairie dependent species.

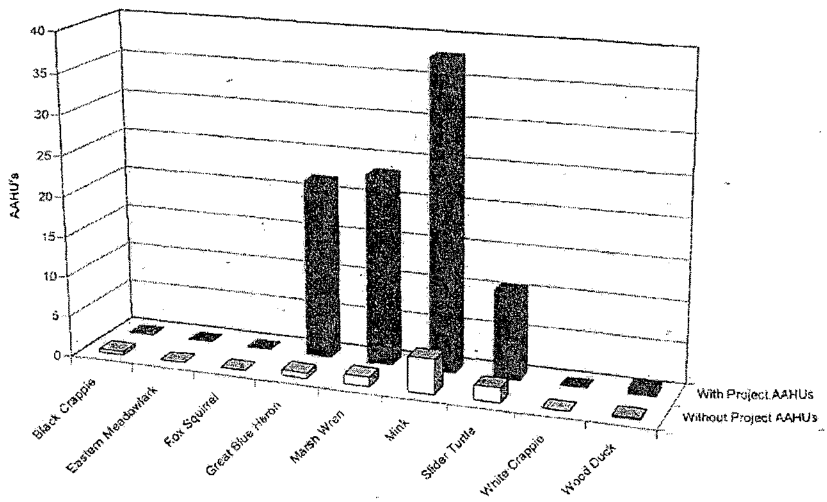

Chart 57 Dobrey Slough

Dobrey Slough is north of Horseshoe Lake in Madison County. This habitat area is not directly connected to any upland streams so there is no associated upland work. The selected alternative produced only two AAHU's less than the highest producing alternative yet was significantly less expensive. This alternative will result in the restoration of herbaceous wetlands and a 75-meter wide forested corridor along the existing slough. The AAHU chart indicates this alternative will greatly increase the quality and quantity of habitat for wetland dependent species.

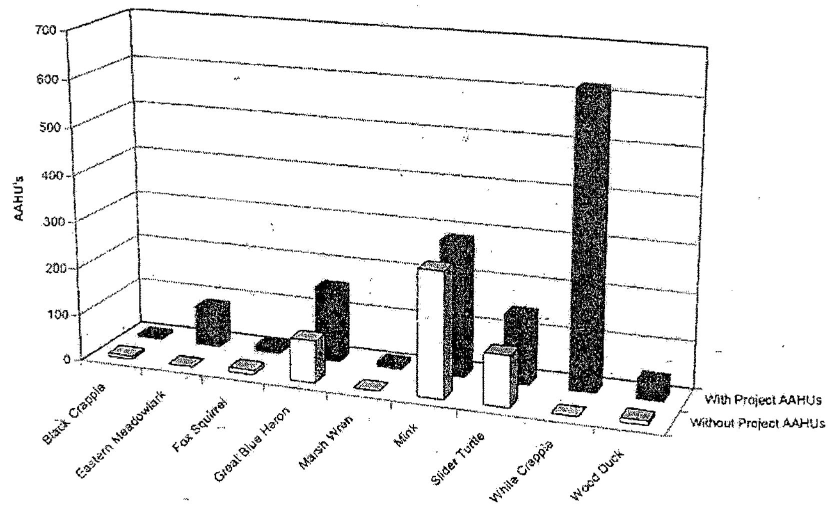

Chart 6: Mullens Slough

Mullens Slough is in the southeast corner of the American Bottoms, near Centreville. The Powdermill and "Bluff 6" watersheds comprise the upland stream work area. The selected alternative produced the greatest number of AAHU's and will result in a 310-acre total habitat area, this includes the existing 205-acre Mullens Slough. In addition to increasing the size of the area, habitat quality will be improved. The AAHU chart indicates this alternative will greatly increase quality open water habitat for species like the white crappie.

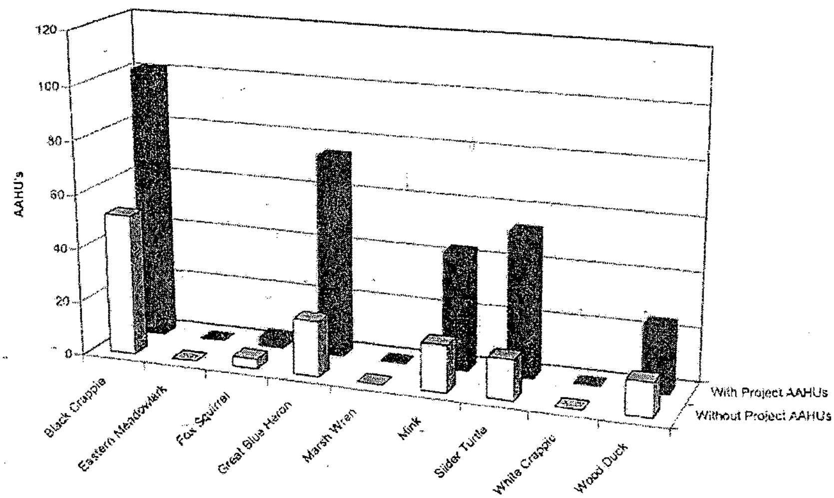

Chart 7: Old Cahokia Creek

Old Cahokia Creek is in Madison County and consists of remnants of the historic Cahokia Creek and its adjacent floodplain. The "Bluff 1" watershed comprises the upland stream work area. The alternative that produced the greatest number of AAHU's was not selected due to the need to install a pumping station to bring water into the floodplain from the other side of the levee. It was decided this alternative was not viable due to public opinion regarding pumping water back over the levee and the added cost of pumping. The selected alternative does not require any mechanical pumping and will result in 2.9 miles of channel restoration with a 100-meter wide forested corridor. The AAHU chart indicates this alternative will produce quality stream habitat for species like the black crappie, slider turtle, mink, and great blue heron.

Colonel Michael R. Morrow 16.

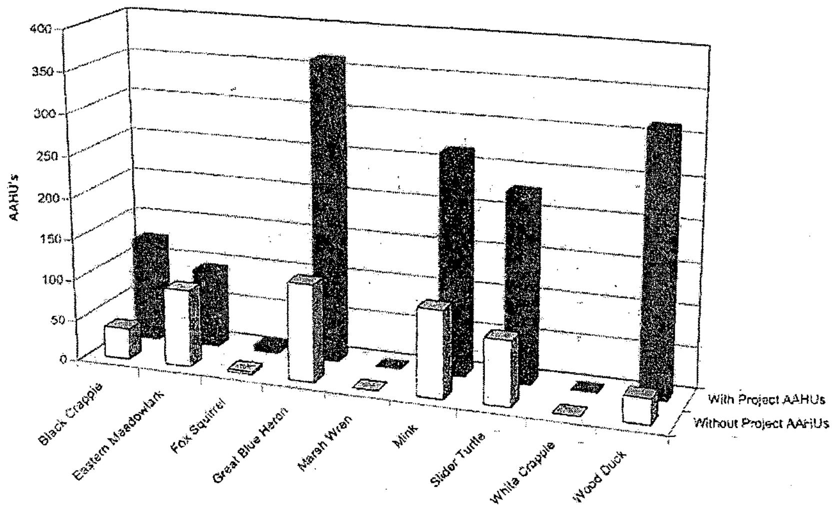

Chart 8: Brushy Lake

Brushy Lake is in Madison County, east of Horseshoe Lake. The Schoolhouse Branch and Snyder Ditch watersheds comprise the upland stream work area. The selected alternative produced the greatest amount of AAHU's and will result in a 710-acre habitat area including a restored channel and forested wetlands. The AAHU chart indicates this alternative will produce quality forested wetland habitat and stream habitats for a variety of species.

Colonel Michael R. Morrow 17.

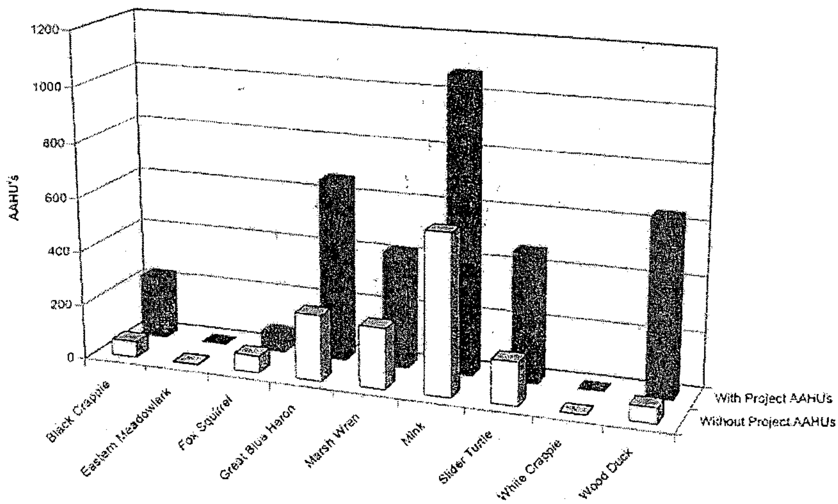

Chart 9: Spring Lake

The Spring Lake habitat area is located in both Madison and St. Clair Counties and is made of three separate areas: Cell One, St. Clair Farms, and Indian Lake. The watersheds of Canteen Creek and Little Canteen Creek comprise the upland stream work area. The alternative that produced the greatest number of AAHU's was not selected due to new information regarding the predicted effectiveness of the upland stream work in reducing sedimentation. Upon further investigation it was determined that work in the uplands will not eliminate all sediment transport to the bottoms. In light of this, an alternative was selected that would allow for accumulating sediment to be periodically cleaned out of the channel in the habitat area. The selected alternative will result in 370 acres in Cell 1, 180 acres in St. Clair Farms, and 620 acres in Indian Lake. These three areas will be predominantly herbaceous and forested wetlands. The AAHU chart indicates this alternative will produce quality habitats for all species associated with marshes.

Colonel Michael R. Morrow 18.

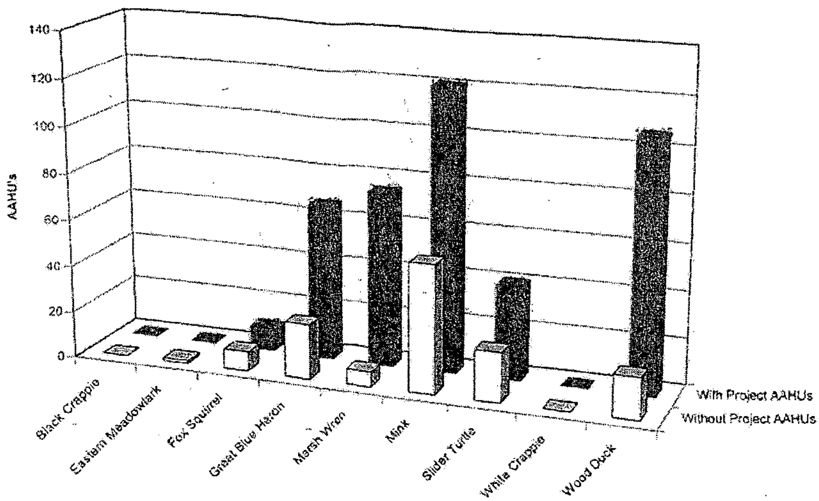

Chart 10: Wedgewood

Wedgewood is in East St. Louis, St. Clair County. The watershed of Schoenberger Creek comprises the upland stream work area. The selected alternative produced the greatest number of AAHU's and will result in a large herbaceous wetland restoration area.

Colonel Michael R. Morrow 19.

Fish and Wildlife Impacts and Mitigation

After engineering plans for each habitat area and the upland stream work are completed, the number of acres and types of any wetlands that may be negatively impacted should be calculated. If wetlands or other important habitat areas are adversely affected, a mitigation plan should then be developed to address these impacts. Emergent wetlands should be replaced at a 1.5 to 1.0 ratio and forested wetlands should be replaced at a minimum of 2.0 to 1.0 ratio. Emergent wetlands may be allowed to naturally regenerate. Native tree species, including hard mast producing trees, should be planted to compensate for impacts to bottomland forests.

Surveys for the decurrent false aster (*Boltonia decurrens*) should be conducted prior to construction activities. If impacted by the construction, this species should be reestablished in suitable wetland sites.

Conclusions

The proposed project represents an ambitious effort by various agencies to address resource concerns in the American Bottoms. As proposed this project will result in significant habitat gains for a variety of species. Restoration of wetlands will not only provide valuable wildlife habitat, but it will improve flood storage, groundwater recharge, sediment control/erosion reduction, and pollution control. The Service fully supports measures to reduce upland stream erosion and degradation. The benefits of these measures to fish and wildlife resources is difficult to measure with existing evaluation techniques. Overall, project features in the upland areas will improve water quality and ensure protection of the riparian corridor. The Service applauds the Corps and project sponsors for selecting alternatives that truly reflect an ecosystem restoration initiative.

Recommendations

Results from the Habitat Evaluation Analysis predict the proposed plans for restoration of the nine habitat areas in the floodplain will be beneficial to a wide variety of wildlife. However, plans for the associated upland stream work are not as fully developed as the floodplain habitat areas. Successful development of high quality habitats in several of the habitat areas is dependent on reduction of sediment loads coming from the upland streams. A variety of stream restoration/stabilization measures should be evaluated and implemented to reduce sediment transport into the American Bottoms. Such efforts should not only utilize dry detention basins, where appropriate, but include bioengineering techniques to reduce stream bank erosion.

The Service also recommends establishing the decurrent false aster (*Boltonia decurrens*) in all appropriate wet prairie sites.

Thank you for the opportunity to provide this Draft Fish and Wildlife Coordination Act Report. Please contact this office should you have any questions or require additional information.

Sincerely,

Joyce A. Collins
Assistant Field Supervisor

cc: IDNR (Stuewe, Malone, Messinger, Tecic)
NRCS (Harryman, Starr)
USEPA (White)

G.9.2 Agriculture

Illinois Department of Agriculture George H. Ryan, Governor • Joe Hampton, Director

Bureau of Land and Water Resources

State Fairgrounds • P.O. Box 19281 • Springfield, IL 62794-9281 • 217/782-6297 • TDD 217/524-6858 • Fax 217/557-0993

December 17, 2001

Mr. Tim George
U.S. Army Corps of Engineers, St. Louis District
CEMVS-PD-A
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: East St. Louis Ecosystem Restoration
St. Clair and Madison Counties, IL
USDA NRCS Form AD-1006
US Army Corps of Engineers, St. Louis District Funds

Dear Mr. George:

In response to your request for completion of the USDA NRCS Form AD-1006 for the above referenced project, enclosed are two copies of the completed form. Also enclosed is a copy of the revised Illinois LESA System for your future reference.

The Illinois Department of Agriculture (IDA) looks forward to providing comments for the project's draft environmental impact statement to determine its potential impacts to agricultural land and its compliance with the Illinois Farmland Preservation Act (505 ILCS 75/1 et seq.). Our analysis also relates to the federal Farmland Protection Policy Act (7 USC 4201 et seq.) that specifies federal actions affecting farmland conversion shall be consistent with state and local programs to protect farmland.

Sincerely,

Steve Frank, Chief
Bureau of Land and Water Resources

SF:TS

Enclosures-3

cc: Director Joe Hampton, IDA
Joan Messina, IDA
Mike Williams, IDA
Anita Kratochvil, IDA
John Herath, IDA
Warren Goetsch, IDA

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

U.S. Department of Agriculture (36)

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request July 11, 2001
Name Of Project East St. Louis Ecosystem Restoration	Federal Agency Involved St. Louis Dist., US Army COE
Proposed Land Use Fish & Wildlife Habitat	County And State Madison & St. Clair, Illinois
PART II *(To be completed by SCS)*	Date Request Received By SCS 7-19-01

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form).* Yes ☒ No ☐		Acres Irrigated	Average Farm Size 372
Major Crop(s) Corn, Soybeans, Wheat, Hay	Farmable Land In Govt. Jurisdiction Acres: 29,633,500 % 97		Amount Of Farmland As Defined in FPPA Acres: 27,695,900 % 91
Name Of Land Evaluation System Used Illinois	Name Of Local Site Assessment System Statewide		Date Land Evaluation Returned By SCS 7-25-01

PART III *(To be completed by Federal Agency)*		Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly		3,874.			
B. Total Acres To Be Converted Indirectly		27.			
C. Total Acres In Site		3,901.			
PART IV *(To be completed by SCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		2,380.5			
B. Total Acres Statewide And Local Important Farmland		72.5			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		0.014			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		11.8			
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*		51.0			
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b))*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government		(See attached ILLINOIS LESA			
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services		Site Assessment factors)			
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS *200	~~160~~				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	51			
Total Site Assessment *(From Part VI above or a local site assessment)* *200	~~160~~	70			
TOTAL POINTS *(Total of above 2 lines)* *300	~~260~~	121			

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☒

Reason For Selection:

*When using the Illinois Site Assesment Factors, 200 Points assigned to the Site Assessment section of the LESA System for a maximum score of 300 Points.

(See Instructions on reverse side) Form AD-1006 (10-83)

East St. Louis Ecosystem Restoration
St. Clair and Madison Counties, Illinois
U.S. Army Corps of Engineers, St. Louis District

PART VI-A Illinois Site Assessment Criteria	Maximum Points	Site A
1. Land Use on the Site	20	10
2. Adjacent Land Use	20	12
3. General Character of Area Within 1½ Miles of Site	20	5
4. Distance to City	20	8
5. Zoned Use of Proposed Site	20	10
6. Zoned Use of Land Adjacent to Proposed Site	20	10
7. Planned Land Use of Proposed Site	20	0
8. Compatibility of Proposed Use with Surrounding Land Uses	20	0
9. Alternative Sites Proposed on Less Productive Land	10	0
10. Availability of Central Water System	10	4
11. Availability of Central Waste Disposal System (Sewer)	10	6
12. Transportation	10	5
TOTAL SITE ASSESSMENT POINTS	**200**	**70**

PART VII		
Relative Value of Farmland	100	51
Total Site Assessment	200	70
TOTAL ILLINOIS LESA POINTS	**300**	**121**

121301
ts

U.S. Department of Agriculture

(36)

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request July 11, 2001
Name Of Project East St. Louis Ecosystem Restoration	Federal Agency Involved St. Louis Dist., US Army COE
Proposed Land Use Fish & Wildlife Habitat	County And State Madison & St. Clair, Illinois
PART II *(To be completed by SCS)*	Date Request Received By SCS 7-19-01

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply — do not complete additional parts of this form).* Yes [X] No [ ]		Acres Irrigated	Average Farm Size 372
Major Crop(s) Corn, Soybeans, Wheat, Hay	Farmable Land In Govt. Jurisdiction Acres: 29,633,500 % 97	Amount Of Farmland As Defined in FPPA Acres: 27,695,900 % 91	
Name Of Land Evaluation System Used Illinois	Name Of Local Site Assessment System Statewide	Date Land Evaluation Returned By SCS 7-25-01	

	Maximum Points	Site A	Site B	Site C	Site D
PART III *(To be completed by Federal Agency)*		Alternative Site Rating			
A. Total Acres To Be Converted Directly		3,874.			
B. Total Acres To Be Converted Indirectly		27.			
C. Total Acres In Site		3,901.			
PART IV *(To be completed by SCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		2,380.5			
B. Total Acres Statewide And Local Important Farmland		72.5			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		0.014			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		11.8			
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*		51.0			
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b))*					
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government		(See attached ILLINOIS LESA			
5. Distance From Urban Builtup Area		Site Assessment factors)			
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS *200	~~160~~				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	51			
Total Site Assessment *(From Part VI above or a local site assessment)* *200	~~160~~	70			
TOTAL POINTS *(Total of above 2 lines)* *300	~~260~~	121			

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes [ ] No [X]

Reason For Selection:

*When using the Illinois Site Assesement Factors, 200 Points assigned to the Site Assessmen section of the LESA System for a maximum score of 300 Points.

(See Instructions on reverse side) Form AD-1006 (10-8

G.10 Draft Report Review Comments

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MAY 1 6 2003

REPLY TO THE ATTENTION OF:

B-19J

Deborah Roush
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

Re: "General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement (DPEIS)" for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project (February 2003), EIS #030072.

Dear Ms. Roush:

U.S. EPA Region 5 is pleased to have been involved with this project. Therefore, we are also pleased to provide comments on the re-evaluation report and draft programmatic environmental impact statement under our authorities contained in the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. We have given the DPEIS an LO (Lack of Objections) rating. The following review identifies a few environmental issues but the DPEIS explains how such issues are to be appropriately addressed in the subsequent NEPA documentation for components of the overall project that will be designed in detail and implemented individually.

<u>Project Background</u>

The study area is approximately 106,000 acres of bottomland (historical floodplain), bluff, and upland watershed areas in Madison and St. Clair Counties in Illinois. The area is within the Metro East/St. Louis area bordering the east bank of the Mississippi River. The area originally contained a rich diversity of natural communities that have been largely replaced or degraded by a diverse array of urban and rural land uses in the bottomland and above the bluffs. Remnant natural areas remain, but are of generally low quality. Three endangered and threatened species are known to exist within the study area. The area is also rich in archaeological resources, the most notable of which is Cahokia Mounds National Historic Site.

While the American Bottoms, as the lowland part of the study area is called, is protected from Mississippi flooding via a levee, the area has been subject to "interior" flooding from upland runoff. Such flooding is an economic burden in the minority and lower income communities in the Bottoms area. Sediment from upland areas that is carried down the bluffs degrades water quality and remaining habitat areas, and in addition, reduces flood storage capacity in the Bottoms' floodplain.

Project Overview

The U.S. Army Corps of Engineers (COE), working in collaboration with the National Resources Conservation Service (NRCS), U.S. Environmental Protection Agency (EPA), U.S. Fish & Wildlife Service (FWS), Illinois Department of Natural Resources (IDNR), other state and federal agencies and local governments, has developed a complex and innovative approach to addressing the flooding and ecosystem degradation problems in the study area. The project is intended to benefit area ecosystems, the area's communities, and the local economy – the three "legs" of the stool of sustainable development. The report under review is a re-evaluation of the previously authorized project for the area, a new problem-solving plan and program, and a draft environmental impact statement (DEIS) for the Recommended Plan.

The planning objectives for the project include: 1) expand natural areas; 2) restore the flood pulse; 3)maintain habitat quality; 4) improve water quality; 5) reduce erosion; 6) improve upland streams; 7) restore floodplain streams; and 8) address the incidental social objectives of reducing flood damages, enhancing outdoor recreation, and protecting cultural resources.

The Recommended Plan is based upon complex and thorough analyses of potential restoration sites located in nine Action Areas. The plan provides for the establishment of habitat areas in the floodplain affecting 4,593 acres, as well as the construction of 155 dry sediment detention basins in upland areas. The Plan is intended to create or improve 1,705 acres of forest habitat, 1,111 acres of prairie habitat, 948 acres of marsh and shrub swamp habitat, 460 acres of lake habitat, and 410 acres of upland forest habitat. It will also involve floodplain stream restoration (10.4 miles), placement of bird houses, perches, overwintering holes and shoreline plantings, and the construction of earthen embankments to contain floodwaters around the habitat areas, and hydraulic control devices.

The dry sediment basins will contain sediment from the upland areas. In addition, the stream stabilization and restoration components are planned to reduce sediment transfer into the lower floodplain area and habitat restoration areas. Stormwater, with reduced sediment loads, will thus be used to substitute for historic riverine overflow from the Mississippi which provided the flood pulses which sustained the floodplain habitats. The total project cost is estimated to be $211,887,000. The non-federal sponsors for the construction project will be Madison and St. Clair Counties.

A pilot study of the plan for one Action Area (Judy's-Burdicks Branch) is being conducted, and adjustments will be made to the plan components as indicated by the pilot study. No engineering plans have been prepared for any of the Action Areas. Prior to implementation of any approved project, follow-up NEPA compliance documents will be prepared either as a Supplement to the DPEIS or as a series of Environmental Assessments to cover groups of Action Areas. Public involvement will be included during the preparation of future NEPA documentation.

Comments

Habitat Restoration:

The expertise provided through the project collaborators has resulted in analyses of existing conditions, future "without project" conditions, problems and opportunities. Its plan formulation and evaluation components are especially strong with respect to the habitat restoration elements. Habitat restoration in the project area is particularly challenging in view of the complex hydrologic and geologic conditions, and existing and future development. The goal of aiding habitat restoration by simulating pre-development flood pulses in the floodplain is an innovative and experimental approach, which, if proven effective, can be an important model for restoration strategies in many other similar areas along our major rivers.

The success of the habitat restoration is heavily dependent upon effective monitoring and maintenance, especially within the first five years of construction and revegetation. The effectiveness of sediment and erosion control will have a major impact on the viability of the restoration program, so the pilot study and resulting refined plans need to address this concern.
1-1 The detailed plans for the individual Action Areas should explain the habitat monitoring and maintenance approach in each area, indicating what will be done, by whom and at what cost.

Iterative Approach:

The development of a draft programmatic environmental impact statement and the adaptive assessment approach for the project implementation constitute a good strategy for this innovative project. Having the ability to test the effectiveness of the components of the project and make design and other changes will help the project sponsors and collaborators guarantee the ultimate success of the overall initiative. The Judy's-Burdick pilot study underway is an excellent example. The Preconstruction Engineering and Design (PED) work for individual action areas and the following of the NEPA process for the individual plans or clusters of plans are also important.

The overall approach may prove to be a valuable model for addressing similar environmental degradation and flooding problems associated with other rivers. Therefore a careful and ongoing evaluation of the planning and design process, project implementation and project maintenance
1-2 has importance beyond this particular initiative. The promulgation of data and other information

about this project as it proceeds is therefore extremely important and some discussion of how this will occur would be a valuable addition to the draft EIS.

Stormwater and Sediment Management:

The overall project has been designed conservatively. The upland sediment basins are expected
to perform over the 50-year life of the project, assuming development of most of the agricultural
tracts in the upland areas and without assumptions regarding extensive voluntary sediment
controls or rigorous regulatory erosion and sediment control in the upper areas of the affected
1-3 watersheds. This may have been a factor in fairly high project costs for the federal government
and the local sponsors for construction and maintenance.

It is possible that, given the build-out of all or most of the agricultural lands in the upper parts of
the watershed, unmanaged stormwater and excessive sediment loads could reduce the
effectiveness of the project or require additional facilities and maintenance activities, such as the
removal of sediment from the lower level basins, the construction of basins to trap sediment
before water enters habitat restoration areas, repairs of stream channels, and the construction of
1-4 larger upland dry sediment basins. It would therefore be wise for all the local government
partners to have adopted, prior to construction, state-of-the-art stormwater management
regulations, as well as soil erosion and sediment control regulations. Part of this effort would be
achieved through effective compliance with the requirements of Phase II of the NPDES program
under the Federal Clean Water Act. This should be a standard of local government participation
in the project as it moves forward.

As detailed engineering and design for the individual Action Areas are undertaken, the role of
regulation of new development with respect to stormwater and soil erosion and sediment control
1-5 (including compliance with NPDES Phase II) should be evaluated and reported in NEPA
documentation for these areas. In addition, the role of voluntary participation in installing
appropriate best management practices should also be addressed. The Judy's-Burdick Branch
pilot project should be looked to as one way of assessing the effectiveness of the conservative
approach being considered, as compared with additional stormwater and sediment controls
applied via regulation and voluntary means in the upland areas.

Natural Landscaping, Bio-Technical Erosion Control, and Bank Stabilization:

Use of native vegetation and bio-technical measures for managing stormwater and stabilizing
1-6 banks of channels and streams should be used wherever practicable given the potential habitat,
water quality, and maintenance benefits. Use of such techniques may be infeasible in areas with
high flows and velocities, however. The development of the detailed engineering and design for
streams and channels should maximize the use of these techniques wherever they will function
properly. The individual NEPA documentation on plans for Action Areas should assess this
option (environmental benefits, installation costs, maintenance costs, etc.) and make appropriate
recommendations in the final plans for the Action Areas.

Summary

The proposed project has unusual strength because of the multi-agency, multi-disciplinary approach take from the beginning. The project will be looked to as a pilot for solving similar problems in other areas along major rivers where habitat restoration, flood control, and erosion and sediment control need to be addressed simultaneously. U.S. EPA looks forward to reviewing subsequent detailed plans for the various Action Areas as they are formulated based upon initial experience with the techniques being used in the pilot area.

Sincerely,

Kenneth A. Westlake
Chief, Environmental Planning and Evaluation Branch

SUMMARY OF RATING DEFINITIONS AND FOLLOWUP ACTIONS*

ENVIRONMENTAL IMPACT OF THE ACTION

LO——Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC—Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO——Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU——Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

ADEQUACY OF THE IMPACT STATEMENT

Category 1——Adequate

EPA believes the draft EIS adequately sets forth the environmental impart(s) of the preferred alternative and those of the alternatives reasonably avail able to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2—Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3—Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

**From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment.*

1. United States Environmental Protection Agency, Region 5

1-1. The monitoring and maintenance approach would be addressed in each action area's follow-on Engineering Design Report. As discussed in Section 9 of the Draft Report, the analysis of the recommended plan in light of existing conditions at the time of implementation would be critical to ensuring that project integrity is maintained.

1-2. The goal would be for each Engineering Design Report to be placed on the District web site in order to ensure the widest dissemination and coordination of information. In this way, data gathered and analysis of project area conditions can be shared.

1-3. Tributary streams have been adversely impacted by past urbanization. Increased peak flows have had a destabilizing effect on this stream system. Future stormwater management will help but not correct the process that has already begun. In our past review of the sediment problem it has been determined that large amounts of this sediment are coming from the streams themselves. The fact that there are 215 miles of tributary streams makes any attempt to correct a watershed based problem expensive.

1-4. With the issuance of EPA's Phase II Stormwater Regulations, both Madison and St. Clair Counties have begun to address the issues of stormwater management in a coordinated and comprehensive manner. Both counties are pursuing the establishment of standardized, best management practices. Madison County has passed a county-wide stormwater ordinance and St. Clair County is pursuing the passage of such an ordinance.

1-5. Existing conditions would be analyzed as an integral part of the development of Engineering Design Reports for each action area.

1-6. Comment noted and concur.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 244
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

IN REPLY REFER TO:

June 3, 2003

ER-03/399

Colonel C. Kevin Williams
District Engineer
U.S. Army Corps of Engineers
St. Louis District
ATTN: CEMVS-PM-F (Roush)
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Colonel Williams

The U.S. Department of the Interior (Department) has reviewed the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project, General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement (PEIS), dated February 2003. The Department offers the following comments and recommendations for your consideration.

GENERAL COMMENTS

We appreciate the extensive efforts of the St. Louis District to involve the public and local, State, and federal agencies in development of the project plan. Staff from the U.S. Geological Survey (USGS) provided input to the study, including stream sediment analysis and geomorphology. The USGS has updates and comments on the data that were presented in the Report and will be communicating directly with the Corps of Engineers. The USGS contact is the Illinois District Chief, Robert Holmes, who may be reached at 217-344-0037, ext 3005.

Staff from the U.S. Fish and Wildlife Service (FWS) participated in various aspects of the study, including biological alternative development and application of habitat evaluation procedures. The FWS also provided a draft Fish and Wildlife Coordination Act Report, which is included in Appendix G.

The proposed project represents an ambitious effort by various agencies to address resource concerns in the American Bottom, St. Clair and Madison Counties, Illinois. This includes improving fish and wildlife habitat while providing for flood damage reduction. As proposed in the Recommended Plan, this project will result in significant habitat gains for a variety of species. Restoration of wetlands will not only provide valuable wildlife habitat, but it will also improve flood storage, groundwater recharge, sediment control/erosion reduction, and pollution control. Upland sediment and erosion control measures and stormwater management will also improve water quality and assist in maintaining restored habitats. The Department supports implementation of the Recommended Plan and applauds the Corps of Engineers and project sponsors for developing a project concept that truly reflects an ecosystem restoration initiative.

Due to the large programmatic nature of the Draft PEIS, restoration plans for each individual action area are not comprehensive. The FWS should remain an active participant in the interagency team as site-specific plans are developed.

Currently, plans for the associated upland stream work are not as fully developed as the floodplain action areas. Successful development of high quality habitats in several of the floodplain habitat areas is dependent on reduction of sediment loads coming from the upland streams. We are supportive of the two-year pilot study proposed on Judy's Branch to evaluate the effectiveness of upland stream work at reducing these sediment loads. We recommend that a variety of stream restoration/stabilization measures be evaluated. Such efforts should not only utilize dry detention basins, where appropriate, but also include bioengineering techniques to reduce water velocity and stream bank erosion. A range of alternatives should be developed and pursued for addressing water and sediment issues in upland areas at the source.

ENDANGERED SPECIES ACT COMMENTS

Based on information provided in the Draft PEIS and associated Biological Assessment included in Appendix B, the FWS concurs that the proposed project is not likely to adversely affect any federally listed threatened or endangered species. The FWS also concurs with the assessment that threatened and endangered species consultation will be necessary for each of the proposed action areas once detailed plans are developed. We are supportive of your commitment for contributing to endangered species recovery plans. The FWS recommends establishing the decurrent false aster (*Boltonia decurrens*) in all appropriate wet prairie sites. In addition, please note that the eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*) is now a candidate species for listing under the Endangered Species Act.

For continued consultation and coordination with the FWS, please contact Brian Wiebler of the Marion, Illinois Sub-Office, U.S. Fish and Wildlife Service, 8588 Route 148, Marion, Illinois, 62959; telephone number 618/997-3344, ext. 343.

We appreciate the opportunity to provide these comments

Sincerely,

Michael T. Chezik
Regional Environmental Officer

2. United States Department of the Interior, Office of the Secretary, Office of Environmental Policy and Compliance

Comments noted and concur.

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
2031 Mascoutah Road
Phone: 618.233.5577 x3
Fax: 618.233.5028 e-mail: John.Harryman@il.usda.gov

Ms. Deborah L. Roush, Program Manager
Planning, Programs, and Project Management Division,
U.S. Army Corps of Engineers, St Louis District
1222 Spruce Street
St Louis, Mo. 63103-2833

Dear Ms. Roush;

I am writing in response to your request for comments on the East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project.

The Natural Resources Conservation Service (NRCS) whole-heartedly supports the Ecosystem Restoration and Flood Damage Reduction Project. One of the primary needs identified by the Stormwater Planning effort spearheaded by the NRCS in the mid 1990s was the need for the development of a comprehensive plan for the American Bottoms and the associated upland watersheds. Initial inventories of the watersheds showed the majority of the ecosystems stressed and in some cases, destroyed. NRCS gained additional insight on the need for the project when it was involved with the post 1993 Flood American Bottoms ditch cleanout project to re-establish baseline flow in streams and ditches clogged with silt and debris. The project had two major thrusts; clean the ditches and where possible, work with private landowners to protect and/or re-establish hydrology for degraded wetland areas along the ditches we were cleaning. Our goal was to clean the ditches without destroying the wetlands and it appears that, at least in the short term, we were successful. One would hope the COE and the project sponsors would be able to implement the Ecosystem Restoration and Flood Damage Reduction Project to complete the task.

The plan is a good plan. The planning process the COE used included input from all interested parties and NRCS has been providing input from the get-go. It has been interesting to watch the plan develop into one of the most, if not the most comprehensive, environmentally ecosystem oriented flood reduction projects I have seen. My hope is that the close cooperation to accomplish the "good of the whole" over the specific desires of an individual agency continues and we can provide the ecosystem and flood protection to the American Bottoms it so richly deserves.

John F Harryman
District Conservationist.

Cc: Bob McLeese

3. United States Department of Agriculture, Natural Resources Conservation Service, Saint Clair County, Illinois

Comments noted.

United States Department of Agriculture	***Natural Resources Conservation Service***	***7205 Marine Road Edwardsville, IL 62025 Phone: 618-656-7300 Fax: 618-656-5187***

Deborah Roush, Project Manager
Planning, Programs and Project Management Division
US Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis MO 63103-2833

April 23, 2003

Ms. Roush,

The Natural Resource Conservation Service is pleased offer it's support of the Draft Programmatic Environmental Impact Statement developed by your planning team.

The NRCS has been involved in the planning process since its inception and has contributed technical evaluations and analyses that provided guidance in the plan's development. Any comments or concerns from our agency have already been brought to your attention during this process.

It is in the best interest of the Metro-East region that this Flood Protection Project Plan addresses the need for flood reduction in St. Clair and Madison Counties while also identifying ecosystem restoration and bio-diversity opportunities in this area. This plan, when adopted and implemented, will be an immense benefit to East St. Louis and the neighboring communities.

Sincerely,

Dan Steinmann
District Conservationist
Madison County NRCS

Copy: Mcleese, NRCS, STSS

4. United States Department of Agriculture, Natural Resources Conservation Service, Madison County, Illinois

Comments noted.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276, 217-782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601, 312-814-6026

ROD R. BLAGOJEVICH, GOVERNOR   RENEE CIPRIANO, DIRECTOR

217/782-3362

May 9, 2003

Ms. Deborah L. Roush
Project Manager
Planning, Programs and Project Management Division
U. S. Army Corps of Engineers-St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project, Madison and St. Clair Counties -- Draft Re-evaluation Report and Programmatic Environmental Impact Statement
Log No. C-500-03

Dear Ms. Roush:

The Agency received your letter of February 20, 2003 regarding the Draft Re-evaluation Report and Programmatic Environmental Impact Statement for the above project on February 25, 2003. Agency staff have reviewed the report and draft EIS and offer the following comments:

The proposed project is to provide flood control and enhancement of aquatic and other natural resources within the project area. The recommended plan suggests that excavation of soils and dredging will be conducted at several locations to add or enhance existing aquatic resources. Additionally the proposal includes the filling of existing aquatic areas (e. g., the creation of islands from materials excavated to create a lake in Muellens Slough). The filling of waters of the state will require a Section 401 water quality certification that may be associated with a Section 404 permit. The Agency notes in the discussion on Page 8-52 of the Draft EIS that manmade materials,
5-1 for example appliances, would be removed and properly disposed off-site. Portions of Cahokia Creek will be rehabilitated in part, by the excavation of old fill. The Agency requests that the final plans for the proposed project address the nature of any excavated materials and their final disposition in accordance with the Illinois Environmental Protection Act and the regulations thereunder. Excavated areas that may have exposed contaminated soils located within new or existing aquatic sites may need to be evaluated with regard to the impact of the contaminants upon the water quality of the aquatic site. Materials placed within waters of the State
5-2 will need to be of such quality and placed in such manner so as to not cause violation of the State's water quality standards. The study did not report on coordination with Illinois EPA to identify the location of known contaminated sites within the project area. The Illinois EPA's Bureau of Land may have information on contaminated sites within the project area. The Bureau of Water is willing to assist in coordinating the review for known contaminated sites.

If you have questions or comments concering the contents of this letter, please contact Dan Heacock of my staff at the address and telephone number shown above.

Sincerely,

Bruce J. Yurdin
Manager, Watershed Management Section
Bureau of Water

DLH/C500-03.doc

5. Illinois Environmental Protection Agency

5-1. Comment noted and concur. The final plans would be developed in accordance with all Federal and State laws and regulations.

5-2. Comment noted and follow-up coordination would be conducted.

Illinois
Department of
Natural Resources
One Natural Resources Way • Springfield, Illinois 62702-1271
http://dnr.state.il.us
Rod R. Blagojevich, Governor

June 2, 2003

Ms. Deborah Roush
Planning, Programs, and Project Management Division
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103

Dear Ms. Roush:

The East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project in Madison and St. Clair Counties is a project that demonstrates the value of ecosystem restoration in serving many objectives. The Illinois Department of Natural Resources (IDNR) is proud to be a participant in this project.

The Office of Water Resources and the Office of Realty and Environmental Planning have reviewed the draft report and have the following questions and comments. Please note that the IDNR biologists and engineers are full partners in this project and will continue to cooperatively work with the Corps to ensure the integrity of ecosystem components of this project; the regional biologists have provided their comments and questions to the Corps under separate cover.

6-1 1 Section 8.14.2, Cost Sharing of Operation and Maintenance, suggests that the IDNR/Office of Water Resources will inspect the finished project. Operation and maintenance will be the responsibility of Madison and St. Clair Counties as will be specified in the Project Cooperation Agreement. The Illinois Department of Natural Resources will enter into a supplementary agreement with the Counties to help implement the project and ensure maintenance is completed.

6-2 2. Section 9.7, Schedule Development, states that a copy of the proposed schedule is in Appendix K. No project schedule was found in Appendix K. This information will be valuable for discussions of the Project Cooperation Agreement.

6-3 3. Each restoration area is a separate project. However, there are benefits to a project area from adjacent project areas. For example, Spring Lake restoration area recommends a control structure in Harding Ditch to prevent Schoenberger Creek from backing into the St. Clair Farms cell (page C-187). If we build Wedgewood restoration area, would that structure still be necessary? Will there be a methodology in the design phase to analyze and optimize the benefits to the current restoration area based on a "first added" or "last added" incremental benefits analysis?

Ms. Deborah Roush
Page 2
June 2, 2003

6-4 4. Section 7.2.2.2 Economic Implications, discussed the incidental flood damage reduction benefits of this project. When the hydrologic and hydraulic analysis was completed for the economic analysis, what was the assumption for conditions on the Mississippi River, i.e. were the pump stations being utilized or was gravity flow assumed?

6-5 5. In Appendix C, the Old Cahokia Creek restoration area calls for 2-2'x2' box culverts under the bike trail with an outflow of 130 cfs (page C-21). The bike path will be acting like a dam. As such, it will need to meet Illinois Dam Safety criteria.

6-6 6. In Appendix C the Dobrey Slough analysis states that the pumping station plans were not available. We will provide as-built drawings for the pump station under separate cover letter.

6-7 7 The local sponsors desire an opportunity to complete in-kind services as the project is constructed.

In a standard Corps feasability report for a flood control project, the following issues would have been addressed. Since this project is ecosystem restoration, will these issues be addressed during design?

6-8 A. The project cost estimates are based on today's value. The project will take ten to fifteen years to construct. Do we need to account for the increase cost over the construction period in the initial construction estimate?

6-9 B. Channel Improvements were sized based on the 24-hour duration/100-year frequency event. It does not appear that a critical duration analysis was performed. Without the critical duration analysis you are not able to demonstrate that the proposed channel improvements and containment berms will not impound water on areas currently not suffering flooding or that you are not raising the level of flooding outside your project limits.

6-10 C. What are the assumptions that led to all subbasins being assigned a curve number of 75 to represent future development conditions.

6-11 D. The assumption of normal depth flows in the channel improvements needs to be verified.

6-12 E. Why is a triangular rainfall distribution used in the HEC-1 model instead of the appropriate Huff distribution? The precipitation values shown on the PH record in the HEC-1 model have not been adjusted for the St. Louis Anomaly (ISWS Bulletin 70) as stated in the HEC-1 comment cards. (Page C-35).

6-13 F. The n-values for the reconfigured channels seen low for what is assumed to be a natural vegetated channel. The n-value of 0.035 are typical for a grassed lined channel that will be mowed a few times per year.

Thank you for the opportunity to review this report. If you have any questions please contact Mr. Arlan Juhl at 217/782-4636.

Sincerely,

Gary R. Clark

Gary R. Clark
Acting Director
Office of Water Resources

6. Illinois Department of Natural Resources

6-1. Comment noted.

6-2. Concur. The schedule will be included in the final report.

6-3. Concur. The control structure is necessary with or without Wedgewood. All alternative sites are individually justified and do not add or subtract increments of benefit from, or to, other sites.

6-4. The preliminary analysis was based on previous work generated from the Corp's 1984 investigation. That investigation assumed the gravity gates to be closed and the pump stations in operation. The Mississippi River stage does not impact interior flooding of the nature investigated and analyzed for determining benefits for this Project. The flooding considered during this investigation occurs in the Project area when the tributary streams leave their banks, typically at or near the break line of the bluff and floodplain. There was no assumption used in this analysis that shortened duration of, or elimination of, ponding from low-lying areas. Such areas could be impacted by the rate of flow out of the interior.

6-5. Comment noted.

6-6. Comment noted.

6-7. Comment noted and follow-up action will be taken to try and implement. The addition of in-kind credit would have to be specifically authorized for this Project.

6-8. Project costs were assumed at an interest rate over the construction period in accordance with standard Corps' estimating procedures.

6-9. These issues would be addressed during design. Modeling would be updated and conducted to completely analyze and document these factors for permitting purposes.

6-10. This was based on the projections of the biological team for future conditions over the Project life of 50 years. These projections were based on such things as municipal plans in addition to past and current trends.

6-11. Comment noted. See 6-9 above.

6-12. Information utilized for this report was generated from the Corps' 1984 investigation. As indicated in 6-9 above, updated modeling would occur during design.

6-13. Comment noted.

JUN-05-2003 09:17 IL HIST PRES AGY 217 782 8161 P.02

Illinois Historic Preservation Agency

1 Old State Capitol Plaza • Springfield, Illinois 62701-1507 • Teletypewriter Only (217) 524-7128

Voice (217) 782-4836

St. Clair County IHPA LOG #004042803
East St. Louis and Vicinity
Ecosystem Restoration and Flood Damage Reduction Project
American Bottoms

June 3, 2003

C. Kevin Williams, Colonel
Department of the Army
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Colonel Williams:

In response to your letter of April 25, 2003, it is not clear to us whether the Draft Environmental Impact Statement (DEIS) is supposed to be used for consultation under Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: Protection of Historic Properties. However, we will utilize the plans presented in the DEIS for 106 consultation purposes.

Concerning the above referenced undertaking we have the following preliminary comments:

7-1 1. Any construction affecting known archaeological sites will constitute an adverse effect.

7-2 2 Outside the Cahokia Mounds National Historic Landmark (NHL) archaeological surveys (Phase I) and archaeological testing to determine National Register of Historic Places eligibility (Phase II) will need to be done and afterwards, a Memorandum of Agreement (MOA) with participation with the Advisory Council on Historic Preservation will need to be done.

7-3 3. The planting of prairie - amount, species and maintenance are issues to be decided by our historic sites division. However, under Section 106 we would be concerned that the planting did not effect archaeological deposits or cause an adverse visual effect. We presume these concerns can and will be worked out so planting of some prairie can take place.

7-4 4. With specific reference to Spring Lake, the activities planned in the DEIS within the NHL constitute an adverse effect. It has long been our position that we are opposed to physical changes within the NHL. We have never agreed orally or in writing to the ditch. This is consistent with the position in our letter of January 27, 1999. The Corps should continue to investigate alternatives which include using existing ditches and which cause minimal physical and visual impacts within the NHL.

7-5 As your undertaking constitutes an adverse effect to a National Historic Landmark you need to contact and invite the participation of the Advisory Council on Historic Preservation.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer

cc: Advisory Council on Historic Preservation

7. Illinois Historic Preservation Agency

    7-1. Comment noted and concur.

    7-2. Comment noted and concur.

    7-3. Comment noted and concur.

    7-4. Comment noted.

    7-5. Comment noted.

Roush, Deborah L MVS

From:	MARK PHIPPS [MPHIPPS@dnrmail.state.il.us]
Sent:	Wednesday, May 07, 2003 4:45 PM
To:	Roush, Deborah L
Cc:	DIANE TECIC; PAT MALONE
Subject:	East St.Louis and vicinity, IL Ecosystem Restoration and Flood Damage Reduction Project

Ms. Roush,

Please accept comments regarding the above mentioned project via e-mail.

Due to other responsibilities and time constraints I am unable to review the entire document made available but did attend the public meeting on April 8, have read the executive summary and was involved in some of the early meetings and data collection involving agency personnel.

I fully endorse this project to address the problems and opportunities listed under the section Problems and Objectives in the executive summary. Obviously a comprehensive plan beyond the scope of this project will need to be entertained to truly address the problems mentioned at the landscape scale identified in this project document. I understand that complex task is being studied and acted on to some degree by a coalition of organizations. With this reality in mind I
8-1 would ask that the COE project here somehow be flexible enough to address the aforementioned problems and opportunities in lieu of the rapid changes taking place in the American Bottom and associated upland. As you are aware, given the time line presented for this project some of your action areas may not be available for the intended purpose. Hopefully other extant wetlands or other habitat blocks (or even equivalent sized parcels of open space for habitat creation) may in turn be pursued. Adaptability and flexibility seems to be paramount in our rapidly changing world. As a local DNR biologist I feel I may be most helpful in assisting you in making quick assessments and adjustments to this project.

8-2 Additionally as a local DNR person I look forward to providing any input at the PED (planning, engineering and design) phase. Along those lines , endangered and threatened (E&T) wetland bird species such as common moorhen, pied-billed grebe, American bittern, least bittern, king rail, yellow-headed blackbird and sandhill crane could all benefit from wetland habitats that incorporate a mix of emergent wetland vegetation and open water. As acknowledged in the report, inundation by flood pulse events could be problematic for nesting wildlife. Also select management for E&T grassland birds that require short stature prairie habitat could be addressed through the PED via such management practices as mowing and grazing. The report recommends the placement of prairie bird perches. I have never seen this recommended in any prairie wildlife management documents. I would not place this as a priority task. I would envision that these birds will utilize what they can to sing and defend their territories and early successional herbaceous vegetation or nearby available perches will suffice until stout prairie forb stems become established. Similarly I would not make the placement of large numbers of wood duck boxes a high priority. Uneven- aged forest stands should have sufficient numbers of natural cavities present. In the event they do not then some boxes may be suggested.

Thank you for the opportunity to comment and I look forward to working with you in the months and years ahead on this very important project.

Mark Phipps
District Natural Heritage Biologist
Illinois Department of Natural Resources
4521 Alton Commerce Parkway
Alton, IL 62002
618/462-1181

8. Illinois Department of Natural Resources

    8-1. Comment noted.

    8-2. Comments noted. We look forward to your continued input to this Project.

THOMAS HOLBROOK

STATE REPRESENTATIVE • 113TH DISTRICT

SPRINGFIELD OFFICE:
2065-L STRATTON OFFICE BUILDING
SPRINGFIELD, ILLINOIS 62706
217-782-0104

DISTRICT OFFICE:
5200 W. MAIN • SUITE 4
BELLEVILLE, ILLINOIS 62223
618-394-8211

DISTRICT OFFICE:
1310 NIEDRINGHAUS
GRANITE CITY, ILLINOIS 62040
618-451-0305

ILLINOIS GENERAL ASSEMBLY

COMMITTEES:
MEMBER
- TOURISM CHAIRMAN
- CONSTITUTIONAL OFFICERS
- VETERANS AFFAIRS
- ENVIRONMENT & ENERGY
- TELECOMMUNICATIONS REWRITE

April 24, 2003

Michael Fruth
Madison County Stormwater Coordinator
Metro East Regional Stormwater Office
1800 Edison Avenue
P.O. Box 1366
Granite City, IL 62040

Dear Mr. Fruth:

It is my understanding that St. Clair and Madison County has actively supported the mitigation of hazards associated with frequent flooding of the American Bottoms area. Recent events have included major disaster declarations. The control of flooding in this area is necessary to urbanization in St. Clair and Madison Counties.

The plan's recommendation of using stormwater from upland watersheds to be stored in the natural habitat areas will minimized flooding hazards in the bottomland area. Supplying these recharge areas will also allow for the restoration of the ecosystem providing benefit to the natural environment.

The implementation of East St. Louis and Vicinity, Illinois Ecosystem Restoration and flooding and ecosystem degradation in the American Bottoms area. In addition, the project benefits related to the restoration of natural areas will positively benefit the environment in the American Bottom area. Please accept this letter of support for the East St. Louis, and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project.

Sincerely,

THOMAS HOLBROOK
State Representative
113th District

TH/ar

9. State Representative 113th District, Thomas Holbrook

   Comments noted.

ILLINOIS HOUSE OF REPRESENTATIVES

DISTRICT OFFICE
128A WEST MAIN
SPARTA, IL 62286
618-443-5757

SPRINGFIELD OFFICE
SECOND FLOOR SOUTH STRATTON BLDG.
SPRINGFIELD, IL 62706
217-782-1018

COMMITTEES:
TRANSPORTATION
ENVIRONMENT & ENERGY
AGRICULTURE & CONSERVATION
REGISTRATION & REGULATION

DAN REITZ

STATE REPRESENTATIVE • 116TH DISTRICT

April 28, 2003

U.S. Army Corps of Engineers
Deborah Roush, Project Manager
122 Spruce St.
St. Louis, MO 63103

Dear Ms. Roush:

St. Clair County and Madison County has actively supported the mitigation of hazards associated with frequent flooding of the American Bottoms area. Recent events have included major disaster declarations. The control of flooding in this area is necessary to urbanization in Madison and St. Clair Counties.

The plan's recommendation of using stormwater from upland watersheds to be stored in the natural habitat areas will minimize flooding hazards in the bottomland area. Supplying these recharge areas will also allow for the restoration of the ecosystem providing benefit to the natural environment.

The implementation of East St. Louis and Vicinity, Illinois Ecosystem Restoration and flooding and ecosystem degradation in the American Bottoms area. In addition, the project benefits related to the restoration of natural areas will positively benefit the environment in the American Bottoms area. Please accept this letter of support for the East St. Louis, and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project.

Sincerely,

Dan Reitz
State Representative
116th District

10. State Representative 116th District, Dan Reitz

Comments noted.

District Office
1355A State Route 127
Greenville, Illinois 62246
Phone: 618/664-9108
Fax: 618/664-9112

District Office
101 So. Main Street-Suite LL2
Decatur, Illinois 62523
Phone: 217/428-4068
Fax: 217/428-4089

Illinois State Senate
Frank C. Watson
State Senator
51st Senate District

Springfield Office
309A State House
Springfield, Illinois 62706
Phone: 217/782-5755
Fax: 217/782-7818

April 30, 2003

Michael Fruth
Madison County Stormwater Coordinator
Metro East Regional Stormwater Office
1800 Edison Avenue
P.O. Box 1366
Granite City, IL 62040

Dear Mr. Fruth;

I'm writing this letter to pledge my support for the Ecological Restoration Project and East St. Louis Flood Reduction Project.

These projects, administered by the US Army Corps of Engineers, are vitally important for the future of Madison and St. Clair Counties. Flooding in the American Bottoms area has long plagued the Metro East. There were four disaster declarations during the period of 1993 to 1996, which caused millions of dollars in damage and disrupted many lives.

These projects will help improve the natural habitat and ecosystem, address the sedimentation problem caused by upland erosion and help minimize flooding. I believe in the long-term these improvements will contribute to much-needed economic development in the area, through urbanization, and preserve the natural environment for future generations.

Thank you for the opportunity to speak out on these very important projects for Madison and St. Clair Counties.

Sincerely,

Frank

Frank Watson
Senate Republican Leader

FCW:njb

11. State Senator 51st Senate District, Frank C. Watson

Comments noted.

DISTRICT OFFICE:
126 VANDALIA, SUITE 1
COLLINSVILLE, ILLINOIS 62234
618/345-2176
hoffman@legis.state.il.us

1310 NIEDRINGHAUS
GRANITE CITY, IL 62040
618/877-9096
(BY APPOINTMENT)

CAPITOL ADDRESS:
263-S STRATTON BUILDING
SPRINGFIELD, ILLINOIS 62706
217/782-8018

MAJORITY FLOOR LEADER
COMMITTEES:
TRANSPORTATION-CHAIRMAN
JUDICIARY 1-CIVIL LAW
LABOR

JAY C. HOFFMAN
STATE REPRESENTATIVE - 112TH DISTRICT

May 7, 2003

Ms. Debbie Roush
U.S. Army Corps of Engineers
122 Spruce St.
St. Louis, MO 63103

Dear Ms. Roush:

I am writing in support of the Ecological Restoration Project and East St. Louis Flood Reduction Project. I believe this is an important project for the Metro East. I hope that you give their proposal every consideration.

It is my understanding that the plan's recommendation of using stormwater from upland watersheds to be stored in the natural habitat areas will minimize flooding hazards in the bottomland area and the natural environment will benefit from the restoration of the ecosystem.

If you need any additional information, please feel free to contact my office. Thank you for your generous time and consideration.

Sincerely,

Jay C. Hoffman
State Representative
112th District

JCH/jgm

12. State Representative 112th District, Jay C. Hoffman

Comments noted.

ILLINOIS HOUSE OF REPRESENTATIVES

DISTRICT OFFICE:
2 TERMINAL DRIVE, SUITE 18B
EAST ALTON, ILLINOIS 62024
618/259-4934
618/259-5043 FAX

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COMMITTEES:
PUBLIC UTILITIES - CHAIRMAN
REGISTRATION & REGULATION
ENVIRONMENT & ENERGY
FINANCIAL INSTITUTIONS
JOINT COMMITTEE ON
ADMINISTRATIVE RULES

STEVE DAVIS
STATE REPRESENTATIVE
111TH DISTRICT

May 13, 2003

Mr. Michael Fruth
Madison County Stormwater Coordinator
Metro East Regional Stormwater Office
Post Office Box 1366
Granite City, Illinois 62040

Dear Mr. Fruth:

I am writing in support of the East St. Louis and Vicinity Illinois Ecosystem Restoration and Flood Damage Reduction Project.

The plan's recommendation of using stormwater from upland watersheds to be stored in the natural habitat areas will minimize flooding hazards in the bottomland area. Supplying these recharge areas will also allow for the restoration of the ecosystem providing benefit to the natural environment. The control of the frequent flooding of the American Bottoms area is necessary to the urbanization in Madison and St. Clair counties.

Again, please accept this letter of support for the Illinois Ecosystem Restoration and Floor Damage Reduction Project. If you have any questions regarding my support, please do not hesitate to contact me.

Sincerely,

Steve Davis
State Representative
111th District

SD:nfs

13. State Representative 111th District, Steve Davis

Comments noted.

☐ SPRINGFIELD OFFICE
ROOM M120
STATE CAPITOL BUILDING
SPRINGFIELD, ILLINOIS 62706
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☑ LEGISLATIVE SERVICE OFFICE
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FAX: 618-465-4816
E-MAIL: senhaine@cbnstl.com

STATE OF ILLINOIS
STATE SENATE

WILLIAM R. HAINE
SENATOR
56th Senate District

DEMOCRATIC CHAIRMAN
LOCAL GOVERNMENT COMMITTEE

MEMBER
JUDICIARY COMMITTEE
ENVIRONMENT & ENERGY COMMITTEE
LICENSED ACTIVITIES COMMITTEE

May 21, 2003

Re: East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

To Whom It May Concern:

We strongly urge the Corps of Engineers Project to support the Illinois Ecosystem Restoration and Flood Damage Reduction Project for East St. Louis and vicinity.

Our American Bottoms areas have been suffering with increased flooding problems in the last quarter century.

These projects appear to be good efforts that will minimize the flood hazards in the bottom areas by using upland watersheds to store water.

Your support will be very much appreciated.

Very truly yours,

William R. Haine
State Senator- 56th District

WRH/jgk

Cc: Honorable Richard Durbin, U. S. Senator
Honorable Jerry Costello, U. S. Congressman – 12th Dist.
Honorable John Shimkus, U. S. Congressman – 19th Dist.

14. Senator 56th Senate District, William R. Haine

Comments noted.

LOCAL GOVERNMENT

PM- Roush

OFFICE OF THE CITY MANAGER

301 River Park Drive
East Saint Louis, Illinois 62201
(618) 482-6664
Fax: (618) 482-6648

May 8, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

RE: Request for Extension of Public Comment Period and Public Meeting in East St. Louis General Reevaluation Study and Draft EIS-
East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project in Madison and St. Clair Counties, Illinois

Dear Colonel Williams:

The City of East St. Louis hereby requests at least a 60-day extension of the deadline for public comment in the above-entitled project. We understand that the Corps has withdrawn the Wedgewood action area from the project because of objections from citizens and the City to the closing of Marybelle (Summit) Ave. We appreciate the action, but we hope that you will not just withdraw the Wedgewood component and not address alternatives.

We, therefore, also request that you hold another public meeting in East St. Louis so that our citizens and others in neighboring communities who were not informed of the meeting in Collinsville are given the opportunity to address the East St. Louis and Vicinity project, ask questions and propose alternatives.

If you withdraw the Wedgewood detention area, do you propose also to withdraw upland detention and sediment control?

While we are opposed to the closing of Marybelle, we understand that the Corps proposed the Wedgewood project as a result of a request by East St. Louis Community Action Network (ESL CAN) and American Bottom Conservancy (ABC) to address flooding in East St. Louis. It is also our understanding that this project, originally entitled East St. Louis and Vicinity Interior Flood

Control project when Congress authorized it in 1965 included East St. Louis in its boundaries. We trust that you will want to include the city in the present project.

Although much of the flooding in East St. Louis is caused from high groundwater levels associated with a rise in the level of the Mississippi River and the low elevations of the city, more of the flooding is a result of stormwater from development by communities on the bluffs. They send their water down to those of us below and the ditches cannot handle it. Even new sewers in the city would not handle that quantity of water. And while the Harding Ditch clean out has helped, we still feel that stormwater should be retained on the bluff and paid for by those communities.

We also hope that you will continue to ensure that the ditches are maintained on a regular basis.

Therefore, the City of East St. Louis requests that the Corps schedule a public meeting in East St. Louis, perhaps at City Hall with advance notice to our citizens. We also request a 60-day extension of the deadline for public comment following the public meeting. We look forward to hearing from you on this matter.

Sincerely,

Robert P. Storman
City Manager

Copy: Debbie Roush

15. City of East St. Louis, Illinois, Office of the City Manager

The Corps of Engineers furnished a letter in response (attached).

PM-F R/F

MAY 2 7 2003

Planning, Programs and Project Management Division
Planning and Project Development Branch

Mr. Robert P. Storman
City Manager
301 River Park Drive
East St. Louis, Illinois 62201

Dear Mr. Storman:

Thank you for your interest in the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project. You requested an extension in the period of time for public comment on this project. The original public comment period began February 28, 2003, and closes May 7, 2003, in excess of 60 days. At your request, I will accept public comments for an additional 30 days. The comment period will now close June 7, 2003. Unfortunately, due to the time constraints associated with project coordination, I cannot accommodate your request for an additional 60 days. Recognizing the June 7, 2003 deadline, the public comment period will now exceed 90 days.

At this time no decision regarding Wedgewood has been made. The comment period is still open and until all comments are received and analyzed no decision will be made regarding Wedgewood. We have been working with your representative, Mr. Willard Mitchom on these issues and will continue to do so.

Three public meetings and a hearing have been held for this project. The project has been discussed in an open public forum monthly for the past three years at the Metro East Regional Stormwater Committee Meetings. Dozens of special group presentations have been made, to include meetings with residents of the Dayton/Wedgewood Community. Most recently a meeting between the city of East St. Louis, the Corps, and St. Clair County, was conducted on April 12, 2003, to discuss issues related to the Wedgewood plan. No further public meetings or hearings are scheduled for this phase of the project.

The current recommended plan is an environmental restoration project, with flood reduction being only an incidental benefit. A variety of restoration alternatives were explored for the Schoenberger watershed, which includes the Wedgewood site, during the formulation process. However, the only viable alternative (the one which was able to generate the number of habitat unit benefits necessary to incrementally justify the cost of the wetland, stream and upland components) is the currently recommended plan.

The recommended plan for the Wedgewood action area is the creation of a 124-acre marsh in the floodplain, not a detention area, and 46 acres in the uplands required for installation of 24 dry sediment detention basins at scattered locations in the Schoenberger Creek watershed. The Wedgewood action area is justified solely on environmental benefits. Removal of the 124-acre marsh floodplain component of the Wedgewood action area from the recommended plan would eliminate the justification for all components of this plan.

Regarding the scope of the originally authorized project, I will review the history of the project to ensure that you are fully and accurately informed. The originally authorized project of 1965, is reflected in the current study area boundary. With the construction of the Blue Waters Ditch project in the late 1980's Cahokia, Centerville, Alorton and a segment of unincorporated St. Clair County were removed from the boundary. The originally authorized project addressed interior flooding created by "hillside runoff". The original plan for Schoenberger Creek, in 1965, was to divert it to, and complete construction of, Canal No.1. This plan was designed to address a 50-year storm event. As you know, based on urbanization of the area, this plan is no longer viable. In 1984 it was also no longer economically justified. A review of the economic analysis that was updated for the Schoenberger watershed area for the current study shows, just as it did in 1984, that there is no economically justified flood damage reduction project. Damages avoided by providing protection against the 100-year event total only approximately $120,600 in average annual damages. These damages avoided, would justify a project of approximately $2,000,000 at the current interest rate. Events of a lesser magnitude generate fewer damages and resulting benefits. The Wedgewood action area plan contained in the draft report, which is justified solely on environmental benefits, is currently estimated to cost approximately $22,000,000.

Approximately 64% of the total flood damages to the Schoenberger watershed area from the 100-year storm event, estimated to be an additional $220,300, in average annual damages, remain even with the Wedgewood plan in place, as these damages are created by ponding in low areas rather than from hillside run off.

We look forward to receiving your comments so that they may be considered and incorporated into the final study. Decisions regarding the Wedgewood plan will be made following the receipt and analysis of all public input.

Sincerely,

Signed
C. Kevin Williams
Colonel, U.S. Army
District Engineer

C. Kevin Williams
Colonel, U.S. Army
District Engineer

PM-Roush

OFFICE OF THE CITY MANAGER
301 River Park Drive
East Saint Louis, Illinois 62201
(618) 482-6664
Fax: (618) 482-6648

June 3, 2003

Col. C. Kevin Williams
US Army Corps Of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63130

RE: East St. Louis and Vicinity Ecosystem Restoration Flood Damage Reduction Project in Madison and St. Clair Counties, Illinois

Dear Colonel Williams:

The City of East St. Louis appreciates the opportunity to provide more public comment about the East St. Louis and Vicinity Ecosystem Restoration Flood Damage Reduction Project to take place.

We understand that the Corps has not made any final decisions regarding the Wedgewood project, however, we hope that you will take into consideration the concerns of the citizens and the City when making your decision. The closing of Summit Avenue will be a disservice to the community because it is a major street that is used by many of the citizens within the community.

Although the City is opposed to the closing of the Summit Avenue, we are very concerned about the flooding in East St. Louis and would like to see some improvements made to correct this situation. The City is also aware of the cause of the flooding that is generated from high groundwater levels associated with a rise in the level of the Mississippi River and the low elevations of the City.

Temporary measures have been taken to correct the flooding situation through the Harding Ditch, but the City hopes that other alternatives are being addressed to correct this situation on a permanent basis, without the closing of Summit Avenue. The City supports the Corps in other alternatives to rectify the flooding in East St. Louis. We look forward to working with the Corps on future projects.

If you have any questions or concerns please feel free to contact Mr. Willard Mitchom at 618-482-6664.

Sincerely,

Robert P. Storman

Robert P. Storman
City Manager

16. City of East St. Louis, Illinois, Office of the City Manager

As a result of the initial public scoping process in early 2000 the Corps was requested by the public to include the Wedgewood buy-out area in the alternative development process. During the development of alternatives for Wedgewood, those that emerged as viable candidates from the iterative planning process all required the closing of Summit Avenue through the action area site, which was the FEMA buyout land. As this was known to be a main thoroughfare for the citizens in the local area, the Corps of Engineers sought guidance from the city of East St. Louis and the Illinois Department of Transportation to see whether it made sense to proceed with any further analysis of the area at all. It was agreed that closure of this thoroughfare should be given further consideration since potential environmental benefits appeared to be substantial.

While the Wedgewood action area did provide the opportunity to restore wetland habitat, when compared to other areas investigated the site was relatively small in size (125 acres) and close in proximity to the interstate highway and developed neighborhoods. Although habitat restoration at Wedgewood did produce benefits, they cost substantially more to develop per acre than at other sites recommended in the plan.

In light of these results there does not appear to be compelling enough benefits produced by this site to justify it when compared to the obvious detrimental effects the closing of Summit Avenue would have on the local community. As a result of the public involvement and coordination process, the Wedgewood Action Area has been eliminated from further consideration and will not be apart of the final recommended plan.

The incidental flood damage reduction that would have occurred following construction of the recommended environmental restoration project at the Wedgewood action area would have benefited those areas on the north side of Schoenberger upstream of Harding Ditch. Without the closing of Summit Avenue there is not enough available land on the east side of I-255 to provide a similar restoration site that can benefit from the flows from Schoenberger. Appendix C of the report provides information on the alternatives explored.

The Corps will continue to work with the City to address flooding problems that are within our authority.

Pontoon Beach
A Community of New Beginnings

Mayor Harold "Jim" Bethom

Village Clerk Susan Dougherty

June 5, 2003

Via FedEx
Tracking #8384 9305 7827

Ms. Deborah Roush
Project Manager
US Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103

Re: **East St. Louis and Vicinity, Illinois**
Ecosystem Restoration and Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement
(DPEIS), February 2003

Dear Ms. Roush:

17-1 I am writing to express, in the strongest of terms, my objection and my community's objection to the proposed Mitchell Ditch, Long Lake and Elm Slough Project. It is my understanding that if this project moves forward at least 3,000 acres of land will be converted to wetlands. It is further my understanding that a good deal of that land is located within the boundaries of Pontoon Beach. We question both the need for this project and disproprionate impact this project will have on our impact.

17-2 It is a well known fact that water flows off the bluffs and into the bottoms. This is natural and would not normally be a problem. However, over the years the amount of this flow has dramatically increased as the bluffs, or more specifically, Edwardsville, Maryville and Glen Carbon have developed and placed more and more of their land under roof and under asphalt parking lots. The result of this development is the water has nowhere to go but flow into the bottoms. While I congratulate these communities on their development, it is unfair to forcibly take prime development ground from my community and other bottom communities so that the communities on the bluffs

Ms. Deborah Roush
Project Manager
June 5, 2003
Page 2

can continue to grow unabated. These communities need to take steps within their own communities to slow the flow of water from the bluffs to the bottoms and not pass the costs of development downstream to my community and the other bottoms' communities.

17-3 I have heard others claim that this land in question is a flood plain and is far from "prime" commericial real estate. However, I would remind you that my community has taken that same supposedly sub-prime land and turned it into one of the fastest growing industrial parks in Illinois, namely the Gateway Commerce Center. Over the last 4 years over $100,000,000.00 in private funds have been spent to develop this park, which in turn has lead to hundreds of new jobs. How is my community to grow if its prime land is continually taken and transformed into swampland? Will the bluff communities provide subsidies to our community, or will we be forced to continue to subsidize their development by having our land taken from us? I would urge you to consider the impact this project will have on us.

17-4 Moreover, even if you believe the distribution of costs and benefits that will result from this project are fair, we strongly question the need for the project. We are in complete agreement with the opinions expressed in the May 29, 2003 letter of Charles Luehmann which explains in very clear terms why this project is not needed. A copy of that letter is being enclosed for your review.

17-5 Additionally, we believe the study upon which this project is based is faulty in that a number of items were not considered by the study. Again, these issues are well addressed in the May 29, 2003 letter of Charles Luehmann and as such I will not repeat them in this letter other than to say we are in agreement with them. However, I would like to draw your attention to the fact that the study fails to address the effects these "wetlands" will have on the community. Having lived in this area most of my life, I know that wetlands are mosquito breeding grounds. I cannot tell you how many homeowners have expressed concerns to me that if this project moves forward their loved ones will be put at a much greater risk of contracting the West Nile Virus and a host of other diseases carried by mosquitos. What should I tell these people, it is more important for the bluffs to grow than it is to keep the people in the bottoms safe? This, and other issues, in my opinion, need to be studied further before this project can move forward.

I would be happy to make myself and my staff available to discuss this issue further.

Sincerely,

Harold "Jim" Denham
Village President, Pontoon Beach, Illinois

CC: Jerry Costello

17. City of Pontoon Beach, Illinois

17-1. Of the approximately 85,000 floodplain acres that lie between the Cahokia Diversion Canal and the flank levee at Dupo, only approximately 4,500 acres of wetland restoration is recommended in the current plan. The Elm Slough action area and a portion of the Judy's/Burdick action area lie within Pontoon Beach as depicted on Figure 7-3 of the Draft Report.

17-2. The Project, as recommended, is an environmental restoration project designed to restore important habitats that have been lost or degraded on the floodplain. These habitats are important resources to the state, region, and nation. They are used as migratory and breeding habitat by a number of designated threatened and endangered species, as well as others that are of concern because of declining population levels, such as some waterfowl, waterbird, shorebird, and landbird species.

17-3. The action areas recommended in the current plan for restoration were historically wetlands, and once were forest, prairie, or marsh. Restoration work recommended on the floodplain is not designed to penalize or subsidize one community over another, but rather to restore significant resources. These resources cannot be replicated elsewhere.

17-4. Reponses to Mr. Charles Luehmann's letter are located later under item 41.

17-5. Section 3.12.4.2 and Section 10.8 of the draft study report discuss issues related to the West Nile Virus. Documentation to-date indicates that diseases such as West Nile Virus can proliferate in areas where natural sources of surface water, such as wetlands, are absent. In urban or developed areas, mosquitoes carrying West Nile Virus can breed in small pockets of water often found in back yards and around businesses. In these urban settings, natural predators of mosquitoes are often absent or in low numbers. Restoring healthy wetlands that sustain populations of predators, such as dragonflies, which can control mosquito populations. As further information is developed regarding these issues, they would be incorporated into Project considerations and designs. Public education and involvement would provide answers to citizen's concerns about the threat of West Nile Virus and other concerns as the Project moves forward.

Helen M. Hawkins
Madison County Board Member
District #16
2600 Angela Drive
Granite City, IL 62040
618-797-6009

April 2003

Ms. Deborah L. Roush, Project Manager
Planning, Programs & Project Management Division
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Ms. Roush:

Thank you for the invitation to address our problem at the April 8th Public Hearing regarding the Wetlands known as Dobrey Slough.

The Corps of Engineers Public Information Fact Sheet, December 1988, American Bottoms, shows Dobrey Slough as the lowest area in Madison County. (See 1983 depth of groundwater)

Your re-evaluaion study, looking for new solutions to old problems, may be of benefit to some of the American Bottoms. However, your approval of developments in Dobrey Slough is, to say the least, a slap in the face to those of us who educated the Corps, federal and state agencies, about building in wetlands since the year 1965.

It was because of places like Dobrey Slough that congressional actions were taken under the Flood Control Act. We were just another one of those authorized segments that continues to sink in the watery sand.

18.1 I see nothing in the study area that will alleviate our high underground water table flooding problem. I do see all the development you have approved as a total deterioration to (as your own report shows) the lowest area in Madison County. Underground water travels fast to its lowest point.

The next time the Mississippi River is at flood stage from the snows melting in the north and rushing to the lower Mississippi and heavy rains hit us, you will understand what the wetland problem is all about in Dobrey Slough.

Until then, I remain

Helen M. Hawkins

Helen M. Hawkins

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 TUCKER BOULEVARD, NORTH
ST. LOUIS, MISSOURI 63101

REPLY TO ATTENTION OF

July 13, 1984

Economic and Social Analysis Branch
Planning Division

Hubert & Helen Hawkings
2600 Angela Drive
Granite City, IL 62040

Dear Respondent:

Thank you for responding to our recent mailing regarding groundwater problems in your area. It may interest you to know that over 2,200 households in zip code 62040 responded to our inquiry. The interest you have shown will certainly aid us in our study objective of developing solutions to the groundwater problems which exist in the American Bottoms area.

We will endeavor to evaluate all groundwater damage that has occurred in the area. To accomplish this we have prepared a brief questionnaire that will provide additional information. This will permit us to document the amount and extent of damages caused by the underground water. I would appreciate it if you would take a few moments to fill in the enclosed questionnaire. A self-addressed, stamped envelope is also provided.

I appreciate your past cooperation and am hopeful that our mutual efforts will lead to a solution.

Sincerely,

Gary D. Beech
Colonel, Corps of Engineers
District Engineer

Enclosures

And 11 years later they told us there is no solution, See no help coming for flood victims July 1, 1995

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ıds of marijuana. 3B

Section B
Saturday, July 1, 1995

No help coming for flood victims

Housing sits on wetlands

By Amber Grimes
Belleville News-Democrat

> *"They told us the development shouldn't have been built here. They told us there just isn't a solution."*
> — Resident Helen Hawkins

GRANITE CITY — Helen Hawkins is thinking of turning her basement into a beach.

She says there's enough water.

"I've had several government officials tell me to just fill it in with sand," said Hawkins. "I could go ahead and make it into a beach for my grandkids."

The water in the basement is nothing new for the residents in the Nameoki Township area known as Dobrey Slough.

They have had to put up with wet basements, cracking walls and other problems that come every year with the spring rains. The problems started in 1973 when new construction in the area started affecting the water table.

Hawkins, who lives at 2600 Angela Drive, said residents are getting use to their plight.

"They built our subdivision on land that was designated as wetlands," Hawkins said. "Every time it rains we get more damage."

Hawkins, who bought her house on Angela Drive in 1968, didn't know her house was built on Dobrey Slough. The area, which has a lower elevation than neighboring Granite City, collects runoff water from the city.

There is currently 36 inches of water in Hawkins' basement. The water covers the bottom two stairs.

U.S. Army Corps of Engineers employees have told the residents there is not a lot they can do about the flooding problems.

"They told us the development shouldn't have been built here," Hawkins said. "They told us there just isn't a solution."

Anson Eickhorst, executive assistant to the director of the St. Louis division of the Corps of Engineers, said there is nothing that can be done for the residents whose homes are built around the slough.

"The slough's like a pond," Eickhorst said. "It connects with the ground water table. The homes were built in a period when the ground water level was lower. The water has come back up now and there is no other place for it to go."

Eickhorst said the residents can expect problems as long as the water table remains high.

Neighbors Rhoda White and Melinda Cooper have also had problems.

White, who lives at 2632 Angela Drive, and her husband have filled in their basement with sand.

When it rains, Cooper's house is surrounded by water.

"We'll have water up to our door," Cooper said. "Our basement floods. The bricks have shrunk from around the windows. I've had water coming in my bedroom window. It's just ridiculous."

Hawkins, who is also the Nameoki Township clerk, said the damage could have been avoided.

"I just wish that people had been watching when our subdivision was being built over a natural body of water," Hawkins said. "This subdivision should have never been built."

Madison County State's Attorney Bill Haine agrees with Hawkins.

Back in 1991, Haine filed a permanent injunction against developers to stop further development in the Dobrey Slough.

Steven Lathrop, president of Ramm Development Inc., who was responsible for the newest construction, could not be reached for comment.

Quad-City Area 'On Its Own' in Flood Water Fight

FLOOD WATERS of Dobrey slough engulf homes along Angela drive (lower foreground) and Roney drive (upper left), as one of most critical problems resulting from last week's heavy rains. This view is northwesterly, and shows the slough extending to Maryville road in upper left portion of the photo. Backup waters extend southeasterly to block drainage of the Cloverview area in Granite City.

This is what happens once the water table is high and the rains come.
H. M. H.

[redacted]

US Army Corps of Engineers
St. Louis District

Public Information Fact Sheet

Number 1 December 1984

American Bottoms Groundwater Study

Groundwater alert!

For the past several years and continuing into 1984, the water below the ground surface (groundwater) under parts of the American Bottoms area rose higher than ever before, according to reports that go back over the past 70 years or so. Some residents have had problems that varied in seriousness from minor seepage in basements to collapsing foundations and a number of sewer lines have broken in several communities. This is a difficult situation because the source of the problem, high groundwater, is not visible (so the risk is not as apparent as would be the case with surface water flooding) and also because damages are not usually covered by insurance—not even by flood insurance.

Why we're issuing this pamphlet.

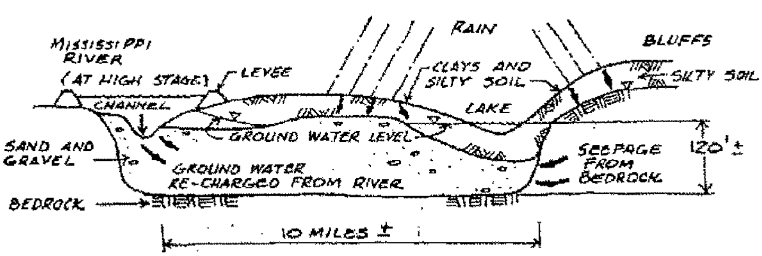
While Corps of Engineers' representatives were talking to local residents to obtain damage information for use in an ongoing groundwater study, many people were kind enough to invite us into their homes so we could examine the damage firsthand and so we could also observe the various measures that were being used in an attempt to avoid or minimize damage. We have prepared this pamphlet to share the information that we are developing with the assistance and cooperation of the local people. In this way, we hope to express our thanks for the help and also to give others an opportunity to learn from the experience of their neighbors.

What's causing the problem?

Over the years, the American Bottoms area has been subjected to flooding from three sources: from the Mississippi River and the local tributary streams. Form heavy rains over the bottomland and runoff from the uplands; and from groundwater. Direct flooding from the Mississippi River and major streams has been controlled by a system of high levees and floodwalls constructed by the Corps of Engineers during the 1960's. Interior flooding, due to rainfall over the bottomlands as well as from upland runoff, has been reduced by the channels, low levees and pumping stations constructed by various organizations including the Corps, the State of Illinois, the Metro-East Sanitary District and local industries. The Corps is also close to completing a study that will determine if additional improvements can be made to control flooding from rainfall and runoff. So far, not very much has been done to help solve groundwater problems. As one exception, the Illinois Highway Department has successfully kept highway underpasses from flooding by pumping nearby wells.

(continued on pg. 2)

Fig. 1



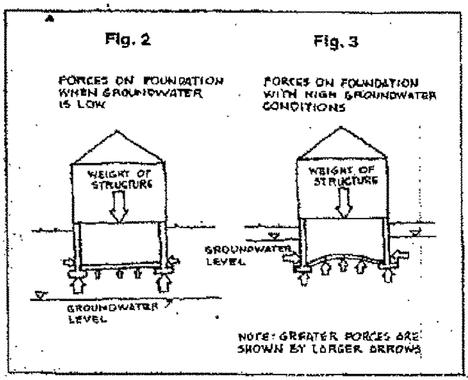
.om pg. 1)

The groundwater is contained within the thick (up to 120 feet) layer of sand and gravel which lies below the surface soil. The sand and gravel layer acts like a sponge as it slowly absorbs water within the pore spaces between particles or slowly releases the water (unless it is pumped from a well—much like squeezing a sponge). Figure 1 shows what the river valley would look like if we could see it from a side view, looking northward. When the river is high, water can be forced into the sand and gravel and this can raise the groundwater level high enough to reach into the finer grained surface soils. Rainfall over the bottomlands can also filter down through the soil and seepage from bedrock can add to the volume of groundwater. All of these conditions have been unusually severe over the past several years. For example, records show that the Mississippi River stage averaged 6.6 feet above normal during 1982 and 5.5 feet above normal in 1983. Rainfall during 1982 totalled 55 inches (53 percent above normal). The total for 1983 was almost 45 inches or 25 percent above normal.

At one time, the large volume of groundwater was considered a valuable resource and water-using industries were attracted to the American Bottoms area. As recently as 1966, groundwater use reached a peak of 104 million gallons per day. Since then, however, pumping has declined as some companies have closed or relocated out of the area and as others have decided to recycle water or to draw supplies from surface water sources. As you might expect, where pumping was reduced, the groundwater rose to approach the level that would exist under natural conditions.

The trouble with high groundwater is that it pushes against underground structures (exerting the same kind of buoyant force that floats heavy ships). Unfortunately, basement floors and walls, sewer lines and septic tanks are not free to float. Instead, they are held in place by their weight and by the surrounding soil. If the structures are not strong enough to resist the rising pressures, they will break and allow the groundwater to flow in. Figure 2 shows how forces act against a structure during a normal, low groundwater period. Figure 3 shows the increased forces against the basement floor and walls as would occur when the groundwater level is high.

For typical residential construction, when the groundwater rises about two feet above the level of the basement floor, the buoyant force would be great enough to crack the floor slab.



Once a crack develops, the groundwater can flow into the basement and some of the foundation soil can also be washed in (this is sometimes called "piping"). If enough soil is removed by flowing groundwater or by excessive pumping, a void can develop and the unsupported part of the structure can break free and slump into the cavity. Such a condition is shown by Figure 4.

If high groundwater is expected in a particular area, the problems can be overcome by designing the underground structures so they are strong enough to withstand damage. Better yet, problems can be avoided altogether by enacting and enforcing ordinances that control or prohibit construction of underground structures (especially basements) in these areas. Unfortunately, many residences and other buildings and many miles of sewer lines were built during the 1950's and 1960's when weather conditions were relatively dry and before rising groundwater was recognized as a potential problem.

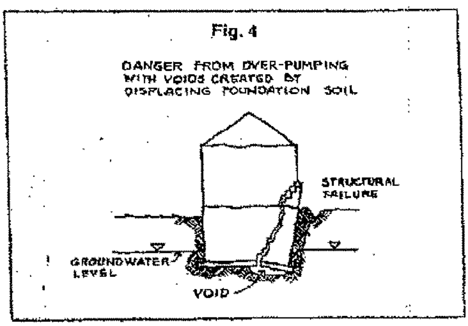


TABLE 1

Approximate Depth of Groundwater in 1983 and Greatest Depth Recorded (year)—According to Computer Model

Location	1983 Depth*	Greatest Depth (Year)
Nameoki Township		
Unincorporated Areas		
Pine St. at Alton & Southern Railroad Right of Way	6-feet	11-feet (1941)
Holly at Hemlock St.	7-feet	14-feet (1941)
Granite City		
Nameoki Drive and Circle Drive	11-feet	20-feet (1956)
Monroe St. and August Ave.	12-feet	19-feet (1941)
Madison		
Ewing and 6th St	10-feet	17-feet (1941)
Venice		
Broadway and Granite St.	8-feet	19-feet (1956)
Pontoon Beach		
Pontoon Road and East Lake Drive	6-feet	11-feet (1956)
Brooklyn		
Canal and 5th St.	9-feet	20 feet (1956)
National City		
Exchange and Stockyard Ave.	19-feet	28 feet (1956)
Washington Park		
Park Drive and 50th St.	10-feet	14-feet (1956)
East St. Louis		
State St. and Belleville	18-feet	20-feet (1941)
St. Clair Ave. and 51st St.	8-feet	13-feet (1956)
Marybell and Pershing	10-feet	17-feet (1956)
Cahokia Mounds State Park Place		
College and Harvard	10-feet	19-feet (1956)
Caseyville		
Caseyville Road and 4th St.	21-feet	23-feet (1954)
Centreville-Alorton		
Mousette Lane and Tudor Terrace	10-feet	14-feet (1941)
Sauget		
Monsanto and Mississippi Ave.	7-feet	19-feet (1956)
Cahokia		
Jerome and Mousette Lane	8-feet	14-feet (1941)
St. Dorothy and St. Monica	5-feet	17-feet (1950)
Water St. and Southern View Dr.	4-feet	18-feet (1956)
Mississippi Ave. and Gloria St	5-feet	15-feet (1956)

*Approximate depths are shown as of 1983 because this is the most recent year for which all river stage and rainfall data are available. Depths shown are believed to be accurate to within 2-feet or less and represent an average for a one-fourth square mile area (a square with each edge measuring one-half mile).

What the Corps of Engineers is doing.

As part of our urban studies program, the Corps has been investigating the groundwater problems for some time. If a plan can be developed that will achieve widespread benefits greater than the cost of improvements, a report will be prepared to recommend the plan for authorization by Congress.

For this ongoing study, the Illinois State Water Survey designed a computerized model that is being used to analyze the effects of various plans for controlling the groundwater level. Results from this model have been compared to actual well measurements and the model's predictions were found to be accurate to within two feet or less. So far, the model has been used to determine if increased pumping by the Granite City Steel Company would help relieve groundwater problems in the Nameoki Township area (preliminary results indicate that it would *not* help to any significant degree) and to prepare the table that is included in this pamphlet. This table shows the current (as of 1983) depth to groundwater and the lowest depth of record at various locations identified by street or road intersections. By referring to this table, residents can see if a potential groundwater problem exists in a given part of the American Bottoms area. When using this table, the accuracy limits of the model should be considered and also the fact that the numbers represent an average depth below the ground surface for a one-fourth square mile area.

The Corps is also assembling damage information that will be used to compute the benefits for various plans. The costs for repairing sewer line breaks are being assembled and additional data on residential damage are being compiled from recent questionnaires. Other items of work that we are considering include a field pumping test and a study of the extra sewage treatment costs that communities may be paying because of groundwater seeping into the sewer lines.

Measures used by some residents while attempting to control basement flooding.

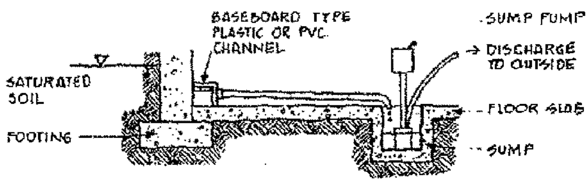
The following sketches show the kinds of measures that residents have used to deal with their basement flooding problems. The costs were reported to range from a very minor amount (in the case of the floor drain plug and the similar standpipe installation) to over $10,000 (for cases where the damage was so great that the owners decided to move the houses to new non-basement foundations). Some homeowners have tried a series of measures, beginning with simple and inexpensive installations and then trying the increasingly elaborate and costly systems, and still many have not achieved good results.

We have prepared these sketches just for your information. *The Corps is not in a position to endorse specific products or to recommend or guarantee the success of any of these measures.* Some of these installations are intended to be used for less serious surface water problems and would be ineffective for seeping groundwater. Others would carry a sizeable risk because the foundation soils could be displaced, causing voids beneath the structure that could lead to eventual settlement and major cracking.

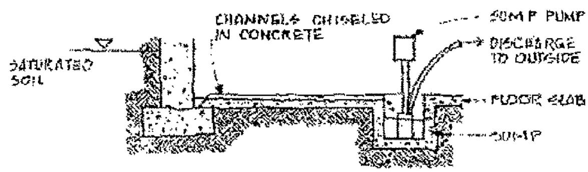
The measure that provides for filling the basement with clean, washed sand (Sketch No. 9) would be hard to accept by many homeowners because of the loss of living or storage space and because of the costs associated with relocating the furnace and water heater as well as the cost of the sand fill. *Yet, this could be the only practical way for individual homeowners to guard against structural damage once rising groundwater starts entering the basement.*

The most effective solution could involve installing large wells at various locations within a neighborhood and pumping the wells on a more or less continuous basis to keep the groundwater at a low level. This measure would be very expensive to install and operate but it could be more affordable if the costs could be shared among the many members of the community who would be benefited. Although such a plan could result from our groundwater study, it would be a number of years before construction would begin according to the normal time required for Congressional approval and appropriation of funds and for completion of detailed designs and plans and specifications.

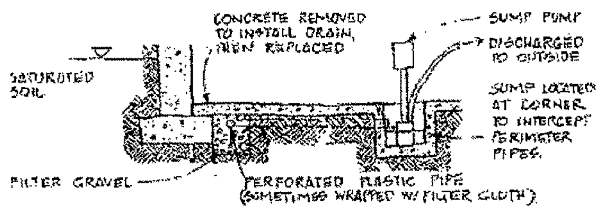
Sketch No. 1.
Baseboard Channels.



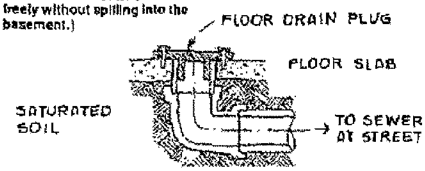
Sketch No. 2.
Channels Chiseled in Basement Floor.



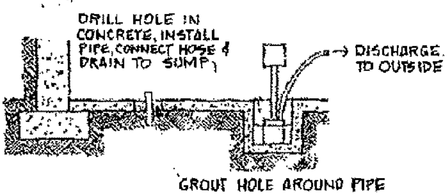
Sketch No. 3.
Perforated Plastic Pipe and Gravel Placed Around Inside of Basement Walls.



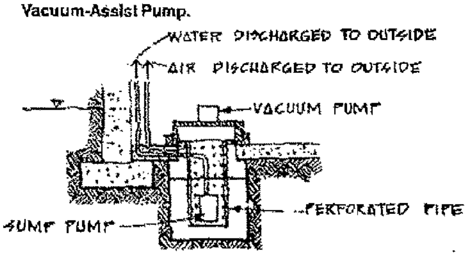
Sketch No. 4.
Floor Drain Plug
(A standpipe is installed the same way. A new section of pipe extends several feet above the drain so waste water can rise freely without spilling into the basement.)



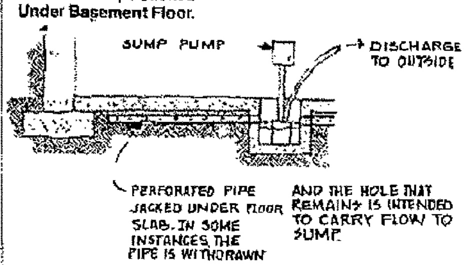
Sketch No. 5.
Vent Pipes Through Basement Floor.



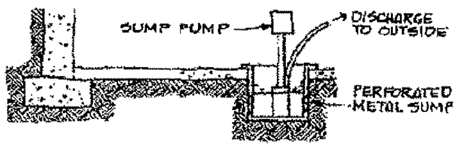
Sketch No. 6.
Vacuum-Assist Pump.



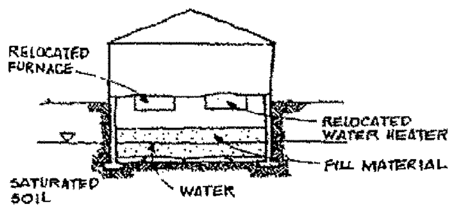
Sketch No. 7.
Perforated Pipe Jacked Under Basement Floor.



Sketch No. 8.
Perforated Metal Sump.



Sketch No. 9.
Furnace and Water Heater Relocated and Basement Filled with Clean Sand.



Suggestions for residents to consider when faced with groundwater problems.

Because of policy and staffing limitations, the Corps of Engineers cannot help solve problems that individual property owners might be facing. However, we can offer some general suggestions, based on information obtained during the course of the current groundwater study.

- When a water problem is first noticed, *it is most important to find out if surface water or groundwater is the cause.* Surface water problems occur only during or shortly after a heavy rainfall. Groundwater problems will continue over a long time, with or without heavy rains. The reason for distinguishing between the two causes is that surface water problems can usually be corrected easily and inexpensively by directing stormwater away from the foundation of the home. Solutions to groundwater problems can be very expensive and the types of measures available to individual property owners may not be acceptable or effective and some could cause additional damage if not properly designed and installed and if over-pumping is allowed to occur.

(continued on pg. 6)

(Continued from pg. 5)

- Check with local government offices to see if assistance or advice is available. Some city or county engineering departments may be familiar with groundwater problems or may be able to recommend experienced engineering firms or contractors.

  Ask your neighbors if they are having similar problems and see if they would be interested in joining together to find solutions. It may be possible to negotiate lower prices from engineers and contractors if more than one residence is involved and the most effective area-wide solutions might be affordable only if many residents would share the costs.

- Because of the difficulty of dealing with groundwater problems and the high cost of potential solutions, it would be worthwhile to obtain expert advice from an experienced and qualifed engineering firm or from a contractor with an engineering staff. The cost for an engineering report could vary from $250 to over $1,500, depending on the amount of detail required, the need to sample and test the soil conditions and the need for construction supervision. *These services could be well worth the cost if they result in practical solutions and help homeowners avoid the kinds of measures that will not be successful.*

- As would be a good idea when considering any major expenditure, obtain the best possible value and reduce the risk of later problems by asking knowledgeable people for recommendations, by checking references, by obtaining information from the local consumer protection agency (such as the Better Business Bureau) and by consulting with an attorney before signing any contract.

- If any plan is being considered that would involve venting groundwater into the basement and then pumping the water to the outside, *it is critically important that a proper filter system be designed and installed between the foundation soil and the outlet into the basement.* The purpose of the filter is to allow the groundwater to flow or seep without causing "piping" (a gradual loss of the sandy or silty foundation soil). Otherwise, voids could develop under the structure so that basement floors and walls would lose support and could crack and settle.

- If a pumping system is already being used, *it is most important to frequently check the sump and the discharge from the pump to see if the water is cloudy or sandy (such conditions can be subtle, so a close inspection is needed). Cracks should also be checked for enlargement or for signs of settlement.* If any of these conditions is noticed, *stop pumping*, disconnect electrical power to low outlets and remove, raise or otherwise protect the items in the basement that would be damaged by water. Then look for expert advice as suggested previously.

- If severe cracking and settlement have already occurred, *safety should be the first concern*. Arrange for the gas company to inspect the service line and interior piping to see if there is any danger of rupturing due to foundation movement. Then, with the previous suggestions in mind, obtain expert advice on ways to stabilize the structure, to prevent future problems and to repair the damage.

In conclusion . . .

Once again we'd like to thank the local people who have taken the time to talk to us about their groundwater problems or to fill out our questionnaires. This information has not only helped us with our ongoing groundwater investigations but has also served as a basis for the subjects we've presented in this pamphlet. We hope to issue more of these fact sheets from time to time, as new results become available from our studies.

18. Madison County Board Member, District #16, Helen M. Hawkins

18-1. Previous studies addressing high ground water levels within the Metro-East area have found no economically viable solution. As a result, no ground water project was undertaken. Your understanding is correct. This study is an environmental restoration project and does not address high ground water tables.

MADISON COUNTY
PLANNING AND DEVELOPMENT DEPARTMENT

Joseph D. Parente, AICP
Administrator

157 North Main Street, Suite 254 Edwardsville, IL 62025-1964

April 8, 2003

U.S. Army Corps of Engineers
St. Louis District
ATTN: CEMVS-PM-F (Roush)
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Ladies and Gentlemen:

Please accept this letter of support for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project. The recommended projects listed in the General Reevaluation Report would restore natural habitat areas and provide other flood control benefits to Madison County. These improvements are needed to correct problems that have been the result of many decades of urbanization in the American Bottoms and adjoining upland areas.

The plan's recommendation of using storm water from upland watersheds to be stored in the natural habitat areas will minimize flooding hazards in the bottomland area. Supplying these recharge areas will also allow for the restoration of the ecosystem providing benefit to the natural environment. Other significant objectives being addressed by the project include reducing sedimentation and enhancing outdoor recreation opportunities.

The problems that exist have occurred as the result of urbanization in Madison County. The problem will only worsen unless significant modifications are made. The implementation of East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project is necessary and essential to address flooding and ecosystem degradation in the American Bottoms area.

Sincerely,

Joseph D. Parente

Joseph D. Parente, AICP
Administrator

JP

Phone: (618) 692-7040, ext. 4468 Fax: (618) 692-8982 Email: zoning@co.madison.il.us
Building and Zoning, 4468 ■ Code Enforcement, 4565 ■ Environmental Lab, 5234 ■ Planning, 5205 ■ Recycling, 4666 ■ Solid Waste, 4468

19. Madison County Planning and Development Department

Comments noted.

MADISON COUNTY BOARD

157 NORTH MAIN STREET STE 165
EDWARDSVILLE ILLINOIS 62025-1963
(618) 692-6200 EXT. 4341 FAX (618) 692-7476
e-mail: coboard@co.madison.il.us

April 8, 2003

U.S. Army Corps of Engineers
St. Louis District
ATTN: CEMVS-PM-F (Roush)
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Ladies and Gentlemen:

Madison County has actively supported the mitigation of hazards associated with frequent flooding of the American Bottoms area. Recent events have included major disaster declarations. The control of flooding in this area is necessary to reduce damage to property.

Please accept this letter of support for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project. The project, if constructed, will provide much needed relief from flood damage that has increasingly occurred as the result of urbanization in our county. In addition, the project benefits related to the restoration of natural areas will positively benefit the environment in the American Bottom area.

I encourage your agency to seek authorization for the implementation of this project.

Sincerely,

Alan J. Dunstan

Alan J. Dunstan
County Board Chairman

jp

20. Madison County Board

Comments noted.

METRO EAST REGIONAL STORMWATER OFFICE

Serving Madison, St. Clair, Monroe Counties and Metro East Sanitary District

1800 Edison Avenue, P.O. Box 1366, Granite City, Illinois 62040 (618) 452-9400 Fax (618) 452-4810

April 8th, 2003

U.S. Army Corps of Engineers
St. Louis District
ATTN: CEMVS-PM-F (Roush)
1222 Spruce St.
St. Louis, Mo 63103-2833

Dear Ladies and Gentlemen:

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Please accept this letter of support for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project. The project, if constructed, will provide much needed relief from flood damage that has increasingly occurred as the result of urbanization in our county. In addition, the project benefits related to the restoration of natural areas will positively benefit the environment in the American Bottom area.

I encourage your agency to seek authorization for the implementation of this project.

Sincerely,

Michael Fruth
Madison County Stormwater Coordinator

METRO EAST REGIONAL STORMWATER OFFICE
Serving Madison, St. Clair, Monroe Counties and Metro East Sanitary District
1800 Edison Avenue, P.O. Box 1366, Granite City, Illinois 62040 (618) 452-9400 Fax (618) 452-4810

April 8th, 2003

U.S. Army Corps of Engineers
St. Louis District
ATTN: CEMVS-PM-F (Roush)
1222 Spruce St.
St. Louis, Mo 63103-2833

Dear Ladies and Gentlemen:

I am submitting this letter on behalf of the Regional Stormwater Committee asking that you please accept this letter of support for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project. The recommended projects listed in the General Reevaluation Report would restore natural habitat areas and provide other flood control benefits to Madison and St. Clair Counties. These improvements are needed to correct problems that have been the result of many decades of urbanization in the American Bottoms and adjoining upland areas.

The plan's recommendation of using storm water from upland watersheds to be stored in the natural habitat areas will minimize flooding hazards in the bottomland area. Supplying these recharge areas will also allow for the restoration of the ecosystem providing benefit to the natural environment. Other significant objective being addressed by the project include reducing sedimentation and enhancing outdoor recreation opportunities.

The problems that exist have occurred as the result of urbanization in Madison and St. Clair Counties. The problem will only worsen unless significant modifications are made. The implementation of East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project is necessary and essential to address flooding and ecosystem degradation in the American Bottoms area.

Sincerely,

Michael Fruth
Madison County Stormwater Coordinator

21. Metro East Regional Stormwater Office - Madison County

Comments noted.

21-1 Metro East Regional Stormwater Committee

Comments noted.

MESD

METRO EAST SANITARY DISTRICT

Mac G. Warfield
Executive Director

1800 EDISON AVENUE
P.O. BOX 1366
GRANITE CITY, ILLINOIS 62040-1366

Phone: (618) 452-9400
Fax: (618) 452-4810

April 8th, 2003

U.S. Army Corps of Engineers
St. Louis District
ATTN: CEMVS-PM-F (Roush)
1222 Spruce St.
St. Louis, Mo 63103-2833

Dear Ladies and Gentlemen:

I am submitting this letter on behalf of the Regional Stormwater Committee asking that you please accept this letter of support for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project. The recommended projects listed in the General Reevaluation Report would restore natural habitat areas and provide other flood control benefits to Madison and St. Clair Counties. These improvements are needed to correct problems that have been the result of many decades of urbanization in the American Bottoms and adjoining upland areas.

The plan's recommendation of using storm water from upland watersheds to be stored in the natural habitat areas will minimize flooding hazards in the bottomland area. Supplying these recharge areas will also allow for the restoration of the ecosystem providing benefit to the natural environment. Other significant objective being addressed by the project include reducing sedimentation and enhancing outdoor recreation opportunities.

The problems that exist have occurred as the result of urbanization in Madison and St. Clair Counties. The problem will only worsen unless significant modifications are made. The implementation of East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project is necessary and essential to address flooding and ecosystem degradation in the American Bottoms area.

Sincerely,

Mac G. Warfield
Executive Director

22. Metro East Sanitary District

Comments noted.

Nameoki Township

4250 HIGHWAY 162 • GRANITE CITY, IL 62040
Telephone (618) 931-1230

KEN DAVIS
SUPERVISOR

April 15, 2003

U.S. Army Corps of Engineers
St. Louis District
ATTN: CEMVS-PM-F (Roush)
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Ladies and Gentlemen:

I am submitting this letter as a Board Member of the Regional Stormwater Committee. The recommended projects listed in the General Reevaluation Report would restore natural habitat areas and provide other flood control benefits to Madison County. These improvements are needed to correct problems that have been the result of many decades of urbanization in the American Bottoms and adjoining upland areas.

The plan's recommendation of using water from upland watersheds to be stored in the natural habitat areas will minimize flooding hazards in the bottomland area. Supplying these recharge areas will also allow for the restoration of the ecosystem providing benefit to the natural environment. Other significant objectives being addressed by the project include reducing sedimentation and enhancing outdoor recreation opportunities.

The problems that exist have occurred as the result of urbanization in Madison County. The problem will only worsen unless significant modifications are made. The implementation of East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project is necessary and essential to address flooding and ecosystem degradation in the American Bottoms area.

Sincerely,

Ken Davis
Township Supervisor

KD/tw

23. Nameoki Township

Comments noted.

David A. Dietzel
County Engineer

Gary F. Stahlhut
Assistant County Engineer

Office of the County Engineer

Madison County Highway Department

7037 Marine Road
Edwardsville IL 62025

Telephone 618-692-6200 ext. 4540
Fax 618-692-7049

April 16, 2003

Deborah Roush
U.S. Army Corps of Engineers
St. Louis District
1222 Spuce Street
St. Louis, MO 63103-2833

East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project

Dear Ms. Roush:

The County of Madison encourages and supports the above mentioned project, being a solution to the interior flooding problems experienced in Madison and St. Clair Counties of Illinois.

Yours truly,

David A. Dietzel, P.E.
County Engineer

Gary F. Stahlhut, P.E.
Asst. County Engineer

GFS/kh

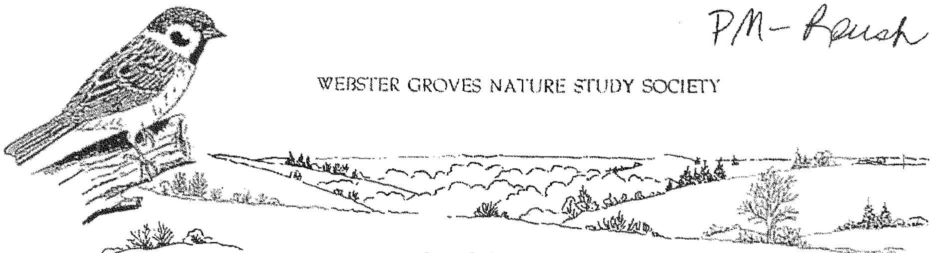
cc: Michael Fruth
Madison County Stormwater Coordinator

24. Office of the County Engineer, Madison County Highway Department

Comments noted.

PRIVATE ORGANIZATIONS

PM - Roush



WEBSTER GROVES NATURE STUDY SOCIETY

May 3, 2003

By Fax to: (314) 331-8741 and by U.S. Mail

Colonel C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103

Re: General Reevaluation Study and Draft EIS -
East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project in Madison and St. Clair Counties, Illinois

Dear Colonel Williams:

The Webster Groves Nature Study Society is interested in certain aspects of the proposed flood control project referred to above, specifically with regard to the wetlands known as **Indian Lake** along Collinsville Road, formerly referred to as the Collinsville Golf Course. Indian Lake is a wetlands that has been allowed to revert to its natural condition now that it is no longer being used as a golf course. Since its restoration, many bird species have returned to Indian Lake both in migration and breeding season. We would object to any habitat change altering Indian Lake's natural function as a wetlands and we would also object to any proposed excavation of the area, since excavation activities would destroy the vegetation that is presently providing habitat.

We have been unable to review the draft EIS sent to WGNSS on a C.D. because the material is so extensive that reviewing it on a computer screen is impractical. It is impossible to submit public comment on the draft EIS provided on C.D. because:

1. The material on the C.D. would exceed 3,000 pages if printed out, and much of the material consists of graphics that I do not have the capacity to print, especially if the paper would need to be larger than 8 ½ x 11. It is burdensome to require members of the public to print out a C.D. of that size in order to review it in order to make public comment.

2. The Corps was unable to provide WGNSS with a hard copy of the draft EIS. I requested that the Corps send me a printout of the materials included on the C.D. and I was told that no hard copy exists, even for the text portion (omitting graphics).

We are therefore requesting an **extension to submit public comment** on the draft EIS regarding this project until such time as a hard copy of the document is available to the public for review. We are further requesting that **all sections of the draft EIS relating to Indian Lake be sent to WGNSS in hard copy form.**.

In addition, we understand that other groups and individuals are interested in the entire project, and we support these groups' requests for the entire draft EIS in hard copy form.

Thank you for considering our requests.

Very truly yours,

Yvonne Homeyer, President
1508 Oriole Lane
St. Louis, MO 63144
(314) 863-3321

25. Webster Groves Nature Study Society

The Corps of Engineers furnished a letter in response (attached).

PM-F R/F

MAY 13 2003

Planning, Programs and Project Management Division
Planning and Project Development Branch

Ms. Yvonne Homeyer, President
Webster Groves Nature Study Society
1508 Oriole Lane
St. Louis, Missouri 63144

Dear Ms. Homeyer:

Thank you for your interest in the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project. You requested an extension in the period of time for public comment on this project. The original public comment period began February 28, 2003, and closes on May 7, 2003, in excess of 60-days. At your request, I will accept public comments for an additional 30 days. The comment period will now close on June 7, 2003.

Plans for Indian Lake remain the same as discussed at length with you and representatives of your organization, the American Bottoms Conservancy, St. Louis Audubon Society, Monroe County SWCD and the Piasa Palisades Sierra Club, on November 13, 2002. The recommended plan proposes that the area remain a wetland habitat that will be enhanced through the restoration of a remnant of the historic Old Cahokia Creek, tree plantings and the addition of nesting resources.

Unfortunately, I cannot accommodate your request for printed hard copies of the report. The distribution medium for this report was carefully considered based on the size, complexity and color requirements for display of the information. I recommend that you use the find function on the file to locate all sections of the report for which you are searching for specific information. Using this tool will assist you in quickly finding those topics of direct interest.

We look forward to receiving your comments on this project.

Sincerely,

Signed
C. Kevin Williams
Colonel, U.S. Army
District Engineer

C. Kevin Williams
Colonel, U.S. Army
District Engineer

American Bottom Conservancy

527 Washington Place, East St. Louis, IL 62205-2039
(618) 271-9605, Fax (618) 271-9651
abc@digitalesl.org

May 4, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

Via Fax to: (314) 331-8741 and by email

Re: General Reevaluation Study and Draft EIS - East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project in Madison and St. Clair Counties, Illinois

Dear Colonel Williams:

As we indicated at the public meeting held in this matter on April 8, American Bottom Conservancy (ABC) would very much like to see preservation, enhancement and restoration of the American Bottom ecosystem. That is our mission. We appreciate the time and effort that went into compiling and writing the report and the draft programmatic environmental impact statement for this project. We are grateful for having a compact disc of the report for future reference.

We hereby request a 90-day extension of the May 7 deadline for public comment in this matter because

1) the report is so extensive (3,000 pages) that there simply has not been enough time to read it, let alone analyze it and write comment;

2) there are no printed copies available to the public;

3) there were no printed copies available to the public even at the public meeting;

4) it is on compact disc only;

a) not all members of the public have access to computers;

b) not all members of the public know how to use computers;

c) those members of the public who have computers rarely have laptops to take to the sites to interpret the maps and charts;

d) downloading the report is extremely time-consuming and consumes much space on one's computer and accessing the report eats up one's computer memory, making the task immensely labor-intensive and time-consuming;

e) printing the report is costly and must be done in small sections at a time due to limitations on printer memory.

ABC has spent countless hours trying to download and print the report, and as of this date, still does not have a complete copy.

5) copies in black and white lose essential information contained in the maps and some of the charts, rendering them virtually useless; the cost of printing color copies is prohibitive to citizens;

6) there was not sufficient notice to the public of the April 8 meeting.

a) although ABC was notified--and we appreciate that--some citizens and organizations who met with the Corps last year specifically on this project were not notified;

b) citizens who live in several areas that will be affected by the project were not notified, including citizens in East St. Louis, people living along Judy's and Burdick Branches, farmers near the Edwardsville bluff action area, and residents in State Park Place;

c) ABC board members have been in contact with a number of people who indicate they knew nothing of the project or the meeting. Some citizens of Madison County said they did not think a project called "East St. Louis and Vicinity..." affected them. Others say they were simply not notified.

d) members of the Dayton-Wedgewood Neighborhood Assn. who met with the project manager more than a year ago on this very project say they were not notified of the meeting. One said after the meeting she looked through newspapers to see if there were any articles and saw only a tiny public notice in the back of the East St. Louis Monitor. (ABC is merely reporting citizen complaints; we have not verified the public notice or articles, if any, published in local papers.)

e) members of the Native American community were not contacted, even though much of the project involves cultural resources and sacred ground.

7) for many of the above reasons, ABC and a number of citizens and organizations have been unable to complete their review of the document in order to make informed public comment.

8) even many agency personnel we have been in contact with have been unable to review the document because of its size, complexity, lack of a printed copy and the difficulty of

extrapolating information from an office computer to field observation.

We realize that this is a big project, covering a large area, and that it has been in the planning stages for many years. ABC has tried to participate in all aspects of the project and to notify others. Because this project will cost taxpayers more than $200 million, it is essential that the public be fully informed and allowed full participation in the process. There are many components of the project, involving many different communities and individuals--even two different counties, Madison and St. Clair. The project has changed from an Interior Flood Control Project to Ecosystem Restoration and Flood Damage Reduction. It appears likely that there will be no Water Resources Development Act bill this year, and the Administration has cut the Corps budget and frozen all new construction, so there would be **no harm caused by allowing full public participation and an extension of the public comment period.** In fact, the project could very well be improved by the process, providing more benefits with fewer costs.

We also think it vital that the Corps provide printed copies in libraries or technology centers throughout affected communities. The Neighborhood Technical Assistance Center in East St. Louis, where ABC has an office, would be one such ideal location. ABC printed and made copies of the 584-page report available to the public, but we were unable to open and print all of the appendices. We did not have color copies of the maps and charts. While we agree with the sentiment you expressed at the public meeting when we objected to the unavailability of printed copies of the need to save trees, **the public must have access to the complete report in a printed form.**

The project manager at the public meeting stated that CDs were distributed to local libraries. Following that announcement, several members of ABC and other members of the East St. Louis community asked to view the CD at the East St. Louis Public Library. We inquired at three different times of three different employees. None knew anything about the project or the availability of the CD.

Request for Tour. In addition to the 90-day extension of the deadline for comment and a printed copy of the report with maps, charts and diagrams in color, ABC, in conjunction with other organizations and agencies, requests a **tour of the project areas,** similar to the one provided elected officials at the beginning of the project. We are supported in this request by the Illinois Department of Natural Resources Office of Water Resources, Metro East Stormwater Committee, Sierra Club and Webster Groves Nature Study Society. It is difficult to get a field, on-site perspective through a CD in one's office.

Additional Public Meetings. We also request two more public meetings: one in East St. Louis for members of that community not informed of the public meeting held in Collinsville, and a second meeting for citizens in other parts of the Bottom, who did not realize that a project called "East St. Louis and Vicinity..." affected their lives and their property or who were unaware of or unable to attend the first public meeting. Although ABC is appreciative of the opportunity to ask questions at the evening public meeting held after the daytime open house, some attending the public meeting at night thought the evening session would be a public hearing and were confused by the format. We heard some go away grumbling that they would simply contact their lawyers.

More public meetings and public involvement could help to work through concerns.

We hope, too, that you will ensure that public meetings are public and that all people be included. We note that the Corps held a meeting with several citizens in East St. Louis two weeks ago and then did not show up for another scheduled meeting with a second group, who reportedly was told that the project manager got comments from the first group and didn't need any more, that they weren't going to do the Wedgewood project. People at the second meeting thought they should have the opportunity to voice their opinion and citizens who weren't invited to either meeting could not understand why meetings were closed to them and wanted the opportunity to explore alternatives.

(While ABC will submit more detailed comment on Wedgewood in our public comment, we implore the Corps not to just walk away from the project. Flooding affects many citizens in East St. Louis and surrounding communities. They want to know how they will be helped or hurt should the project be constructed or abandoned. Just abandoning the project because citizens don't want Marybelle/Summit Av. closed is unfair. Both ABC and the East St. Louis Community Action Network told the Corps several years ago that citizens in East St. Louis did not support the closing of that major arterial. We assumed that the Corps would propose an alternative, not just walk away and say if you don't want it, we won't do it. The idea was to address flooding in East St. Louis. How does walking away do that? Do you intend to retain the upland component of the project? Will you look for alternatives to closing Marybelle/Summit? Can you help the area instead through stormwater detention on the bluff, streambank stabilization, sediment removal and ditch maintenance? These alternatives need to be explored--at a public meeting. We are dismayed that alternatives have not been proposed for Wedgewood.)

Report not available at Public Meeting. We note--in further support of our request for an extension of the comment period and for printed copies of the report--that **there was no printed copy of the report available to the public at either daytime or evening public session.** How could those attending the meeting make informed public comment? How could the vast majority of the affected public--without a CD or even access to a computer--make informed public comment? This is unacceptable.

And while it may be legal to not provide written copies according to Corps guidelines, it surely violates the spirit of public involvement and the Environmental Operating Principles introduced by Lt. General Robert Flowers, Chief of Engineers, last year. Gen. Flowers said: "We will respect the views of individuals and groups interested in Corps activities, listen to them actively, and learn from their perspective." In order for citizens to have perspectives and then share them, they must be given the necessary information from which to gain perspective and formulate opinion. Otherwise, it is an empty promise.

Broad Support for Extension, Copies, Meetings, Tour. ABC has broad support among community and environmental organizations, including Sierra Club, Mississippi River Basin

Alliance, Illinois Stewardship Alliance, Webster Groves Nature Study Society, East St. Louis Community Action Network, Olivette Park Neighborhood Association in East St. Louis, Dayton-Wedgewood Neighborhood Assn. in East St. Louis, Project Dupo, Metro East Stormwater Committee, Illinois Department of Natural Resources, various public officials, the City of East St. Louis and other agencies for its request for an extension, for printed, color copies of the document, for a public tour and for more meetings.

At the May 1 Metro East Stormwater Committee meeting, we indicated that ABC was requesting an extension of the public comment period and a tour. Members of the Committee and Illinois Department of Natural Resources Office of Water Resources expressed support for both; Arlan Juhl of IDNR indicated he had already decided to request an extension and favored the tour. Several members of the committee offered the use of a Madison County Transit bus or van for the tour. ABC would be happy to organize the tour if the Corps and DNR would lead it.

The night of May 1, the East St. Louis City Council voted to ask for an extension of the public comment period, for a public meeting in East St. Louis and for alternatives to Wedgewood.

We look forward to working with you to help make this project truly ecosystem restoration that will also reduce flood damage in the American Bottom. We think it will be a better project with greater public involvement.

Thank you for your consideration of our requests for an extension, a tour, additional meetings and printed copies.

Respectfully submitted,
Kathy Andria
Kathy Andria, President

cc: Deborah Roush

26. American Bottom Conservancy

The Corps of Engineers furnished a letter in response (attached).

MAY 1 3 2003

Planning, Programs and Project Management Division
Planning and Project Development Branch

Ms. Kathy Andria
President, American Bottoms Conservancy
527 Washington Place
East St. Louis, IL 62205-2039

Dear Ms. Andria:

Thank you for your interest in the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project. You requested an extension in the period of time for public comment on this project. The original public comment period began 28 February 2003 and closes on 7 May 2003, in excess of 60 days. At your request, I will accept public comments for an additional 30 days. The comment period will now close on 7 June 2003. Unfortunately, due to the time constraints associated with project coordination, I cannot accommodate your request for an additional 90 days. Recognizing the 7 June 2003 deadline, the public comment period will now exceed 90 days. I am sure you will agree that this is a reasonable time for a project of this size.

Three public meetings and a hearing have been held for this project, two official tours of the area have been conducted, the project has been discussed in an open public forum monthly for the past 3 years at the Metro East Regional Stormwater Committee Meetings, and dozens of special group presentations have been accommodated. No further public meetings or hearings are scheduled for this phase of the project. However, as you know this draft study report includes a Programmatic Environmental Impact Statement. This means that future public involvement and coordination would occur as each action area is undertaken should this project be approved for implementation.

If the American Bottoms Conservancy is able to organize a tour of the project area during the remaining open comment period, I will commit to provide a team member to lead a tour and answer questions. Time and resources however, do not permit us to extend you the courtesy of organizing and funding a tour of the project area.

The American Bottoms Conservancy is misinformed regarding coordination with the Native American community. The tribal chairperson and appropriate representative for each of the tribes with whom the St. Louis District consults have been provided notice and information on the project.

PM-F Reading File

Coordination on the Wedgewood plan continues with community residents, the City of East St. Louis and St. Clair County as a part of the ongoing public process. Decisions regarding the Wedgewood alternative will be made following the receipt and analysis of public input. The project is an environmental restoration project, with flood reduction being only an incidental benefit. A variety of restoration alternatives were explored for this area during the formulation process. However, the only viable alternative (the one which was able to generate the number of habitat unit benefits necessary to incrementally justify the cost of the wetland, stream and upland components) is the currently recommended plan.

Unfortunately, I cannot accommodate your request for printed hard copies of the report. The distribution medium for this report was carefully considered based on the size, complexity and color requirements for display of the information.

We look forward to receiving your comments on this project.

Sincerely,
Signed
C. Kevin Williams
Colonel, U.S. Army
District Engineer
C. Kevin Williams
Colonel, U.S. Army
District Engineer

To: Col. C. Kevin Williams
U. S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, Mo. 63103

From: Larry Kinsella (pres. CAS)
645 Pleasant Ridge
Fairview Hghts. Il. 62208

Dear Colonel; As president of the Cahokia Archaeological Society and at the request of our membership I wish to ask for a 90 day extension of the deadline for the proposed Spring Lake ditch project in Washington Park and Cahokia Mounds SHS. We would like to have more discussion on the possible impact on Cahokia Mounds, the need for rerouting a ditch which seems to be working well now, the impact of this ditch on surrounding farms and residences, the need for a new project that would need to be maintained when the maintenance of existing canals requires so much attention, and other concerns. Our membership is especially concerned about the impact on archaeological resources in this area and it's impact on Cahokia Mounds.

Thank you for your attention to this matter.

Larry Kinsella (president CAS)

27. Cahokia Archaeological Society

The Corps of Engineers furnished a letter in response (attached).

MAY 1 6 2003

Planning, Programs and Project Management Division
Planning and Project Development Branch

Mr. Larry Kinsella, President
Cahokia Archeological Society
645 Pleasant Ridge
Fairview Heights, Illinois 62208

Dear Mr. Kinsella:

Thank you for your interest in the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project. You requested an extension in the period of time for public comment on this project. The original public comment period began February 28, 2003 and closes on 7 May 2003, in excess of 60-days. At your request, I will accept public comments for an additional 30 days. The comment period will now close on June 7, 2003. Unfortunately, due to the time constraints associated with project coordination, I cannot accommodate your request for an additional 90 days. Recognizing the June 7, 2003 deadline, the public comment period will now exceed 90 days. I am sure you will agree that this is a reasonable time for a project of this size.

The Spring Lake action area consists of features to preserve, restore, and enhance aquatic, wetland, and terrestrial habitats in the floodplain and uplands, and to stabilize erosion of stream channels in the uplands. It is the largest of all action areas of the recommended plan, and the total footprint for all features is 1,615 acres. A 1,364-acre floodplain habitat area consisting mainly of marsh and forested wetlands is to be established at three separate locations (Spring Lake, Indian Lake and St. Clair Farms) adjacent to Harding and Lansdowne Ditches. These sites were selected based upon the fact that they were originally recorded as wetland swamps on the first General Land Office surveys conducted between 1810-1820. Fifty-eight dry sediment detention basins are to be constructed at scattered locations in the Canteen Creek and Little Canteen Creek watersheds. These detention areas will be constructed in deeply eroded, low archaeological site potential areas on the upland/floodplain interface. This plan, also affords the Cahokia Mounds Museum, Caseyville, State Park Place, the Collinsville Water Treatment Plant and the Fairmont City Race Track with flood protection that is incidental to providing the largest number of ecosystem restoration benefits in the recommended plan. The construction of a new water conveyance ditch between the Spring Lake and Indian Lake habitat areas running across the far western end of the National Land Mark site in Fairmont City is an integral component to the restoration of these habitat areas. This plan includes the knowledge that future archeological investigations will be required; the final channel configuration could be altered to avoid archeologically sensitive areas; and that the recommended below ground channel would not be visually obstructive to site integrity.

The current draft report, which is out for public and agency review, is intended to serve as an authorization document that justifies a Federal interest in an ecosystem restoration project. However, because the study area is large and complex the report includes a Programmatic Environmental Impact Statement and clearly identifies the follow on activities required to move to design and construction at any one of the nine major action areas identified as the Recommended Plan. This process, as described in Section 9 of the draft report, includes the development of a subsequent decision document called an Engineering Documentation Report for each Action Area. This report would provide the level of detail seen in a typical feasibility study, to include coordination under NEPA and applicable governing laws, prior to initiation of design or construction.

Please understand that it is not our intention to recommend any measure that would significantly impact the World Heritage site of Cahokia. Our challenge is to beneficially utilize floodwater by redirecting it from areas where it causes significant damage to areas that it benefits. Had the last flash flood in 1996 breached the western berm of the existing Harding Ditch instead of the east (as it did), approximately three feet of water would have filled Cahokia's new museum - the crown jewel of the site which you and your dedicated volunteers struggled for so many years to see built.

If you have additional specific questions, I recommend you contact Dr. Terry Norris at 314-331-8464. We look forward to receiving your comments on this project.

Sincerely,
Signed
C. Kevin Williams
Colonel, U.S. Army
District Engineer
C. Kevin Williams
Colonel, U.S. Army
District Engineer

28. Sierra Club, Piasa Palisades Group Letter 25 April 2003 response follows letter.

28-1. Sierra Club, Piasa Palisades Group Letter 7 June 2003

28-1. Your understanding is correct.

28-2. Your comments have been passed on to the EMP program manager.

SIERRA CLUB
FOUNDED 1892

PIASA PALISADES GROUP

Charles Williams
District Engineer
ATTN: Ms. Deborah Roush, Project Manager
US Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103-2833

April 25, 2003 East St. Louis Vicinity Flood Damage Reduction Project

Dear Colonel Williams:

We are writing to request a 3-month extension of the comment period for the East St. Louis Vicinity Flood Damage Reduction Project. There are thousands of pages to review and we need for time. We also request additional public meetings and a formal public hearing. Finally we request that the ACOE provide some tours of the area. This would make it much easier to understand and grasp the project. Thank you. We look forward to your response.

Sincerely,

Jim Bensman
Conservation Chair
585 Grove Ave
Wood River, IL 62095-1615
(618)259-3642, Fax also, Call First!
jbensman1@charter.net

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Planning, Programs and Project Management Division
Planning and Project Development Branch

Mr. Jim Bensman
Conservation Chair
Piasa Palisades Group
585 Grove Avenue
Wood River, Illinois 62095-1615

Dear Mr. Bensman:

Thank you for your interest in the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction project. You requested an extension in the period of time for public comment on this project. The original public comment period began February 28, 2003, and closes May 7, 2003, in excess of 60-days. At your request, I will accept public comments for an additional 30 days. The comment period will now close June 7, 2003. Unfortunately, due to the time constraints associated with project coordination, I cannot accommodate your request for an additional 90 days. Recognizing the June 7, 2003 deadline, the public comment period will now exceed 90 days. I am sure you will agree that this is a reasonable amount of time for a project of this size.

Three public meetings and a hearing have been held for this project. The most recent public meeting, which culminated with a formal public hearing, was conducted on April 8, 2003. Information on this meeting was contained in the February 24, 2003 package provided to you. No further public meetings or hearings are scheduled for this phase of the project. Unfortunately, time and resources do not permit us to extend you the courtesy of a tour of the project area. We look forward to receiving your comments on this project.

If you have any questions or need additional information, please contact my Project Manager, Ms. Debbie Roush, at (314) 331-8033.

Sincerely, Signed
Joseph D. Tyron
Major, U.S. Army
Deputy District Engineer
C. Kevin Williams
Colonel, U.S. Army
District Engineer

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FOUNDED 1892

PIASA PALISADES GROUP

Charles Williams
District Engineer
ATTN: Ms. Deborah Roush, Project Manager
US Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103-2833

June 7, 2003

East St. Louis Vicinity Flood Damage Reduction Project

Dear Colonel Williams:

Thank you for the opportunity to comment on the East St. Louis Vicinity Flood Damage Reduction Project. While we appreciate the 30-day extensions of time, it was still not adequate to review the massive documents. We have not been able to adequately review all the documents. Therefore, all we can offer is some general comments.

We also wish to express our disappointment that the Army did not set up a tour of the sites. We, however, are glad the Army choose to participate when others set up a tour. That outing was very helpful in understanding the project.

We support preservation, enhancement, and restoration of the American Bottom ecosystem We, however, have grave concerns about the Army doing any restoration considering the St. Louis District's track record on the EMP. Measures need to be included to insure that the Army is only doing true restoration.

We note that the Army is now proposing to do many of the kinds of projects we have been saying should be done with the EMP. Thus, we are cautiously optimistic about this proposal. We support efforts to keep sediment out of the wetlands, restoration of forests, prairies, and marshes. We also support converting drainage ditches back into a more natural stream.

While there certainly are some legitimate concerns about some of these projects, we are generally supportive of them. For example, there were many legitimate concerns raised about some of the projects details on the tour. 28-1 Our understanding is all of these issues and similar concerns would be addressed when a tiered site-specific EIS or EA is done for the project. We understand this is a programmatic EIS which does not make any site-specific project

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decisions. Any decision will have to have additional public participation and a site-specific analysis. At that time we will provide more specific comments on the projects.

We want to stress the need for projects with planting of mast trees. For many years we have argued a major focus of the EMP should be to take the thousands of acres of public land farmed and restore it to bottomland forests and wetlands. Studies are showing the vital importance of this.[1] Most of the historic mast producing forests are finally dying off as a result of the Army building the dams. These dams have raised the water table making land that used to be suitable for mast trees no longer able to grow mast trees due to the higher water table. When these trees finally die, mast tress no longer come back. The 93 flood was the final straw for many of these trees and there have been massive die offs. Thus there is a desperate need to plant mast trees in areas further back from the river. The Army needs to make it a major priority to convert these types of land into mast producing forests.

28-2 Finally, we hope the District will change the focus of the EMP to projects such as those being proposed here instead of mainly bulldozing wetlands, building levees, and pumping in water for the duck hunters.

Sincerely,

Jim Bensman
Conservation Chair
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Wood River, IL 62095-1615
(618)259-3642
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[1]cf http://www.conservation.state.mo.us/conmag/2003/03/20.htm

28. Sierra Club, Piasa Palisades Group

28-1. Your understanding is correct.

28-2. Your comments have been passed on to the EMP program manager.

American Bottom Conservancy

527 Washington Place, East St. Louis, IL 62205-2039
(618) 271-9605, Fax (618) 271-9651 abc@prairienet.org

June 6, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

Via Fax to: (314) 331-8741 and by email

Re: General Reevaluation Study and Draft EIS -
East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction
Project in Madison and St. Clair Counties, Illinois

Dear Col. Williams:

American Bottom Conservancy (ABC) is an Illinois not-for-profit organization working to protect, preserve, enhance, restore and promote the natural, cultural and historic resources of the American Bottom, the Mississippi River floodplain of southwestern Illinois, and to educate the public as to the importance of those resources. Ecosystem restoration is an important part of our mission and we support efforts to protect and restore the American Bottom floodplain. We are pleased that the Corps has recognized the importance of ecosystem restoration and is working on environmentally sound management of resources.

I have been attending meetings of the Metro East Stormwater committee from its earliest days in the mid 1990s when NRCS, under Dave Rahe, first addressed flooding and stormwater management in the American Bottom. Those efforts grew into this project. Most flooding in the American Bottom comes from stormwater runoff from the bluffs. Those of us in the bottom feel that those communities on the bluff should manage their stormwater there rather than putting the burden on the communities in the floodplain. While this project partially addresses that with its upland sedimentation basins, for the most part the burden still lies with the bottomland communities. Stormwater is not retained on the bluff. Currently, the ditch cleanout has helped
29-1 flooding in the bottom. If the ditches were maintained and stormwater managed on the bluff, taxpayers could be saved the more than $210 million estimated for this project.

While this project was initially authorized as an interior flood control project, it was modified to be an ecosystem restoration project in the Water Resources Development Act of 2000. As such, we believe this project should be constructed, completed and evaluated as an ecosystem
29-2 restoration project and should adhere to the principles of the Corps' Environmental Operating Principles as announced by Lt. General Robert Flowers on March 26, 2002.
We believe that construction of this project would encourage new development in the floodplain

in all the areas not included in the project. That could result in a significant net loss of open space, woods, and wetlands--removing important habitat on the Mississippi River flyway, green space important to the quality of life for bottomland residents, wetlands that play an important role in flood control, and trees, which provide oxygen, soak up excess water and clean the air.

29-3 Although we cannot now locate the page, we believe we observed somewhere in the document that there would be a loss of 300+ acres of forested wetlands. The bottom suffers from poor air quality due to emissions from industries and cars, trucks, trains and barges passing through. It has been, and under the new 8-hour standard, will be nonattainment for ozone. It will also be nonattainment for particulate matter. Both contribute to asthma and heart and lung disease, which occur at high rates in the Metro East. Because of wind patterns (often a lack of wind) and our location in a valley, the pollution often hovers for days, exacerbating health problems and sending our children and elderly to emergency rooms. Trees play an important part in cleansing the air. We need more trees, not fewer.

Wetlands filter out contaminants and play an important role in flood control. One acre of wetlands can hold up to 1.6 million gallons of water. We fear this project could result in a net loss of wetlands. The American Bottom was declared a presidential disaster area for flooding in 1993, 1994, 1995, 1996 and 2003. We need more wetlands to help keep us from flooding.

Wetlands also play an important role on the Mississippi River flyway, attracting migrating songbirds, waterfowl, and shorebirds and bringing thousands of visitors to the American Bottom to birdwatch and hunt. Those people bring millions of dollars in economic benefits to the region.

29-4 The project manager said the project assumes 100 percent development on the bluffs. Does it assume 100 per cent development in the bottom except for the project areas?

While the report addresses what would happen if the project were not done, we do not believe it has accurately assessed what will happen to the land not in the project area if the project is done. How many acres of warehouses with how many acres of impervious parking lots and loading areas will there be? Where will all that water go?

If the project is constructed, we insist that mitigation for wetland loss be immediate, site specific, with replacement in kind. The Corps discourages piecemealing from 404 applicants and should not engage in the practice itself. That would be contrary to the Environmental Operating Principles of responsibility and accountability for Corps activities that impact the continued viability of natural systems and to mitigate cumulative impacts to the environment.

29-5 We do not think proper evaluation has been made of the benefits of the ditch cleanouts. People who flooded previously in areas where cleanouts have occurred say they no longer flood (although we have not verified this or measured stormwater events). And while we protested the Corps' practice of cutting down (and burning) hundreds of trees during the ditch cleanout, the cleanout appears to be working. Perhaps flood control could be attained by merely maintaining the ditches and retaining stormwater on the bluffs.
You will remember that ABC and others requested a 90-day extension of the public comment

deadline because of the massive amount of material to be reviewed, the time required to review it, and because much time was spent simply trying to download and copy the 3,000-page report. We still have not been able to fully access and review the entire report, so this is only a limited, partial public comment. We ask that our previous letter dated May 4 and sent May 7, requesting the extension, be made part of our public comment.

While we very much appreciate the 30-day extension you granted, we again request an extension of the comment period. In the alternative, we ask that you consider any comments filed after the deadline. It took nearly three years for the Corps to write the report; the public should be given adequate time to review and prepare informed comment on it.

29-6 The Executive Summary indicates that prior to implementation of an approved project, NEPA compliance documentation will accompany the detailed design reports as either a supplement to the DPEIS or as a series of Environmental Assessments. Given the Corps' aversion to compiling EIS's and that the present document is not detailed enough to suffice as an EIS, we do not believe this is acceptable. You indicate that as the projects move forward we will be given the opportunity to comment on each, but a full EIS should be required for each project area.

29-7 We appreciate the time and effort that went into the writing of this lengthy report. The material included will be helpful in our work. But because of the desire to move ahead to get approval from Congress, there seems not to have been time to fact check it for accuracy. We have found a number of errors, ranging from historical inaccuracies to the height of Monks Mound (100 feet rather than 85) to mis-characterizing the nature of the various habitat areas at Indian Lake to reversing directions in project area descriptions (east instead of west) to the boundaries of the American Bottom floodplain (it extends all the way to the mouth of the Kaskaskia). Because of the many errors that we found, we wonder how many we did not, either because of unfamiliarity with the project area or subject or insufficient time for review. This is yet another reason to grant an extension for public comment. It would help to make it a better report and one which could also serve as an important historical and area resource.

We want to thank you for making the project manager available for our tour of the project areas on Monday, June 2, 2003. It was extremely helpful to see each of the project areas and to better understand some of the rationale for various components of the project.

29-8 According to the 11-page Executive Summary provided for the tour, the Project area includes "all of the bottomlands between the bluffs on the east and the Mississippi River and the Chain of Rocks Canal on the west; and, from the Prairie du Pont Canal on the south to the Cahokia Creek Diversion Channel on the north." The bottomland municipalities include Pontoon Beach, Granite City, Venice, Madison, Brooklyn, East St. Louis, Fairmont City, Washington Park, Sauget, Centreville, East Carondelet, Caseyville, Alorton, Cahokia and Dupo. When we inquired about this at the Metro East Stormwater committee meeting on Thursday, June 5, the project manager said those communities were not included. We are puzzled by this seeming contradiction.

Why weren't all of the areas listed in the summary included in the project in order to receive benefits derived from it? Most of the bottomland communities are low-income or minority communities.

29-9 People in the bottomland communities feel the stormwater being sent down on them should be retained and managed by the communities on the bluffs. We are told that the project assumes the bluffs will be 100 per cent developed. This appears to be an environmental justice issue that should be addressed.

29-10 We are extremely concerned with the lack of sustainability provided for in the project. We are told that the local sponsors will do the maintenance. Where will the money come from? How much would be required? Who will oversee and enforce that maintenance is properly performed to ensure sustainability? Who will be responsible for the controlled burns on the prairies? Who will manage forestry for the new tree species being planted? Who will ensure that cottonwoods and silver maples don't once again overpower the hardwood species? Who will be responsible for assuring that marsh will be marsh? Who will monitor water levels in the various areas? Who will monitor the drainage from retention areas? For how long will the project be monitored? Is the cost of maintenance, monitoring and sustainability of the project areas after completion included in the cost of the project?

29-11 We understand the habitat assessment was performed within a two-week period and by biologists mostly unfamiliar with the site. It does not appear to be a thorough survey. Several biologists remarked that the assessment appears to have been taken from a field guide--a list of what animals might show up--rather than an actual survey. Why wasn't the assessment done over a longer period and with people familiar with the area? Why weren't the Corps' Illinois regulatory people who are most familiar with the project area consulted? Were local university personnel involved? If not, why not?

We welcome your statements about recreational opportunities in the future. The project areas should be connected by greenways and corridors. While there should be trails, there also should be areas with limited access in order to protect habitat and encourage breeding.

29-12 **Hazardous Waste and Contaminants.** As your report indicates, the American Bottom is full of hazardous waste sites, Superfund or CERCLIS, both identified and as yet unknown. According to the report, the local sponsors--Madison County, St. Clair County, and the Illinois Department of Natural Resources--must pay for testing for environmental contamination and for the cleanup of contaminated areas. Do they know that? We question whether the state and counties have the financial resources for this. Should not testing take place before planning, engineering and design costs are incurred? Should not testing take place before moving to the next stage? That does not seem to be the case. Several sites in the project areas seem likely to be contaminated. Why should money be spent on planning and engineering if an area is contaminated and the money is not there for cleanup?

The U.S. Environmental Protection Agency is currently investigating the Old American Zinc site in Fairmont City. It identified the Indian Lake wetlands at the eastern end as possibly contaminated. Just across the highway from Indian Lake, Canteen Lake has recently undergone environmental testing, both by the State of Illinois and by Southern Illinois University at Edwardsville. High levels of cadmium were found in the sediment. It is suspected that the cadmium came from the Old American Zinc plant. If Canteen Lake is contaminated, the eastern end of Indian Lake is likely to be.

Part of Indian Lake lies downgradient from the Milam landfill, which takes special wastes from industries as well as toxic household waste. Cahokia Creek used to back up into the Indian Lake site when the river was high or in high stormwater events. The groundwater flow is to the southwest. Has that part of Indian Lake been tested?

29-13 **Indian Lake.** We have grave concerns about the Indian Lake component of the Spring Lake project area. The Executive Summary states that the study is to re-examine the project under current conditions. But the conditions in various project areas, including Indian Lake, have changed markedly since the reevaluation was begun and the report does not reflect those changes. It does not reflect current conditions. Several years ago, the Illinois Department of Transportation bought the Indian Lake golf course, which is wetlands but was considered degraded because of groundwater pumping. It was purchased for wetland mitigation for IDOT's Mississippi River Bridge and highway realignment project. IDOT stopped the pumping and the wetlands hydrology returned. It is now considered one of the best wetlands in the entire area. It should be allowed to restore itself naturally.

IDOT is in the process of purchasing another wetlands parcel in Indian Lake, adjacent to the old golf course, also for wetlands mitigation. Would not this preclude its usage for open water or deep water habitat?

If nearly all of Indian Lake is already functioning as a quality wetland and is either being used for wetlands mitigation or under a conservation easement, how would it be able to provide the needed habitat improvement benefits? Would that not raise the cost per acre of construction of Spring Lake to a prohibitive level?

At one point last year, we were told that the perimeter of Indian Lake was to be bermed, with the trees removed. We are pleased that that is now not in the plan. What assurances do we have that there will be no berming, no de-forestation of Indian Lake? What assurances do we have that the wetlands or marsh will remain wetlands or marsh and not become a lake? IDOT would lose its wetlands mitigation designation and we would lose a prized wetland.

American Bottom Conservancy is planning a trail that would connect the East St. Louis riverfront with Cahokia Mounds. It would pass through Fairmont City alongside the Indian Lake wetlands. We believe the trail will bring much-needed economic benefits from tourism to both Fairmont City and East St. Louis. We want to preserve the view and integrity of Indian Lake for the trail and a planned interpretive lookout.

The northeastern part of Indian Lake has a conservation easement and is a functioning wetland with a deeper pond. Even the dead trees provide important habitat. According to birding sources, some 305 species visit Indian Lake, including threatened and endangered species. Our

29-14 members have seen Illinois-endangered Black-crowned Night-heron, Common Moorhen, Little Blue Heron, and Snowy Egret. We've seen Glossy Ibis and many species of herons and egrets. There are bald eagles in the winter. Two weeks ago, a member spotted an adult Pied-billed Grebe (Illinois Threatened) with her young where the project plans to discharge the water from Indian Lake into Lansdowne. Will the pulse of water wash out nests? Will it harm the wildlife that is there? How will the pulses of water affect amphibians and reptiles?

Jim Ziebol of Webster Groves Nature Study Society is submitting a list of bird species breeding, feeding, roosting, and visiting at Indian Lake. We incorporate that list as part of our comment.

The Executive Summary indicates that the principal goal is to identify potential improvements to the natural system for ecosystem restoration, which would restore biodiversity with the reintroduction of an historic flood pulse...in a manner that will enhance habitat quality and sustainability while also providing incidental ecosystem services, such as flood damage reduction.

There already is biodiversity at Indian Lake. The quality of the habitat already is enhanced. Plans to restore Cahokia Creek and to put the water from a 100-foot concrete channel in a Rube Goldbergesque configuration from Spring Lake and St. Clair Farms could very well threaten and endanger that biodiversity.

How much water would be sent to Indian Lake? How often? How deep would it be? How long would it remain? These questions have not been answered. The depth and force of water from a 100-foot channel could destroy nests and wildlife. Could you reduce the 100-foot size channel that would feed Indian Lake? A 100-foot constructed concrete channel is not consistent with ecosystem restoration. It is also not consistent with historic restoration, since it was Lansdowne (previously Schoenberger Creek) that originally fed Indian Lake, not Cahokia Creek as indicated in your report.

29-15 We are told that the water in Indian Lake is mostly from rainfall. We are concerned that bringing in stormwater runoff from both urban areas and agricultural areas into Indian Lake will bring toxic chemicals, such as pesticides, herbicides, lawn chemicals, automobile and road chemicals into the area. That could have an extremely negative impact on the habitat and wildlife at Indian Lake and very well destroy some species and the biodiversity that is desired.

29-16 Because much of the habitat at Indian Lake is already high quality, it would seem not to be able to provide the habitat improvement benefit needed for the Project Area. We were told in the case of Wedgewood that if the bottomland component were dropped because of opposition from the community, then the upland component could not be constructed. It would seem, then, that the Spring Lake and St. Clair Farms components of the Indian Lake project would be in jeopardy since Indian Lake could not show the needed improvement. Could you find an alternative to bringing the water into Indian Lake?

We also question the need to construct a new channel when there exists the Lansdowne Ditch, which could be used to convey water. The Corps has stated as a goal to reintroduce the historic flood pulse. But according to archeologists, the original flow into Indian Lake was from Schoenberger Creek (Lansdowne Ditch). Therefore, the Lansdowne Ditch would be the logical channel to use. Much of Lansdowne Ditch is in an area that is already vacant and could be easily purchased.

Cahokia Creek flowed under what is now Interstate 70 and between two landfills at the Milam Landfill north of the site, into what is now Cahokia Creek Canal. The Corps granted a permit to the landfill to use the old creek bed as a leachate collection area. The connection from Cahokia Creek to the Canal is severed.

In addition, the proposed Spring Lake concrete channel into Indian Lake would cross an important archeological site on National Historic property, requiring excavation of the cultural resources.

Building a new 100-foot concrete channel to Indian Lake is not environmentally sound, not sustainable, and not historically accurate. It is therefore <u>not</u> ecosystem restoration.

There would be cost benefits to be gained by using the ditch. Lansdowne is already there. It would need to be cleaned. The project manager indicated it would cost more to buy out homes in Washington Park, but there are few homes on the ditch. Those that are there flood. It would be cheaper, more humane and in accordance with Executive Order 12898 on Environmental Justice just to move those who remain on Lansdowne Ditch to a dry, secure home. Using Lansdowne rather than constructing a new 100-foot wide channel would also avoid destroying farmland, which is rapidly disappearing in the bottom. The Spring Lake channel goes against Objective 8 of the planning objectives as listed in Exec.Sum. p. iv.

We suggest severing Indian Lake from the project and treating Spring Lake as a separate project. Using Lansdowne to carry water to the Cahokia Canal from Spring Lake and not disturbing Indian Lake would be consistent with the goals of environmental conservation, preservation, restoration and sustainability under the Corps' Environment Operating Principles.

<u>**General.**</u> Following are questions and statements regarding the proposed project:

29-17 Pp. iv-v of the Exec. Summary says that unfortunately the study team was unable to use both habitat (Habitat Evaluation Procedures HEP) and the wetland (HydroGeomorphic Method, HGM) assessment procedures to quantify environmental benefits. Why not? Where was it used and where was it not used? Why? How did this affect the results of the study formulation?

The Corps project could be an important tool in protecting and expanding wetland habitat in this area, if it did not facilitate development in all the remaining area. The plan, however, will benefit a limited range of wildlife species. Nesting of some species may be disrupted by the flood pulses expected (see page 7.65 in the Re-evaluation Report).

29-18 A project involving 5,000 acres of habitat should produce more of a benefit in terms of creating more diverse habitat types that will, in turn, result in a higher level of biodiversity and help to restore declining species. The habitat restoration should not only aim to provide feeding areas for wildlife but also nesting habitat.

Beside the wood duck, a number of wetland wildlife species should benefit from this project by the creation of nesting habitat. Species such as the Common Moorhen, Pied-billed Grebe, Hooded Merganser, Black Tern and others should be included in management plans.

Marshy areas in the project should have some pockets of deeper, open water to attract nesting marsh birds. Marshy ponds subject to varying degrees of flooding could be considered. Some ponds should receive no flooding from the creeks to encourage nesting wetland birds and breeding frogs and salamanders. Adequate drainage should be planned for the action areas so that they are not inundated with flood waters for prolonged periods.

We are concerned that the stormwater being put into the various project areas will introduce new chemicals which could affect habitat and wildlife. Urban runoff contains lawn chemicals, road-clearing chemicals, automotive chemicals that drip from cars in parking lots and on streets. Agricultural chemicals such as herbicides and pesticides could also affect habitat and wildlife.

Action areas in this plan should be connected to each other and to existing and planned conservation areas with wildlife corridors. Restored creeks, drainage canals, and hiking/biking paths could be used to provide migration routes for wildlife.

Some wetland areas that provide especially good nesting opportunities for wetland birds should be restricted areas with limited access.

Cooperation with other state and federal agencies and with private conservation organizations would be very important in improving this project.

The plan should be flexible enough to include additional wildlife management plans as resources become available.

There is a need for more public involvement in this project. Access to hard copies of the general re-evaluation report should be provided.

Any area with threatened or endangered species should not be disrupted by implementation of this project. Each action area needs an environmental impact statement before any work is begun.

29-19 Habitat restoration should not be limited to feeding for migratory birds, but be actively managed to create breeding habitat for declining wildlife and habitat for native plant species. How will you ensure that re-forestation takes place?

29-20 Not one acre of land used for horseradish farming should be lost. It is a unique and important resource in terms of tourism, economic benefits and area prestige. The soil cannot be duplicated elsewhere.

29-21 The hydrologic/hydraulic connection to the river is ignored. Flooding in some areas of the bottom occurs when the river, and therefore, the groundwater level is up. This should be considered and made a part of the evaluation.

Dobrey Slough seems not to have been adequately addressed.

29-22 We understand that when sediment is removed from water, it moves faster and can cause undercutting. How will/could this affect habitat? The Judy's Branch USGS sedimentation pilot project will take five years to complete. Which project areas will move forward and which will be put on hold until the results are known?

29-23 More information is needed on drainage and monitoring of the drainage. Marshes and wetlands must not be allowed to be turned into lakes and reservoirs. More information is needed on water levels in determining the quality of wildlife habitat. What kind, if any, habitat would exist if the project areas flood and the water is retained. How good is the drainage? What is the worst-case scenario?

More research is needed on food sources for wildlife.

29-24 Habitat restoration should not be limited to feeding for migratory birds, but be actively managed to create breeding habitat for declining wildlife and habitat for native plant species. What forestry procedures are needed? Who will provide the expertise?

29-25 How many deep water acres will there be? How many acres of marsh?

29-26 **Elm Slough and Brushy Lake**. We request that Elm Slough be expanded across Rte. 111, as was suggested on our tour by a resident. The creation of large tracts of forested wetland as planned in areas such as Elm Slough should be helpful in restoring forest songbirds and provide nesting areas for herons and egrets. Brushy Lake (levee lake natural area) should be restored to the high quality wetland conditions that existed in the 1970s.

29-27 We have been unable to evaluate Elm Slough, Brushy Lake and the other project areas because of lack of time and resources. We have been told that the Old Cahokia Creek project is inaccurate in its historical recreation and that the water actually flowed in the opposite direction. We have not researched this and only bring it to your attention if those living there do not. We plan to continue reviewing the entire project and the report and will send in additional comments.

29-28 **Wedgewood.** We do not support the closing of Marybelle/Summit Av. in the Wedgewood project. Neither do we support berming the area where people live. We have never been able to learn the flood control benefit of the Wedgewood project. How many families, how much area would be protected if some aspect of the project were to move forward? We are told there is no alternative. If that is true and Wedgewood is removed from the project, we ask that the upland sedimentation basins be constructed. That will help Harding Ditch and Schoenberger from silting in sooner and allow more time between ditch cleanouts, while saving taxpayers money.

29-29 Originally, there was no component to benefit East St. Louis in the project that bears its name. ABC requested that the Corps look at the Wedgewood FEMA buyout as a possible project area to help those who flood. When the Corps added Wedgewood to the project and showed the closing of a major artery, we told them the community would not support the closing of Marybelle/Summit. Several East St. Louis community groups, including East St. Louis Community Action Network and Dayton-Wedgewood Neighborhood Assn., in addition to many residents, protested the closing of Marybelle. That was three years ago. When the report was finally issued this year, berming and the street closing were key components, indeed, necessary components. When residents objected, the Corps representative said it was ABC's idea, that we wanted it for habitat restoration. She told residents that since they didn't want it, it would be dropped--period. They were not offered alternatives nor were they given information about retaining the upland component. They were not treated with respect. Neither was our organization and its members. We requested public meetings be held. They were not.

29-30 We have read and fully support the statement of Richard Worthen, formerly Metro East Stormwater coordinator, regarding cooperation between the Corps and the local participants. We have had many instances when there should have been better cooperation and improvement in public relations. Gen. Flowers final Environmental Operating Principle states:

Respect the views of individuals and groups interested in Corps activities, listen to them actively, and learn from their perspective in the search to find innovative win-win solutions to the nation's problems that also protect and enhance the environment.

It appears that the Corps has been driving this project, making the decisions. When someone disagrees or suggests an alternative, his/her views are not only not respected, but he/she has been ridiculed, scolded and lectured. We hope the situation will improve and that we can work together in partnership with the Corps to protect and enhance the American Bottom. That is our mission and that is this project's goal.

We look forward to working with you, Col. Williams, to make this project truly ecosystem restoration--and win-win. Thank you for granting a 30-day extension, for providing the project manager for our tour, and thank you for your consideration of our remarks. As we are able to review more of the report, we will continue to send in public comment. We hope it will make for a better project and a better report. We hope this will be a restoration project that Gen. Flowers and you can point to with pride, as an example of the new Corps of Engineers.

Sincerely,
Kathy Andria
President

29. American Bottom Conservancy

29-1. The Project, as recommended, is an environmental restoration project designed to restore important habitat that has been lost or degraded on the floodplain and in the tributary watersheds. The flood control benefits that accrue are a by-product of the environmental restoration measures employed. Further, the maintenance of ditches and the management of stormwater within the bluff area do not accomplish the restoration of aquatic resources, such as floodplain wetlands. Aquatic resources that are the focus of this project are important to the state, region, and nation. They have significance to a number of threatened and endangered species, and support numerous migratory bird species, such as waterfowl and songbirds.

29-2. The recommended Plan does not change the existing 100-year floodplain and as such, should not provide any inducement for development.

29-3. With the Project, there is a net gain of about 1,000 acres of forest. About 200 acres of forest would be removed to implement the plan, and most of this loss involves conversions to another habitat type, such as marsh. Table 7-11 of the Draft Report provides this information. With the Wedgewood action area removed from the recommended plan, there would be about 130 acres of forest lost.

29-4. Initial hydraulic calculations assumed full development in the Bluffs in order to ensure an appropriate factor of safety in initial planning estimates. As PED proceeds, this analysis would be refined. One hundred percent development was not a planning assumption for the projection of habitat loss on either the floodplain or in the bluff. The recommended Project does not change the existing 100-year floodplain and as such should not provide any inducement for development. It does, however, ensure protection in perpetuity of approximately 4,660 acres of wildlife habitat and restoration of approximately 178 miles of tributary streams. With regard to the future with Project conditions, please reference Section 7 of the Draft Report for our current best estimate of Project impacts. The plan has been coordinated with the District's Regulatory Branch that administers the Section 404 program, and no mitigation per se is required because proposed restoration of former wetlands exceeds initial losses of existing wetlands (mainly to convert one habitat type to another). This coordination would continue into the next phase if the project were approved.

29-5. Since this is an environmental restoration Project, flood damage reduction benefits are incidental benefits to the Project. Evaluation of the ditch clean-outs done for the existing flood protection system were considered during the hydraulic analysis used to predict future flood damage reduction benefits of affected areas. With regard to the requested extension, please refer to the Corps' letter to you dated May 13, 2003.

29-6. NEPA guidance determines the assessment process to be taken and would be followed in the implementation of this Project.

29-7. Errors noted will be corrected.

29-8. Comment noted. The Executive Summary will be revised so that it is clear what geographic area is covered under the authorized Project.

29-9. See 29-4 above.

29-10. Operation and maintenance would be the responsibility of the local sponsor. A project cooperation agreement, executed between the Federal government and the local sponsor(s), would spell-out the requirements and responsibilities of the non-Federal interests. Additionally, since it is anticipated that state funding would be provided for this Project, separate requirements under state statute would also provide an oversight mechanism for operation and maintenance of Project features. The overall plan for the Project is to establish, to the greatest extent possible, a system that operates in a natural way. Section 9 of the Draft Report describes in general terms, monitoring and adaptive management for the Project. As indicated, specific requirements would be included in follow-on plans.

29-11. The baseline habitat assessment was meant to be a snapshot of the conditions of an area so that all areas can be evaluated under the same external conditions such as season, rainfall, etc. This sampling technique is a standard practice. Botanists noted all plant species observed at sample sites, and biologists recorded animal sightings. Individuals familiar with the area were utilized for this assessment process, and came from a number of agencies, including the District's Regulatory Branch. Acknowledgement of these people can be found in Section 13 and Appendix A of the Draft Report. With regard to recreational opportunities, we will be looking into the ideas you mention as well as others as we move into the design phase.

29-12. Initial evaluation of sites was conducted during the site analysis process with the assistance of USEPA, Region 5. In the Draft Report, Section 3.17 identifies existing areas of concern while Section 7.13 discusses implications to the recommended plan. During the design process, sites would be further examined for contamination and as necessary, appropriate actions undertaken. The sequence is typical with regard to these investigations.

29-13 (First five paragraphs under "Indian Lake"). The District has coordinated this study with IDOT, and has been aware of IDOT's plan for wetland mitigation at Indian Lake. This mitigation is not reflected in our plan because it developed after the baseline habitat assessment was conducted in the spring of 1999, which served as the cutoff point for capturing existing conditions. As indicated in the Draft Report, as each alternative moves forward into design, the conditions at that time would be evaluated and their implication on the recommended action analyzed. Outputs anticipated would have to be re-validated in order to show the area is still justified for Federal action. See comment 29-6, above.

29-14 (Paragraphs 6-11 under "Indian Lake"). Plants and animals typical of floodplain habitats are adapted to periodic flood events. Section 7.11.3.5 of the Draft Report discusses potential adverse impacts to nesting birds from flooding introduced into habitat restoration areas, and Section 7.11.3.4 addresses impacts to reptiles and amphibians. There is no concrete channel recommended in the plan going into Indian Lake. Table 7-17 also identifies current assumptions regarding depth and duration of flood pulses at all of the alternative sites. The frequency of events would be determined by naturally occurring rainfall events across the Project area. As stated in Section 7, further hydraulic modeling is required during design to fix sequencing and durations at Indian Lake to ensure that intended beneficial results are received.

29-15. As stated in Section 5.4.2.2, the biology team expressed concern with the potential for storm water introduced into wetlands to contain pollutants. Addressing water quality is one of the Project's primary planning objectives. The protection of all restored areas from degraded or contaminated water is fundamental to the success of the Project and has been considered throughout the planning process and would continue to be a key consideration during design and implementation. Also see Section 7.11.3.1.3, which addresses the effects of storm water on native plant communities.

29-16 (Paragraphs 13-19 under "Indian Lake"). Wedgewood is a separate alternative site justified on its own merits. If significant changes are required by future conditions within the Spring Lake action area that includes Indian Lake, its ability to produce currently anticipated environmental outputs would have to be assessed. Alternatives for making hydraulic connections within this area were considered during the planning process. It is important to note that the channel proposed to flow into Indian Lake is not concrete-lined but earthen. As previously stated, if conditions or assumptions change in the future, designs would be prepared to address them.

29-17 (Paragraphs 1 and 2 under "General"). HGM was not used to assess effects at all proposed restoration sites because limitations in time and money precluded the development of models applicable to all wetland types. However, it was used to measure results at three sites. Section 3.12.2.4.5 of the Draft Report provides information about this process at Dobrey Slough, Brushy Lake and Elm Slough. The inability to use both methods did not impact study formulation. Overall HGM results are discussed in Appendix A of the Draft Report.

29-18 (Paragraphs 3-12 under "General"). The plan as formulated restores a level of biodiversity to the floodplain that has not been seen since pre-settlement times. Restoration plans were modeled after historic conditions and support a broad range of species. The Project as formulated is not intended to specifically enhance only the nine Blue Book model species selected as indicator species for predictive purposes. The nine predictor species used to project habitat benefits are representative of larger guilds and communities that benefit from like habitats and conditions. Appendix A explains this concept and process. Similarly, restored habitats are also intended as nesting areas.

29-19. A number of migratory bird species exhibit declining populations. Initial reforestation plans call for the use of 4-6-foot tall RPM trees rather than shorter seedlings that would increase survivability and speed the re-forestation process. The plan includes requirements for monitoring and for adaptive management to ensure that habitats develop as anticipated.

29-20. Section 6.2.3 of the Draft Report describes constraints identified for this study that addressed the desire to avoid, to the extent possible, lands currently devoted to horseradish farming. Land suitable for horseradish farming is currently being lost to commercial development and is expected to occur under the future without Project condition. For example, the area of the Brushy Lake action area that takes horseradish farmland out of production is currently zoned commercial. Section 7.2.1 of the Draft Report provides information related to the loss of agricultural land including land suitable for horseradish. The recommended plan has been assessed to have a low rating for farmland protection. It would not create any significant adverse effect on agricultural lands, including farmland used for horseradish production.

29-21. The sand plant site at Spring Lake is the only area within any of the recommended action area sites that has a connection to ground water. Its effects in this area have been considered.

29-22. Until Judy's Branch pilot project is constructed and analysis of its performance is completed, no action in the other bluff tributaries would be undertaken. Sequencing of projects would be determined by Local Sponsor priority.

29-23. Table 7-17 of the Draft Report identifies depths and durations at action areas during extreme events. Storm water temporarily stored in the proposed habitat restoration areas would drain to the Mississippi River through the existing ditch and canal system. Durations during extreme events would be a matter of days.

29-24. The focus of this restoration Project has not been limited to restoring feeding areas for migratory birds. Nesting or breeding of many species would undoubtedly occur. Planning has been guided by historic conditions found on the floodplain during pre-settlement times. Operation and maintenance manuals for the Project would identify procedures required to ensure areas continue to produce the benefits anticipated in the future.

29-25. Table 7-10 of the Draft Report displays about 525 acres of lake and pond habitat, and about 960 acres of marsh and scrub shrub wetland habitat.

29-26. Comment noted.

29-27. Water in the Old Cahokia Creek action area would flow in the same direction (generally north to south) as it did historically.

29-28. This is an environmental restoration Project with Wedgewood being one of nine action areas. By removing the 124-acre floodplain marsh at Wedgewood from the plan, the remaining habitat benefits produced by tributary stream restoration only do not justify the costs associated with their creation. Incidental flood damages benefits for the Wedgewood action area are estimated to be $120,600 average annual damages avoided.

29-29. Appendix G of the Draft Report provides documentation of the public involvement conducted during the planning process for this study. Numerous meetings were conducted at the request of ABC and the Dayton-Wedgewood Association during the planning process and during the Study comment period. The intent of the public involvement process has been, and continues to be, focused on considering all points of view within the context of this planning study.

29-30 (Last four paragraphs). Comments noted. Your input throughout this effort has been very valuable and we look forward to your continued interest and participation as the planning and design process moves forward.

INTERESTED INDIVIDUALS

Richard Worthen
3632 Aberdeen Ave
Alton, Illinois 62002
618 465-0183

April 8, 2003

U.S. Army Corps of Engineers
St. Louis District
ATTN: CEMVS-PM-F (Roush)
1222 Spruce Street,
St. Louis, MO 63103-2833

Dear Sirs,

This cover letter and the accompanying documents are submitted for inclusion in the record for the hearing on April 8, 2003 for the General Re-evaluation Report on the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project.

Two documents are submitted:

1. "Agreement between the Department of the Army and the Metro East Sanitary District, Illinois for Design of the East St. Louis and Vicinity, Interior Flood Control, Illinois Project" dated May 15, 1998, and
2. "Intergovernmental Agreement Among the Metro East Sanitary District, Madison County, St. Clair County, and the State of Illinois, Department of Natural Resources for the East St. Louis, Illinois and Vicinity Interior Flood Control Study" being Contract 078 signed during June, 1998.

These two documents constitute the primary agreements between the local sponsors and the Corps to pursue the re-evaluation.

30-1 It is my testimony that the U.S. Army Corps of Engineers failed to implement a basic component of both agreements, namely, the creation of the "Design Coordination Team"—see Article III of Document One. The Design Coordination Team (DCT) was to be assembled within 30 days of the effective date of the agreement, and to have one member appointed from each of the four local sponsors in addition to one member from the Corps. There were to be co-chairs, one from the Corps and one local person. The DCT was never convened.

The DCT was to perform oversight functions as a small working committee. Clauses include: "meet regularly until the end of the Design, oversee issues related to Design including reports, work products; development of plans and specifications, anticipated real property and relocation requirements for implementation, contract awards and modifications, contract costs, cost projections, requirements and capabilities for performance of operation and maintenance, and other related items".

This failure to convene the DCT was brought to the attention of the project manager soon after she came on line in 1998, but nothing changed after numerous verbal inquiries. Attention was directed to the District Engineer at the end of 1999 and nothing changed. This failure was also brought to the attention of Fred Caver, Chief of Project Management at headquarters at the end of 1999, and nothing happened.

The Corps wrote the agreement and goes to great lengths to discuss "customer service" and "partnerships" and "local participation". The Corps also insists upon a mandatory local financial contribution. Such a financial contribution should buy the local sponsors a place at the table for the purposes of oversight and setting the tone and direction of the study and contracts. There seems to be a disconnect between the public words and the actual implementation. The DCT seems a good idea to promote cooperation, coordination, and sharing of responsibilities, but the experience of this writer and this project would indicate that attention and improvement from the Corps is in order.

Respectfully,

Richard Worthen
Former County Board Rep., District 9, Madison County (1976-1998)
Former Member of Metro East Regional Stormwater Committee (1992-1998
Former Chairman of Metro East Regional Stormwater Committee (1995-1998)
Former Stormwater Coordinator, Madison County (1998- 2001)

Richard Worthen
3632 Aberdeen Ave
Alton, Illinois 62002
618 465-0183

May 5, 2003

U.S. Army Corps of Engineers
St. Louis District
ATTN: CEMVS-PM-F (Roush)
1222 Spruce Street,
St. Louis, MO 63103-2833

Dear Sirs,

These comments are submitted for inclusion in the record for the hearing of April 8, 2003 for the General Re-evaluation Report on the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project.

30a-1 Comment # 1. Page ii and elsewhere. The written description of the boundaries and printed maps do not coordinate. The written description was taken from the original authorization for the East St. Louis and Interior Flood Control Project of 1965 and includes the whole American bottom to the shore of the Mississippi. However the 1965 authorization did not include the uplands. The printed maps include the uplands but do not include any of the shoreline of the Mississippi. Something is wrong.

30a-2 Comment # 2. Page iii. Mention of the non-federal sponsorship and study participants includes the Metro East Regional Stormwater Committee, but no mention or comment is included about the contract language and the failure of the Corps to convene the Design Coordination Team.

30a-3 Comment # 3. Page iv. Paragraph commencing with the words "interior flooding" should also have mentioned the flood of 1996.

30a-4 Comment # 4. Page iv. HGM. The Hydro Geomorphic Method for evaluation of all wetlands was not used in all cases. Where was the method used and where was it not used in the 112 sites (page v).

30a-5 Comment # 5. Page vi. Table ES-1 and other Tables throughout the document. The columns and presentation are very poorly presented and do not clearly label or communicate.

30a-6 Comment # 6. Page vi. Stockyards and Borrow Pit Areas. Something is wrong with consistency here as the geographic boundaries as presented by the printed maps do not include these projects.

30a-7 Comment # 7. Page vii. Mention is made of a "hydrologic regime that was... engineered out...to be re-established", but hydrologic regime in any bottomland also is a function of groundwater and groundwater especially as impacted by the level of the river water. There is no study or mention of the possible implications for management of the surface water despite a common sense that surface, ground, and river water are all related.

30a-8 Comment # 8. Page 1-21. Six Natural Resource Conservation Service (NRCS) resource plans are mentioned, but two additional plans should also be included: Judy/Burdick Branch and Powdermill/Canal#1.

30a-9 Comment # 9. Page 2-15. Cahokia Diversion Canal was completed in 1908.

30a-10 Comment # 10. Pages 6-27 +. All the charts are poorly presented and need to have the columns straightened and titles clarified. The word "Edelhardt" has typographic errors.

30a-11 Comment # 11. This writer was active in the stormwater field for seven years prior to the commencement of this project, and continued to be active through May 2001 when retirement occurred. There is a deep concern about the ability of the Corps to properly define "ecological restoration". There is a concern about the minimal amount of field work and/or collection of data for purposes of inventory to develop a baseline for evaluation of the project. There is concern that the Corps is dedicated to building levees and navigation projects to the detriment of natural river functions, and that such an internal conflict will work at cross purposes. There is a concern that the federal government will not in fact pursue this project with the coordination and support needed among the federal partners—USACE, USEPA, USDA-NRCS—and that "turf battles" will produce continued neglect. There is a concern that the Corps will not treat any of the partners, whether federal or local, as true partners, but that the Corps will arrogantly proceed in a unilateral fashion while giving lip service to partnerships (see earlier Comment 2, and separate submission of documentation containing the original contracts among the Corps and local sponsors). There is a concern that the local sponsors will not implement the proper measures such as zoning, maintenance, land use controls, sprawl controls, green space that are required for successful restoration.

Further concerns include: the newness of the ecological authority, the inexperience of the Corps in working with so many local sponsors, and the historic predisposition of the Corps to build projects with no balance or concern for the environmental consequences that a larger ecological view requires. The levee building and navigation projects of the past have exacerbated the destruction of floods and produced billions of dollars of negative consequences because the Corps has no commitment to support the natural function of the river or the river valley. The Corps has no commitment to provide proper economic evaluation of the natural capital that is the river. This is a basic and foundational conflict that results from participation of the Corps in any water project. Congressional authorizations to the Corps are working at cross purposes. Such conflicts have to stop.

The river requires and demands that a sustainable use be implemented. That is more work than the Corps is capable of producing.

Additional concern centers about the exclusion of the City of East St. Louis, Cahokia, Dupo, Madison, Venice, Granite City and other low areas from the boundaries of the project. These urban areas receive all of the surface water within the watersheds of the Cahokia Creek south of the diversion canal and the Harding Ditch. To exclude these low-lying areas is simply not acceptable. (See maps of project boundaries)

Respectfully,

Richard Worthen

Richard Worthen
Former County Board Rep., District 9, Madison County (1976-1998)
Former Member of Metro East Regional Stormwater Committee (1992-2001
Former Chairman of Metro East Regional Stormwater Committee (1995-1998)
Former Stormwater Coordinator, Madison County (1998- 2001)

30. Richard Worthen

30-1. Comments noted. The 15 May 1998 document referenced is an agreement between the Department of the Army and the non-Federal sponsor, Metro East Sanitary District. The Department of the Army was not a party to the referenced Intergovernmental Agreement. However, throughout the entire process, the Corps has managed this Study in an open public manner in accordance with all applicable statutes, regulations and policies plus the desires, needs and goals of the local sponsor. Appendix G of the Draft Report represents a wealth of information concerning the record of extensive public involvement activity for this Study. This activity included the very important monthly meetings with the Metro East Regional Stormwater Committee whose members included Madison County, St. Clair County, Monroe County, IDOT, IHPA, IDNR, IEPA, MESD and numerous interested municipalities and local citizens. The Chief of Planning at the State of Illinois, Office of Water Resources, served as the local sponsor's co-chair representative for design coordination, reviewing and approving all actions recommended and taken during this study process. As you may recall, this is the process for which you served as a representative along with representatives from the Counties, the State and the local sponsor. In your capacity, you attended numerous planning meetings described above and as a voting member during the plan selection process. Your input was very valuable and for that, in addition to the other assistance you have provided, we thank you very much.

30a. Richard Worthen

30a-1. The final report will clearly state what geographic area the re-evaluation effort is authorized to address.

30a-2. The participation of the Metro East Regional Stormwater Committee was an integral part of the public involvement process.

30a-3. Comment noted and correction will be made.

30a-4. The HGM was used to measure results at three sites. Section 3.12.2.4.5 of the Draft Report provides information about this process at Dobrey Slough, Brushy Lake and Elm Slough. It was to assess effects on wetland functions at all proposed restoration sites, but because of limitations in time and money, development of individual models applicable to all wetland types was precluded. The 116 sites you mention served as sample sites for development of the models. The inability to use both methods did not impact study formulation. Overall HGM results are discussed in Appendix A.

30a-5. Comment noted. ES-1 and similar tables will be revised.

30a-6. The Stockyards and Borrow Pit have been eliminated from the Project. Text references to these sites will be removed in the final report.

30a-7. This reference will be clarified to ensure the reader understands that the reference is to streams only.

30a-8. Comment noted. The information will be included.

30a-9. Comment noted.

30a- 10. Page 6-27 of the Draft Report is one of a sequence of tables depicting sites investigated and measures considered to be applicable to them. Problems identified in this comment could not be found. However, a search of the document will be made to ensure spelling of "Edelhardt" is consistent.

30a-11. Comments noted. The Corps has worked very hard to coordinate extensively and meaningfully with all interested parties and encourages you to discuss your concerns first-hand with our study/Project partners to confirm.

Fax To: Ms. Deborah L. Roush
Attn: CEMVS-PM-F
U. S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
Saint Louis, Missouri 63103-2833
Fax Number 1-314-331-8774

From: Stephanie M. Green-Resident
ETC of Illinois and Missouri Public Foundation-Treasurer
Fax Number: 1-314-429-6469
Phone: 1-314-733-0100
1-618-271-8481
Email: madamstephanie@aol.com

Re: Comment Form
East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Number Pages Faxed 3

Dear Ms. Roush,
Please contact me or have someone to contact me at Missouri headquarters if comments need further explanation, and future conversations regarding this public organizations participation to provide services regarding this project.
Our public foundation represents all the residents of the State of Illinois and Missouri. As a public foundation we have developed a plan to participate by educating the general public regarding eco-system conservation, flood system protection and damage reduction. We are planning very soon to make a second presentation to Congress regarding our proposed site development project on the East St. Louis River Front.

Respectfully yours,
Stephanie M Green
Stephanie M. Green
May 9, 2003

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Stephanie M. Green

Address: 1128 Bond Ave Village/Town/City: East Saint Louis

State and Zip Code: IL - 62201-1149 Telephone Number: 618-271-8481 / 314-733-0100

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 -- address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

31-1 1. If any component of this project will increase flooding in the American Bottoms Region. Don't forget to ask for funds to restore antiquated storm sewers in the Enterprise and Empowerment Zone Communities.

31-2 2. Offer opportunities for non profit public foundations to assist with restoration projects to improve creeks, canals, channels, streams, lakes and river banks.

31-3 3. Allow opportunities for small businesses whom are registered with the corps contract office, to get contracts for improved animal and water creature life within marsh lands creeks, lakes etc. Create real eco system

31-4 4. As work proceeds hire someone to do videos which can be shown on T.V Channel 9 or other cable stations which will allow the public to see what good work is being done with tax dollars. In other words keep the project peaceful and no protest groups will show up.

31-5 5. Post public information notices inside city, village or county halls which provides update progress information to the public

Stephanie McKheen - ETC of Illinois, Inc.

Thank you for taking the time to provide comments! To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

Ms. Deborah L. Roush E-Mail: Deborah.L.Roush@mvs02.usace.army.mil
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

31. Stephanie Green

31-1. No component of this Project is designed to increase flooding in the American Bottom but rather to beneficially utilize already available water resources.

31-2. Comment noted.

31-3. Comment noted.

31-4. Comment noted.

31-5. Comment noted.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: William G. Hunt

Address: 110 Shirlwin DR. Village/Town/City: Pontoon Beach

State and Zip Code: IL 62040 Telephone Number: 618 531-1143

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Comments Are on Attached Sheet.

Email Jdbillhunt@aol.com

5/10/03

Ms. Deborah l. Roush

Hello

My name is Bill Hunt.

I live at the end of Shirlwin Dr. in Pontoon Beach IL. The area that I live in is adjacent to the proposed Elm Slough area of the Ecosystem Restoration and Flood control project.

I know this project has been in the planning stages for quite some time. Until recently (5/9/03) I have had very little information concerning this project. Now that I have documentation from the web site and have downloaded pertinent maps and information I have a couple of concerns regarding the Elm Slough area.

1. What plans if any, are there to control mosquitoes.
2. The proposed new-forested wetland will have a berm that will hold floodwater. This berm will also, unless constructed correctly hinder the flow of runoff water that now flows through the woods directly behind my house into the current ditch that runs from the woods to the existing forested wetland. This water under normal conditions is pumped out into Cahokia Creek. However, during torrential rains the pump is not adequate to handle the volume of water and the water must run through the woods and ditch.
This is extremely important to all of us that live in this lower elevation area.

Neighbors and myself would be very interested in speaking with a representative from your office about the Elm Slough Action Area.

Personally, being an avid outdoor enthusiast I am looking forward to the implementation of this project and the benefits it could provide.

Sincerely

Bill Hunt

32. William Hunt

An email reply was provided in response to this letter.

Roush, Deborah L MVS

From: Roush, Deborah L MVS
Sent: Wednesday, May 14, 2003 8:40 AM
To: 'Jdbillhunt@aol.com'
Subject: RE: Corrected letter

Dear Mr. Hunt,

Thank you for your interest in the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project. The original public comment period began 28 February 2003 and has been extended to 7 June 2003. The current draft report, which is out for public and agency review, is intended to serve as an authorization document that justifies a Federal interest in an ecosystem restoration project. However, because the study area is large and complex the report includes a Programmatic Environmental Impact Statement and clearly identifies the follow on activities required to move to design and construction at any one of the nine major action areas identified as the Recommended Plan of which Elm Slough is one. This process, as described in Section 9 of the draft report, includes the development of a subsequent decision document called an Engineering Documentation Report for each Action Area. This follow-on report would provide the level of detail seen in a typical feasibility study, to include futher public involvement, coordination under NEPA and applicable governing laws, prior to initiation of design or construction.

We are very familiar with your area and have met numerous times with residents of the area. We are in the process of beginning the detailed hydraulic modeling that will give us more definitive information on berm alignment, water flows etc. that we will need to further detail the recommended plan at each of the action area sites.

The goal of the project is to beneficially use stormwater runoff by redirecting it from areas where it causes significant damage to areas that it could benefit.

The question of mosquitoe control will be apart of our follow on assessment. Information currently available indicates that in a healthy ecosystem mosquitoes have sufficient predators to control them. What has been seen to date is that the most significant problems with mosquitoe control are created in areas where stagant water is allowed to stand. The problem with the West Nile outbreak in Illinois last year was most heavily consentrated in the urbanized areas not those adjacent to functioning wetlands. However, further investigation will have to be undertaken if this project is authorized to ensure all issues related to mosquitoe's are understood and addressed.

Three public meetings and a hearing have been held for this project, the project has been discussed in an open public forum monthly for the past 3 years, at the Metro East Regional Stormwater Committee Meetings, and dozens of special group presentations have been accommodated. No further public meetings or hearings are scheduled for this phase of the project.

If I have not adequately answered your questions please call me at 314-331-8033.

Deborah Roush
Project Manager

-----Original Message-----
From: Jdbillhunt@aol.com [mailto:Jdbillhunt@aol.com]
Sent: Sunday, May 11, 2003 6:32 AM
To: Roush, Deborah L

Roush, Deborah L MVS

From: Jdbillhunt@aol.com
Sent: Friday, May 16, 2003 4:13 PM
To: Roush, Deborah L MVS
Subject: Re: Corrected letter

Thank you for your response.

Bill Hunt

2514

PM-Roush

June 1, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

Re: General Reevaluation Study and Draft EIS -
East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project in Madison and St. Clair Counties, Illinois

Dear Colonel Williams:

I've been a bird watcher in the St. Louis area for 20 years. Yvonne Homeyer and I have compiled records for the area, from local birders, which are published in the WGNSS (Webster Groves Nature Study Society). I personally also report sightings to the Illinois Department of Natural Resources and the Illinois Ornithological Society for their *Meadowlark* publication.

I particularly like the Horseshoe Lake--Indian Lake--Bischoff and Bruns area around East St. Louis. In my opinion, the Indian Lake area along Collinsville Road, Highways 70 and 111, are some of the best remaining natural wetlands in the area. It's an important bird area and many shorebirds, wading birds and, in winter, raptors either breed or feed or rest and stage there.

On May 5, 2003, 40 Little Blue Herons were reported there. Common Moorhen, a rapidly declining species, bred there recently. Good numbers of shorebirds, which need shallow wetlands to feed while in migration, are seen there. Countless other species of insects, some rare, are associated with wetlands of this type. It was a very good decision for IDOT to save this area as a part of its mitigation. There are also conservation easements on most of the remaining part of the area.

With Horseshoe Lake, Eagle Park Lake and surrounding wetlands, Indian Lake and these other areas make up a huge block of habitat for many species. I'm aware that up to 80-90 percent of Missouri and Illinois wetlands no longer exist. Indian Lake in its present state is a wonderful wetland which probably will continue to revert to its historical balance if left undisturbed. I
33-1 oppose disturbing the habitat or creating a lake there because Horseshoe, Canteen Lake, Frank Holten and Eagle Park serve that function well.

33-2 We need more more wetlands to prevent outbreaks of avian malaria and duck plague which are made worse by forcing more birds to use smaller and smaller areas. Groups like Ducks Unlimited are buying wetlands to create more habitat to keep large concentrations of waterfowl from outbreaks of these diseases. West Nile virus is known to affect more than 100 species of birds and many become worse as time goes on.

Col. Williams p. 2

The Horseshoe Lake State Recreation area has recorded 305 species of birds including the first sitings of Cinnamon Teal and Chuck-wills-widow (a nightjar) in May 2003. The following is a summary of different groups of birds seen at or near Indian Lake:

- All of the possible waders occur including Great Blue Heron, Great Egret, Snowy Egret, Little Blue Heron and others.
- Rarities such as Tricolor Heron and Glossy Ibis have occurred.
- Many species of ducks including Northern Shoveler, Green and Blue-winged Teal, Gadwall, Mallard, Hooded Merganser, Ruddy Duck and others.
- Wetland specific species including Sora, Virginia Rail, and Common Moorhen.
- Shorebirds including Greater and Lesser Yellowlegs, Pectoral Sandpiper, Least Sandpiper, Semi-palmated Sandpiper, Kildeer, and others.
- A rare Eurasian species Ruff was seen several years ago.
- Most of the breeding wetland and forested land bird species occur including Common Grackle, Red-winged Blackbird, Brown-headed Cowbird, Eastern Meadowlark, Song Sparrow, Field Sparrow, Common Yellow-throat and others.
- Raptors such as Red-tailed Hawk, Osprey, Kestrel, and Bald Eagle are regular visitors.

Many thousands of birds use the area in migration and most of the 305 species seen at Horseshoe Lake Recreation Area are expected at Indian Lake each year.

33-3 I respectfully submit a new checklist of birds for Horseshoe Lake compiled from WGNSS publications, members' records and other sources. We intend to put the checklist on our website, send it to Horseshoe Lake, and will also provide you a copy.

In view of the importance of Indian Lake and its habitat in the ecosystem of the area and the fact that it is already a functioning high-quality wetland, I request that it not be disturbed. I request that you not destroy any bottomland forested wetland. I request that you provide for maintenance and sustainability in the plan, which is now missing. (Who will maintain the areas and who will pay for it?) I also request that this project adhere to the new Corps Environmental Operating Principles.

Thank you for your consideration of my remarks.

Sincerely,

Jim Ziebol
3900 Berger
St. Louis, MO 63109

33. Jim Ziebol

33-1. Comment noted. Our plan for Indian Lake does not include creating any lake there.

33-2. Comment noted.

33-3 (Last two paragraphs). Your submittal of the updated "Checklist of Birds" is appreciated. Actions proposed at Indian Lake in the recommended plan are designed to restore a segment of floodplain stream with a forested corridor, introduce storm water to mimic the historic flood pulse, and partially drain a drowned area of forest. The recommended plan calls for the restoration of over 1,000 acres of new floodplain forest. Operation and maintenance would be the responsibility of the local sponsors as detailed in Section 8 of the Draft Report. A project cooperation agreement between the Federal government and the local sponsor would spell out the responsibilities for each participant. Additionally, since it is anticipated that State funding would be provided for this Project, separate requirements under State statute would also provide an oversight mechanism for the operation and maintenance of Project features in the future.

WGNSS 2003
C - Common
U - Uncommon
R - R
Ca - Casual
a - accidental

CHECKLIST OF BIRDS, HORSESHOE LAKE
(MADISON COUNTY, ILLINOIS)

Species	Winter	Spring	Summer	
Common Loon	U	U		U
Pacific Loon	a	a		
Red-throated Loon	Ca			
Clark's Grebe	Ca			
Western Grebe	R	Ca		
Red-necked Grebe	a			
Horned Grebe	R	U		U
Eared Grebe	a	R	a	C
Pied-billed Grebe	R	C	U	C
American White Pelican	C	U		C
Double-crested Cormorant	R	C	R	C
Least Bittern		R	R	
American Bittern		R		R
Black-crowned Night-Heron	R	C	C	C
Yellow-crowned Night-Heron		U	U	U
Green Heron		U	U	U
Tri-colored Heron		Ca	Ca	R
Little Blue Heron		U	C	U
Cattle Egret		C	U	U
Snowy Egret		U	C	U
Great Egret	Ca	C	C	C
Great Blue Heron	U	C	C	C
Wood Stork				a
White-faced Ibis		Ca	Ca	
Glossy Ibis		Ca	Ca	
White Ibis		a		
Tundra Swan	Ca			
Mute Swan	Ca	R		
Greater White-fronted Goose	R	C		R
Snow Goose	U	C		U
Ross's Goose	Ca			Ca
Canada Goose	C	C	C	C
Brant				a
Mallard	C	C	C	C
American Black Duck	R	R		R
Gadwall	C	C		C
Green-winged Teal	U	C		C
American Wigeon	U	U		U
Northern Pintail	U	C	Ca	U
Northern Shoveler	U	C	Ca	C

Species	Winter	Spring	Summer	Fall
Blue-winged Teal	a	C	R	C
Cinnamon Teal		a		
Ruddy Duck	C	C	Ca	C
Wood Duck	Ca	C	R	C
Canvasback	R	C		C
Redhead	R	U		U
Ring-necked Duck	R	C		C
Greater Scaup	R	U		R
Lesser Scaup	U	C		C
Black Scoter	Ca			
White-winged Scoter	R			Ca
Surf Scoter	Ca			Ca
Oldsquaw	R			R
Common Goldeneye	U	C		C
Bufflehead	Ca	U		U
Common Merganser	U	U		
Red-breasted Merganser	Ca	C		C
Hooded Merganser	R	U	Ca	U
King Rail		Ca	Ca	
Virginia Rail		R		R
Sora		R	Ca	R
Yellow Rail[1]				H
Common Moorhen		Ca	Ca	
American Coot	U	C	U	C
American Avocet			R	R
Piping Plover			Ca	Ca
Semipalmated Plover		C		U
Killdeer	R	C	C	C
Black-bellied Plover		R		R
American Golden Plover		U		U
Marbled Godwit		Ca		
Hudsonian Godwit		R		
Willet		Ca	Ca	
Greater Yellowlegs		U	U	U
Lesser Yellowlegs	Ca	C	C	C
Solitary Sandpiper		U	U	
Spotted Sandpiper		U	Ca	U
Wilson's Phalarope		R	R	R
Red-necked Phalarope				a
Red Phalarope			a	a

[1] Yellow Rail was reported in August, 1938, by L. Ernst.

Species	Winter	Spring	Summer	Fall
Short-billed Dowitcher			R	Ca
Long-billed Dowitcher		R	R	Ca
Stilt Sandpiper		R	U	
Common Snipe	Ca	C		C
American Woodcock		R	R	
Ruddy Turnstone			R	
Red Knot			Ca	Ca
Dunlin			R	Ca
Sanderling			R	Ca
Semipalmated Sandpiper		R	U	R
Western Sandpiper			R	
Least Sandpiper	Ca	U	C	R
White-rumped Sandpiper		R	Ca	
Baird's Sandpiper			R	R
Pectoral Sandpiper		U	C	U
Ruff				a
Buff-breasted Sandpiper			R	
Upland Sandpiper		Ca	Ca	
Franklin's Gull	Ca	U		U
Laughing Gull		Ca	Ca	Ca
Bonaparte's Gull	R	C		C
Common Black-headed Gull	a			
Little Gull				Ca
Ring-billed Gull	C	C	U	C
Herring Gull	U	R		U
California Gull	a			
Glaucous Gull	R			
Iceland Gull	Ca			
Thayer's Gull	R			
Lesser Black-backed Gull	R			R
Great Black-backed Gull	Ca			
Black-legged Kittiwake	Ca			
Sabine's Gull				a
Common Tern		U		U
Forster's Tern		C	R	U
Least Tern			Ca	Ca
Black Tern		U		U
Caspian Tern		R		R
Turkey Vulture		R		R
Black Vulture			a	
Golden Eagle		Ca		Ca
Bald Eagle	U	R		U

Species	Winter	Spring	Summer	Fall
Mississippi Kite			a	
Northern Harrier	R	U	Ca	U
Sharp-shinned Hawk	R	R		R
Cooper's Hawk	U	U	Ca	U
Goshawk	Ca	Ca		
Red-shouldered Hawk	R	R	R	R
Broad-winged Hawk		U	R	C
Red-tailed Hawk	C	C	C	C
Swainson's Hawk		a		
Rough-legged Hawk	R			R
Ferruginous Hawk	H			
Osprey		U	R	C
American Kestrel	C	U	U	C
Merlin	Ca	R		R
Peregrine Falcon	Ca	R	R	R
Northern Bobwhite	R	R	R	R
Ring-necked Pheasant[2]	U	R	R	R
Wild Turkey	U	U	R	U
Rock Dove	U	U	U	U
Mourning Dove	C	C	C	C
Ringed Turtle Dove				a
Monk Parakeet			a	
Yellow-billed Cuckoo		U	R	R
Black-billed Cuckoo		R		R
Long-eared Owl	Ca			
Short-eared Owl	Ca			
Great Horned Owl	U	U	U	U
Barred Owl	U	U	U	U
Eastern Screech Owl	R	R	R	R
Whip-poor-will		R	R	
Common Nighthawk		U	R	C
Chimney Swift		C	C	C
Ruby-throated Hummingbird		U	R	U
Belted Kingfisher	R	R	R	R
Red-bellied Woodpecker	U	U	U	U
Northern Flicker	U	U	U	U
Red-headed Woodpecker	Ca	R	R	R
Yellow-bellied Sapsucker	Ca	U		U
Downy Woodpecker	C	C	C	C

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[2] Ring-necked Pheasants are released.

Species	Winter	Spring	Summer	Fall
Hairy Woodpecker	R	R	R	R
Pileated Woodpecker	Ca	Ca	Ca	Ca
Eastern Kingbird		C	U	U
Western Kingbird		Ca	Ca	
Scissor-tailed Flycatcher				a
Great-crested Flycatcher		U	U	U
Olive-sided Flycatcher		R		
Eastern Wood Pewee		U	U	R
Eastern Phoebe	Ca	C	U	U
Least Flycatcher		U	a	U
Acadian Flycatcher		U	U	
Willow Flycatcher		R	R	
Alder Flycatcher		R		
Yellow-bellied Flycatcher		U		U
Horned Lark	U	U		U
Tree Swallow		C	C	C
Purple Martin		C	U	U
Bank Swallow		U	R	U
Cliff Swallow		U	R	U
Northern Rough-winged Swallow		U	R	U
Barn Swallow		C	C	C
Bluejay	U	C	C	C
American Crow	C	C	C	C
Fish Crow	a	U	U	Ca
Tufted Titmouse	U	U	U	U
Carolina Chickadee	C	C	C	C
Brown Creeper	R	U		R
White-breasted Nuthatch	U	U	U	R
Red-breasted Nuthatch	R	Ca		Ca
House Wren		U	R	U
Winter Wren	Ca	R		R
Carolina Wren	C	C	C	C
Bewick's Wren		Ca	Ca	
Marsh Wren		U		U
Sedge Wren		U	Ca	U
Rock Wren				
Golden-crowned Kinglet	R	C		U
Ruby-crowned Kinglet	Ca	U		U
Blue-gray Gnatcatcher		C	U	
Eastern Bluebird	Ca	U	R	R
Wood Thrush		U	R	U
Veery		R		

Species	Winter	Spring	Summer	Fall
Swainson's Thrush		U		U
Gray-cheeked Thrush		R		R
Hermit Thrush	Ca	U		U
American Robin	C	C	C	C
Loggerhead Shrike	Ca	Ca	a	Ca
Northern Shrike		Ca		Ca
Gray Catbird		C	U	C
Northern Mockingbird	C	C	C	C
Brown Thrasher	Ca	C	C	C
American Pipit		R		Ca
Cedar Waxwing	R	R	R	R
European Starling	C	C	C	C
White-eyed Vireo		U	U	U
Yellow-throated Vireo		U		R
Blue-headedVireo		U		U
Bell's Vireo		R		R
Red-eyed Vireo		U	U	U
Warbling Vireo		C	C	U
Philadelphia Vireo		R		R
Prothonotary Warbler			R	
Blue-winged Warbler		U		U
Golden-winged Warbler		R		R
Tennessee Warbler		U		U
Orange-crowned Warbler	a	U		R
Nashville Warbler		U		U
Northern Parula		R	Ca	Ca
Black-and-white Warbler		U	R	R
Cerulean Warbler		Ca		
Blackburnian Warbler		R		R
Chestnut-sided Warbler		C		U
Cape May Warbler		R		Ca
Magnolia Warbler		U		U
Yellow-rumped Warbler	R	C		C
Black-throated Green		U		U
Yellow-throated Warbler		Ca		
Prairie Warbler		Ca		
Bay-breasted Warbler		U		R
Blackpoll Warbler		U		R
Palm Warbler		C		C
Yellow Warbler		C	R	R
Mourning Warbler		R		Ca
Connecticut Warbler		Ca		

Species	Winter	Spring	Summer	Fall
Kentucky Warbler		R	R	
Canada Warbler		R		R
Wilson's Warbler		U		U
Hooded Warbler		Ca		
Ovenbird		R		R
Swainson's Warbler		a		
Louisiana Waterthrush		R		Ca
Northern Waterthrush		U		U
Common Yellowthroat		C	R	U
Yellow-breasted Chat		R	R	
American Redstart		U		U
Rose-breasted Grosbeak		R		R
Northern Cardinal	C	C	C	C
Blue Grosbeak		U	U	
Indigo Bunting		C	C	C
Rufous-sided Towhee	Ca	R	R	R
Grasshopper Sparrow		R	R	
Henslow's Sparrow				
LeConte's Sparrow	Ca			R
Sharp-tailed Sparrow		Ca		Ca
Vesper Sparrow		R		U
Savannah Sparrow		C		C
Song Sparrow	U	C	U	C
Lark Sparrow		Ca		
American Tree Sparrow	U	C		C
Field Sparrow	Ca	U	U	U
Chipping Sparrow		R		R
Clay-colored Sparrow		Ca		Ca
Dark-eyed Junco	U	C		C
Harris's Sparrow	Ca	Ca		Ca
White-throated Sparrow	C	C		C
White-crowned Sparrow	C	C		C
Fox Sparrow	R	U		R
Lincoln's Sparrow		R		R
Swamp Sparrow	R	U		U
Smith's Longspur	Ca	Ca		
Lapland Longspur	R			
Snow Bunting	Ca			
Dickcissel		U	U	U
Bobolink		U		R
Eastern Meadowlark	U	C	U	C

Species	Winter	Spring	Summer	Fall
Western Meadowlark	Ca			
Yellow-headed Blackbird	Ca		Ca	
Red-winged Blackbird	C	C	C	C
Rusty Blackbird	Ca	U		R
Brewer's Blackbird		Ca		Ca
Brown-headed Cowbird	C	C	C	C
Common Grackle	C	C	C	C
Great-tailed Grackle	a			
Northern Oriole		U	U	U
Orchard Oriole		U	U	U
Scarlet Tanager		R		R
Summer Tanager		U	U	R
Eurasian Tree Sparrow	U	U	U	U
House Sparrow	U	U	U	U
Pine Siskin	R	R		R
American Goldfinch	C	C	C	C
Common Redpoll	a			
Purple Finch	Ca	R		R
House Finch	U	U		U

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Gene Winheim Sr.

Address: 2474 Mullins Creek Rd. Village/Town/City: Dupo

State and Zip Code: Illinois 62239 Telephone Number: ____________

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Living in this area for over twenty-five years, I still believe the only way to relieve the flooding is to clean out Canal no. 1. This is for the future but for many years to come. In the future more house and shopping center will take up more farm land and that will take more land out of production, and no place for the water to go, but to flood more ground below the bluffs Fri.

Gene Winheim Sr

34. Gene Winheim Sr.

Comments noted.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Richard C James
Address: 34 Rebeact (Pontoon Beach) Village/Town/City: Granite City
State and Zip Code: Il 62040-6900 Telephone Number: 618-931-0380

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

35-1 It is my wish That This project NOT go foward.

35-2 My conSERN is The Already To high Water Table being Raised even more And An increase of insects Related To Standing water

35. Richard C. James

35-1. Comment noted.

35-2. The restoration Project would not impact the existing ground water table. It is designed to restore healthy wetlands that can sustain populations of insect predators, such as dragonflies, that can control mosquito populations.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Bill & Priscilla Briggs

Address: 43 Dublin Drive Village/Town/City: Pontoon Beach (for mail purposes, it is Granite City)

State and Zip Code: IL 62040 Telephone Number: 618-797-0904

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 -- address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

We have reviewed the proposal. Our comments are as follows:

We like the idea of the reforestation plan.

We are concerned about the controlled burn that is talked about. What are the chances that it will get out of control?

How much water will be flowing? Will there just be a lot of water at flood stage?

How much protection is the berm going to provide?

All in all, we would much rather see this project than a developer coming through and taking away all the trees for development.

36. Bill and Priscilla Briggs

Prescribed burning of restored prairie requires a burn management plan and a permit. This is standard maintenance practice and is used extensively across the state, even in urbanized areas, where is has been done safely. Table 7-17 of the Draft Report identifies current assumptions regarding depth and duration of flood pulses at all of the alternative habitat restoration sites. The frequency of events would be determined by naturally occurring rainfall events across the Project area. However, at the Elm Slough action area, water that currently travels from Long Lake and Mitchell Ditch to Horseshoe Lake via a small farm ditch would be rerouted across the proposed habitat area. Only during infrequent rainfall events would water pond for short durations across this site. These periodic flood pulses are beneficial for maintaining the biodiversity and long-term sustainability of the site.

Williams, Charles K COL MVS

From: American Bottom Conservancy [abc@digitalesl.org]
Sent: Monday, June 09, 2003 9:59 PM
To: Col. Kevin Williams
Subject: public comment ecosystem restoration

Mark Feldworth

1810 August St., Apt. 2

Granite City, IL 62040

June 1, 2003

Col. C. Kevin Williams

U.S. Army Corps of Engineers

St. Louis District

1222 Spruce St.

St. Louis, MO 63103

Comment on East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction

Project in Madison and St. Clair Counties, Illinois

Dear Col. Williams:

37- 1) The Corps project could be an important tool in protecting and expanding wetland habitat in this area if development in the non-project areas is controlled.

37- 2) The plan, however, will benefit a limited range of wildlife species. Nesting of some species may be disrupted by the flood pulses expected (see page 7.65 in the Re-evaluation Report).

37- 3) A project involving 5,000 acres of habitat should produce more of a benefit in terms of creating more diverse habitat types that will, in turn, result in a higher level of biodiversity and help to restore declining species. The habitat restoration should not only aim to provide feeding areas for wildlife but also nesting habitat.

37- 4) Beside the wood duck, a number of wetland wildlife species should benefit from this project by the creation of nesting habitat. Species such as the Common Moorhen, Pied-billed Grebe, Hooded Merganser, Black Tern and others should be included in management plans.

37- 5) Marshy areas in the project should have some pockets of deeper, open water to attract nesting marsh birds. Marshy ponds subject to varying degrees of flooding could be considered. Some ponds should receive no flooding from the creeks to encourage nesting wetland birds and breeding frogs and salamanders. Adequate drainage should be planned for the action areas so that they are not inundated with flood waters for prolonged periods.

37- 6) The creation of large tracts of forested wetland wetland as planned in areas such as Elm Slough will probably be helpful in restoring forest songbirds and provide nesting areas for herons and egrets. Brushy Lake (levee lake natural area) should be restored to the high quality wetland conditions that existed in the 1970s.

37- 8) Action areas in this plan should be connected to each other and to existing and planned conservation areas with wildlife corridors. Restored creeks, drainage canals, and hiking/biking paths could be used to provide migration routes for wildlife.

37- 9. Some wetland areas that provide especially good nesting opportunities for wetland birds should be restricted areas with limited access.

37- 10. Cooperation with other state and federal agencies and with private conservation organizations will be very important in improving this project.

37- 11. The plan should be flexible enough to include additional wildlife management plans as resources become available.

37- 12. There is a need for more public involvement in this project. More access to hard copies of the general re-evaluation report and tours of the action areas would help.

37- 13. An adult Pied-billed Grebe with young was spotted in a marshy area at the end of Indian Lake (May, 2003), indicating

(a) that this Illinois threatened species is breeding here; and

(b) that this is already high quality wetlands.

This area and any area with threatened or endangered species should not be disrupted by implementation of this project. Each action area needs an environmental impact statement before any work is carried out.

37- 14. This project should adhere to the principles and guidelines for ecosystem restoration.

Sincerely,

Mark Feldworth

37. Mark Feldworth

37-1. Comment noted. The Corps' Project would restore approximately 3,000 acres of floodplain wetlands, thereby removing these wetlands from potential future development in perpetuity.

37-2. The Project as formulated is not directed to specifically enhance only the 9 Blue Book model species selected as indicator species for predictive purposes. Appendix A explains this concept and process. Predictor species used to project habitat benefits are representative of larger guilds and communities that benefit from like habitats and conditions.

37-3. The plan as formulated, restores a level of biodiversity to the floodplain that has not been seen since pre-settlement times. Restoration plans were based on historic conditions and as such, support a broad range of species.

37-4. See comment 37-2.

37-5. Comment noted.

37-6. Comment noted.

37-8. Comment noted.

37-9. Comment noted.

37-10. Comment noted and concur.

37-11. Comment noted.

37-12. As the Project progresses, additional public involvement opportunities would be a part of the NEPA process as discussed in Section 9 of the Draft Report.

37-13. As indicated in the Draft Report, as each alternative moves forward into design, the conditions at that time would have to be re-evaluated and the implications to the recommended action analyzed. Previously anticipated outputs would have to be re-validated in order to show that the area is still justified for Federal action. A site-specific EA or EIS would be prepared for each action area.

June 7, 2003

Colonel Charles Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street,
St. Louis, MO 63103-2833

Dear Colonel Williams:

First, I would like to thank the St. Louis District Corps of Engineers (StLCOE) for including me in this process, and the efforts of this agency to improve the environment of the St. Louis region through this project. Second, while I am in favor of what is being attempted there are a number of concerns that I would like to express at this stage of the process.

I have been a resident of the region for nearly thirty years, and have become increasingly concerned with the accelerated rate of development and the impact in particular on the surrounding wetlands and archaeological resources. Although the present project is focused on environmental restoration my concern is that this is another means to control flooding and continue development of the Mississippi river floodplain. Until the political leadership and agencies in the region seriously address this, I am afraid that the warnings listed in your report regarding the rapid pace of development for the next 3 to 5 decades are ominous. It is not development to which I am opposed, but the manner in which it haphazardly occurs at the expense of the resources, environmental, historical, and human. It is not as though we have run out of space; and it is not as though we don't have areas, such as East St. Louis, that were developed but have been abandoned. I realize that your actions are not intended to solve this larger problem, however, I do believe that the efforts have to be even greater to discourage and at least slow the rate of development so it carefully planned and is in balance with the environment. In the 12000 years that Native Americans occupied this region they maintained a philosophy that focused on balance in the world around them. We could benefit immensely from this philosophy.

The following comments are submitted for inclusion in the record for the General Re-evaluation Report on the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project which I received in February 2003. This is a massive document with a lot of information, much of which I can not readily address within the time frame we have had. I have had an opportunity to visit most of the areas recently and over the years I have been in the area. My comments are restricted to the areas with I am most familiar: Cahokia Mounds, East St. Louis, and the Spring Lake. These comments have been presented in discussions at informational meetings with Ms. Deborah Roush and other team members within the last three years.

38-1 First, although the report lauds the importance of the pre-contact Native American occupations, especially Cahokia mounds, no where does it clearly display the limits of the National Historic Landmark boundaries, that coincide with Cahokia's National Register of Historic Places limits. These boundaries fall within the following "Action Areas": Brushy Lake, Borrow Pit, Cahokia Mounds, and Spring Lake. Although your staff is certainly aware of this, I don't believe this has been clearly conveyed, especially on maps, to the rest of the public reviewing this document.

38-2 Second, on Page 3-106, third paragraph, first sentence is incorrect, historically. Efforts to preserve Cahokia Mounds began in the 1880s and culminated with the creation of a state park by 1925. These efforts were initiated by local citizens and politicians on both sides of the river, and not archaeologists. Hence, its "cultural value" has been well known and publicized for some time. As clearly stated in the last sentence of the last paragraph of page 2-106, I do hope that you heed the goal of preservation as it is stated by your staff. As an aside, our armed forces in Iraq went to extraordinary efforts to avoid some of the most significant sites in that country, I believe that same effort should be accorded here.

38-3

Third, the area of primary concern I have is the Spring Lake action area, especially, the Indian lake portion. I am personally involved with the creation of a trail from the East St. Louis Mound group to Cahokia mounds, so I see this beautiful area at least twice a day. As it is now it is simply wonderful to see the way in which different species are presence. I have had an opportunity to video many of the birds including a bald eagle, glossy ibis, a turkey hen and her chicks, deer, numerous other bird species, and an alligator snapping turtle. I see little that you can do to enhance this remarkable area. In fact, you do not mention any problems with this area on page 6-81. As they say, if it isn't broke don't try and fix it.

As I understand Indian Lake will be reconnected to the Spring Lake cell through a newly constructed ditch that is some 2.5 miles in length. I want detail the efforts that will be made to cross highways, railroads, potential hazardous waste areas, and residential areas, not to mention the southeast corner of the Cahokia Mounds National Historic landmark boundaries. This ditch is in violation of the principles of this project in that it does not make use of existing environments, such as a slough or other natural low. This new ditch would replace Lansdowne ditch which represents the original natural flow for Schoenberger Creek through the abandoned channel of the Spring Lake meander. While I understand the logic behind this new ditch, that is to bring a flow of sustainable water into the upper end of Indian Lake so that a pulse can be recreated for Cahokia Creek, I believe this is a misguided. It is important emphasize that Indian Lake was a separate lacustrine resource at the south end of the action area. This lake in the past extended outside of the action area to the west, south, and north around the Gateway International race track. Indian Lake was fed by Schoenberger Creek, which is evident on the early maps nineteenth century maps of the region, and it is these maps that from the basis for the ecological restoration of these areas. At the other end of this massive area, Cahokia Creek entered this area from the northeast. Cahokia Creek has been truncated on the northeast by Illinois Route 111 and I 55/70. It meanders through a small portion of the action area, and then appears to drain under I 55 across from the Milam landfill. The landfill appears to have totally severed its original channel. The focus of the action plan appears to be on Cahokia Creek rather than the original Indian Lake.

Regarding the negative impact of Lansdowne ditch on Washington Park residents, I felt the original cleanout of this ditch was a beneficial effort as were all the ditch cleanouts. I thought after seeing the results of the ditch cleanout that Lansdowne ditch formed the basis of a potential greenway through the community. I fully believe that this approach would represent a major enhancement for the community and not negatively impact Indian Lake or the cultural resources that the relocated ditch will do in crossing the NHL boundaries of Cahokia Mounds.

Finally, I have mixed feelings about supporting this project. I am 100% behind environmental restoration, if that is the sole purpose of the project. If it is simply another means to perform flood control I am not in favor of it, and it is not that I am against flood control. The recent ditch cleanouts if sustained have been extremely successful. There is a saying of KISS and that seems applicable to this situation. In other words help provide the necessary funds for maintenance of these ditches, and keep people and development out of those areas that flood.

Again thank you for the opportunity to present the following comments, while I am supportive of your efforts the devil is in the details and I believe that the devil is development.

Sincerely,

John E. Kelly, PhD
Assistant Director
Powell Archaeological Research Center
5500 Collinsville Avenue
Fairmont City, Illinois
618-271-4920

38. John E. Kelly

38-1. Concur. A map with the NHL boundaries will be included in the final report.

38-2. Concur. The referenced paragraph will be revised in the final report.

38-3 (This paragraph to the end of the letter). Page 6-80, paragraph 4 of the Draft Report supports the potential for Indian Lake. As indicated in the Report, as each alternative moves forward into design, the conditions at that time would be re-evaluated and the implications to the recommended action analyzed. Previously anticipated outputs would be revalidated to show that the area is still justified for Federal action. A site-specific EA or EIS would be prepared for each action area.

Roush, Deborah L MVS

From: Gatestables1@aol.com
Sent: Saturday, June 07, 2003 12:58 AM
To: Roush, Deborah L
Subject: Corps Wetland Project

Kathy,

Would really like to see the true west end of Elm Slough, on both sides of Lake Drive in Pontoon Beach, all privately owned, be enhanced, restored, improved, included, recognized, on the maps, protected and studied along with the other similar bodies of stormwater drainage and retention areas in your project study.

Thank you,
Kelly Arnold

39. Kelly Arnold

Comment noted.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Robert B. Washburn

Address: PO Box 1039 Village/Town/City: Edwardsville

State and Zip Code: Il 62026 Telephone Number: 618-650-2560

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 -- address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

40-1 1. The plan for Cahokia Creek calls for a 200+ meter corridor. I do not find the results of an evaluation of a narrower corridor. A 50-100 meter corridor should provide most of the benefit at far less cost.

40-2 2. The "predevelopment natural communitie" in the sand areas was mesic sandprairie as noted on page 6-66 of the report. I question the likelihood of success in establishing woodlands in these sandy areas uphill from the creek.

40-3 3. The plans call for concrete dams for the detention ponds in the bluffs. We have found earthen structures to be far more economical with very minimal maintenance requirements.

40-4 4. Dams for detention ponds in the bluffs can be a problem due to inadequate structure in the loess soils. We have found that the structures need to be moved back from the bluffs into better soils.

Thank you for taking the time to provide comments! To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

Ms. Deborah L. Roush E-Mail: Deborah.L.Roush@mvs02.usace.army.mil
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

40. Robert B. Washburn

40-1. Corridors of different widths (50, 75 and 100 meters) were evaluated during the incremental analysis for this action area. Section 6.10 of the Draft Report shows alternative combinations evaluated. Appendix A, Table 28 of the Draft Report shows the resulting outputs that were considered during the alternative selection process.

40-2. The establishment of woodlands in the recommended plan is confined to the riparian corridor associated with the restored creek.

40-3. Earthen structures were considered and eliminated based on cost and adverse environmental impacts to the surrounding area. This information is contained in Appendix E, Section E-4 of the Draft Report.

40-4. Comment noted. During future analyses, the design issues related to these recommended structures would be further detailed.

AFFECTED LANDOWNERS

Charles Luehmann
4572 Old Edwardsville Rd.
Granite City, IL 62040
Phone: 618-797-2857

May 29, 2003

Via e-mail and Certified Mail,
Return Receipt Requested

Deborah Roush
Project Manager
US Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

Re: East St. Louis and Vicinity, Illinois
Ecosystem Restoration and Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement
(DPEIS), February 2003

Dear Ms. Roush:

LONG LAKE, MITCHELL DITCH
ELM SLOUGH

Thank you for the extension until June 7, 2003, to provide my comments for the public record regarding the above-referenced project. Please consider this letter (and not my prior correspondence) to be my response to your request for comments about Mitchell Ditch, Long Lake and Elm Slough. Unfortunately, my responses are not as thorough or complete as they might otherwise be if I had enough time to perform my own engineering studies. Based upon the current project proposal, my land would become undevelopable and my use and enjoyment of it would be destroyed.

41-1 **The project's plans to convert approximately 3,000 to 5,000 acres of ground into forest, wetland and prairie, at a proposed cost in excess of $200,000,000 can be completely avoided if the State of Illinois would remove the sedimentation and clear debris that has accumulated over the past sixty plus years in Horseshoe Lake and its related diversionary canal (constructed by the State of Illinois) in the delta region of Horseshoe Lake.** The State's failure to remove the sedimentation has resulted in the lake's level becoming increasingly higher, which in-turn has become a pretext for the need for the above-referenced project. In summary, federal dollars would be unnecessarily spent on the above-referenced project when it could be completely avoided if the State of Illinois would fulfill its duty to maintain and manage the consequences of its diversionary canal and its work in and around Horseshoe Lake. If the silt is removed and debris is cleared, excess surface water in the American Bottoms can be channeled through Horseshoe Lake to the Mississippi River without taking private landowners' productive agricultural land and land that is poised for significant future commercial and residential development. The above-referenced project would unnecessarily destroy any continuing agricultural use and future development of 2,000-5,000 acres and would unnecessarily cost in excess of $200,000,000.

The proposals affecting Mitchell Ditch, Long Lake and Elm Slough are not necessary and should be abandoned for reasons including the following observations and alternatives:

1. Earthen berms are not needed in this area. There were no berms or levees in pre-settlement times. There is a flood pulse at the south end of Metro-East Ditch at KMOX. Dead timber needs to be removed in this area. The flood water spreads out to the southwest through two main channels and two smaller channels. At this time only the southernmost channel flows. The other three channels are blocked by fill to the west. South of highway 162, I have never seen flood water top the south bank of Long Lake. May 1995 was the 100-year flood. Elm Slough had its highest peak (measured at the east side of Highway 111 culvert) was 408.66 on May 18, 1995, in the afternoon.

Solution: Remove beaver dams and downed timbers from the existing channels. Then clearing 30 feet on either side of the channels. This Elm Slough area is already a flood holding area.

2. The two railroads both have an original channel culvert and an overflow culvert.

Solution: Keep the debris, logs, railroad ties, trash, etc. out of the culverts. As of May 20th, 2003, the east overflow culvert was completely blocked by a cottonwood trunk and other debris.

3. It does no good to plant trees along channels and ditches. Beavers destroy trees for food and dam building. Channels should be clear of brush and trees for 30 feet on either side. Old channels should be kept clear of dams and timber. KMOX Ditch is too deep! It allows the beavers to burrow into the bank to build dens.

Solution: If you eliminate or control the beavers by removing their dams and fallen timber, the water channels will return to their normal level which results in the forest renewing itself as in pre-settlement days as a flood pulse region.

4. Use of 7 million-plus dollars to clear a 403.8 foot ditch through the delta on the north side of Highway 111 into Horseshoe Lake. Clear a 30 foot strip on both sides of the ditch.

Solution: Better, yet, clear all the debris and remove all the silt and avoid the buy-out costs of Long Lake, Mitchell Ditch and Elm Slough property owners. You cannot keep raising the lake level to cover sediment.

5. Prescription fire would help since there has been no fire since 1956. The drought years of 1952 to June 1957 was the last time there was a fire in Elm Woods.

6. No bluff water came into the Long Lake, Mitchell Ditch and Elm Slough area in pre-settlement times, and certainly not in the last 100 years. Cahokia Creek flowed through McDonough Lake, then southwest past Monk's Mound. Horseshoe Lake flooding occurred from the South (Monk's Mound area) in 1903 causing back flooding into Horseshoe Lake. (An Army Corps of Engineers 1904 survey map shows Horseshoe Lake's level at 402 feet.) In the earlier flooding from the north, Long Lake was the channel for the flood water that flowed into Horseshoe Lake, thus flushing out the sediment and creating a nice lake, not a sediment laden delta that it is now.

7. The proposal unfairly burdens downstream landowners for the benefit of a few upstream developers of prize commercial ground. The study's proposal appears to be laying the groundwork for a public taking of private land for private benefit. It is not fair that the upstream property value is increased by burdening and destroying the value and development potential of the downstream properties.

8. Given the size of the Army Corps of Engineers study, I have not had time to complete a thorough review by obtaining my own engineering study. These are only my own preliminary observations.

Also, it appears that the following items were not well considered in the project study, but if they were considered, the study's proposals may have been significantly different.

A. In pre-settlement days, nature provided for a cycle of drought pulses and flood pulses, each of which have environmental benefits. However, the study does not consider the benefit of drought pulses or how they may be used with the existing drainage system to obtain the same benefits that the study seeks. For example, if the existing drainage channel levels were permitted to dry-up, beavers would move out, channels can be cleared, the forest can regenerate and wildlife would prosper.

B. There is no consideration of Granite Steel Company's pumping of approximately 20,000,000 gallons of water each day into Horseshoe Lake. This water in-flow, coupled with the State of Illinois' failure to dredge sediment and clean debris in the lake system, has resulted in unnecessarily raising the lake's level. Unfortunately, this unnecessary rise in the level of Horseshoe Lake has reduced the lake's capacity to handle the drainage issues that are identified in the project study.

C. The benefits of low river and lake levels are not considered.· The study does not identify any prior studies or maps that identify historical levels of Horseshoe Lake to demonstrate the significant rise in Horseshoe Lake to today's level. In pre-settlement days, low river levels would result in a low level for Horseshoe Lake, which in-turn had the benefits of a drought pulse and increased the American Bottoms capacity for future drainage.

There is no analysis of how different levels of Horseshoe Lake would affect the proposed plan. If the level of Horseshoe Lake was lowered to its historical levels, the project's proposal would become unnecessary and, as a result, would save significant dollars without adversely affecting private landowners.

D. No consideration is given to how to solve the excess water problem without damaging certain landowners to the detriment of others. Many ideas put forth in this letter would accomplish the results the study seeks without damaging any landowners.

E. Too little analysis (if any) on the effects of past droughts is considered. Instead, the study disproportionately focuses upon the adverse consequences of flooding without considering how drought periods help to reduce flood consequences.

F. The study does not focus upon the type of "wetlands" that would result from its recommendations. Specifically, given the topography, soils and drainage of the affected area, the proposed "wetlands" could be more accurately characterized as creating pools of stagnate water that remain after excess rain or commercial water usage burdens the property. Among other things, these pools become mosquito breeding grounds. As well noted in the project study, West Nile Virus and other diseases are of particular concern in this area. These diseases can be avoided by not creating the proposed "wetlands".

G. There is no explanation about why 1800 is the approximate date that divides pre-settlement days from settlement days. This appears to be an arbitrary date that purposely ignores the impact of the condition of the land and its use prior to that date. One wonders if the date was chosen because it somehow helps to support pre-determined results that the study seeks to support.

Deborah Roush
May 29, 2003
Page 5

As a final observation, the proposal's land acquisition cost estimates are unrealistic and do not reflect current comparable sales that appear to be at least four to six (or more) times greater than the estimates.

Thanks for the extended period of time in which to submit my comments. I would be pleased to have an opportunity to participate in further public hearings, including before Congress, in an effort to resolve American Bottoms' drainage issues economically and with minimal impact on existing landowners.

Sincerely,

Charles Luehmann

Charles Luehmann

Copy: The Hon. Jerry F. Costello

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: CHARLES E LUEHMANN

Address: 4572 OLD EDWARDSVILLE RD Village/Town/City: GRANITE CITY

State and Zip Code: IL 62040 Telephone Number: (618) 797-2857

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

SEE ATTACHED FOR COMMENTS.

I ALSO WISH TO REQUEST AN EXTENDED PERIOD OF TIME TO FURTHER STUDY THE EFFECTS OF YOUR PROPOSALS. THERE ARE MANY OTHER ISSUES THAT NEED TO BE ADDRESSED AND STUDIED.

LONG LAKE MITCHELL DITCH
ELM SLOUGH

1. Earthen berms are not needed in this area. There were no berms or levees in pre-settlement times. There is a flood pulse at the south end of Metro-East Ditch at KMOX. Dead timber needs to be removed in this area. The flood water spreads out to the southwest through two main channels and two smaller channels. At this time only the southernmost channel flows. The other three channels are blocked by fill to the west. South of highway 162, I have never seen flood water top the southbank of Long Lake. May 1995 was the 100 year flood. Elm Slough had it's highest peak {measured at the east side of highway 111 culvert} was 408.66 on May 22, 1995.

Solution: Remove beaver dams and drowned timbers from the existing channels. Then clearing 30 feet on either side of the channels. This Elm Slough area is already a flood holding area.

2. The two railroads both have an original channel culvert and an overflow culvert.
Solution: Keep the debris, logs, railroad ties, trash, etc. out of the culverts.

3. It does no good to plant trees along channels and ditches. Beavers destroy trees for food and dam building. Channels should be clear of brush and trees for 30 feet on either side. Old channels should be at 403.8 to match the normal pool of Horseshoe Lake. KMOX Ditch is too deep! It allows the beavers to burrow into the bank to build dams. If you eliminate or control the beavers this will work as in pre-settlement days as a flood pulse region. Then the forest will come back with simple improvements.

4. Use the 7 million- plus dollars to clear a 403.8 foot ditch through the delta on the north side of Highway 111 into Horseshoe Lake. Clear a 30 foot strip on both sides of the ditch.

5. Prescribe fire would help since there has been no fire since 1956. The drought years of 1952 to 1957 was the last time there was a fire in Elm Woods.

6. No bluff water came into this area in pre-settlement times, and certainly not in the last 100 years. Cahokia Creek flowed through MCDonough Lake, then southwest past Monk's Mound. Horseshoe Lake flooding occurred from the south {Monk's Mound area} in 1903 causing back flooding into Horseshoe Lake. In the earlier flooding from the north, Long Lake was the channel for the flood water that flowed into Horseshoe Lake, thus flushing out the sediment and creating a nice lake, not a sediment laden delta that it is now.

7. I wish to thank the State Highway Department for Beaver Dam control on Highway 111 at the three culverts by putting up 6 inch wire mesh.

8. I wish to thank the Nameoki Township Highway Department for their removal of beaver dams from township properties.

9. I wish to have an extended period of time to further study the effects of your proposals. There are many other issues that need to be addressed and studied.

Sincerely,

Charles Luehmann

Charles Luehmann
4572 Old Edwardsville Rd.
Granite City, IL. 62040
618-797-2857

41. Charles E. Luehmann

41-1. The Project, as recommended, is an environmental restoration Project designed to restore important habitat that has been lost or degraded on the floodplain. Deepening of Horseshoe Lake by removal of accumulated sediments was initially explored during this study, but the likely presence of heavy metals in these sediments that would require special handling and treatment precluded further consideration. Any other actions taken at Horseshoe Lake would not accomplish the restoration of other floodplain resources separate from the lake.

(Note that the numbering of the responses below corresponds to the numbering in the original letter.)

1. Earthen berms for the Elm Slough action area are necessary in order to prevent induced damages from occurring as a result of the recommended Project.

2. Comment noted.

3. Comment noted.

4. The Project, as recommended, is an environmental restoration Project designed to restore important habitat that has been lost or degraded on the floodplain.

5. Comment noted.

6. Under the recommended plan, water coming into Elm Slough would continue to be from the Long Lake and Mitchell Ditch areas and not from Bluff water. Deposition of bottomland sediment has also impacted the depth of Horseshoe Lake.

7. The action areas recommended in the current plan for restoration were wetlands historically. Restoration work recommended on the floodplain is not designed to burden one community over another but rather to restore significant resources. These resources cannot be replicated elsewhere.

8. A. Concur. The Project assumes the spectrum of events from drought to flooding.

B. IDNR removed Horseshoe Lake from consideration under this Study. See Section 6-5 of the Draft Report. Horseshoe Lake as currently managed, provides the wildlife benefits determined by the State to be a priority for the region.

C. The level of Horseshoe Lake is determined by the amount of rainfall and run-off reaching it. There is no correlation between river stage and lake level. The level of Horseshoe Lake does not have any direct impact on the predicted habitat outputs at any of the recommended action area sites. It does, however, impact the ability of IDNR to meet its wildlife management objectives that are separate from this study.

D. The Project, as recommended, is an environmental restoration Project designed to restore important habitat that has been lost or degraded on the floodplain. It is not a flood control project.

E. This Study is focused on environmental restoration and takes into consideration the continuum of events that would naturally occur, from drought to flood.

F. Section 3.12.4.2 and Section 10.8 of the Draft Report discuss issues related to the West Nile Virus. Documentation to-date indicates that diseases such as West Nile Virus proliferate in urban developed areas where mosquitoes are permitted to breed in back yards and other areas that do not provide a balanced habitat. Restoring healthy wetlands that sustain populations of predators, such as dragonflies, which can control mosquito populations. This approach has been used successfully in other cities. As further information is developed regarding these issues, they would be incorporated into Project considerations and designs.

G. Section 5 of the Executive Summary and Section 2 of the Draft Report explains the selection of this time period. This time period was selected because it pre-dates the major alterations of the floodplain by levee construction and stream diversions. In addition, there was a considerable amount and quality of reliable information available to characterize and analyze the conditions during this period available through General Land Office records. Periods prior to this time provide only anecdotal information which is not detailed enough upon which to base analyses.

Roush, Deborah L MVS

From: Farmerj36@aol.com
Sent: Saturday, May 03, 2003 5:14 PM
To: Roush, Deborah L
Cc: Farmerj36@aol.com
Subject: East St.Louis and Vacinity,Illinois Ecosystem Restoration and Flood Damage

My name is John M. Luehmann. I live at:4568 Old Edwardsville Rd. Granite City
Ill. 62040. My concern is that this project will be going right in my back
42-1 yard. The only benefits I see is to satify the gov't. Alot of valuable farmland will be put to "swamp" use. I have a daughter who is alergic to

mosquitoes and all I see is a breeding ground for millions if this goes through. I see designated wetlands being destroyed every day by companies
42-2 filling in to expand their business. They weren't designed to be just given
away. I see my house value decreasing but I'm sure my taxes won't.If everybody keeps taking farmland now what is going to happen in the future? Be
like the Chinese and other countries that have to buy their food supply elsewhere? If they cant figure out what to do with the runoff from these big
businesses in the area well maybe they need to build lakes to retain the

water and let them deal with the mosquitoes and other nuicences. I have lived
here my whole life and I enjoy the country life. Why can't you improve what
systems we have had for the past 39 years? If this project goes through who
42-3 is going to pay for my flood insurance? What about the water table in my

area? Who does this project benefit? I sure don't see any benefits for me. I
know my uncle has been keeping track of the movement of water in this area
for as long as I can remember. Ever since they reintroduced the beaver in the
42-4 area my uncle has been monitoring the dams they build and the impact they
have what will happen when this is no longer done by a private indivdual?
Will we pay the price for a beaver dam backing up this new system? Don't I
already pay for flood control on my taxes why should I have to pay with the
area I live in?

42. John M. Luehmann

42-1. The Project, as recommended, is an environmental restoration Project designed to restore important habitat that has been lost or degraded on the floodplain. These are important resources to the region and the nation having significance to a number of threatened and endangered species as well as supporting the important fly ways of waterfowl and songbird migration routes. Section 3.12.4.2 and Section 10.8 of the Draft Report discuss issues related to the West Nile Virus. Documentation to-date indicates that diseases such as West Nile Virus proliferate in urban developed areas where mosquitoes are permitted to breed in back yards and other areas that do not provide a balanced habitat. As further information is developed regarding these issues, they would be incorporated into Project considerations and designs.

42-2. Section 7 of the Draft Report addresses the Farmland Protection Act. The area affected by the recommended plan has been assessed to have a low rating for farmland protection. The plan would not create any significant adverse effect on agricultural lands, including farmland used for horseradish production. At Elm Slough, a portion of the originally studied site has already been lost to development and been taken out of farm production.

42-3. The restoration Project would not impact the existing ground water table. It is designed to allow water that currently flows through a farm ditch known locally as the KMOX ditch to move across a restored 670-acre forest instead.

42-4. Operation and maintenance would be the responsibility of the local sponsors. A project cooperation agreement between the Federal government and the local sponsors would spell-out the Federal and local sponsor Project responsibilities. Additionally, since it is anticipated that State funding would be provided for this Project, separate requirements under State statute would also provide an oversight mechanism for the operation and maintenance of Project features.

Brockmeier Sod Farms, LLC

3234 Bluff Road ▪ Edwardsville IL 62025 ▪ (618) 656-7265

April 30, 2003

Ms. Deborah L. Roush
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

RE: East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

Dear Ms. Roush:

I am writing this letter to express the strong opposition of the Brockmeier Sod Farms (BSF) to the above referenced Corps of Engineers (CoE) project. My comments are specifically directed at the Old Cahokia Creek section of the Project. I base this opposition on the compilation of information I have gathered from attending countless meetings since 1998 held by, to list a few, the Metro East Stormwater Committee, Sand Road Storm Flooding Committee (a local storm water flooding committee), numerous meetings and discussions with employees of the CoE and the Illinois Department of Natural Resources (IDNR), and several formal CoE public meetings—the last of which was held April 8, 2003, AND from attempts to wade through 3000 pages of CoE *East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project* report. I also base my opinion on personal experience and observations having lived in this very area for over 50 years, as well as personal discussions with previous generations of family and neighbors whose experiences date back to the mid 1800's.

43-1 This project is an ill conceived, feel-good, do-something project at the cost of MILLIONS and MILLIONS of dollars to the taxpayer--$211,887,000 to be exact. Am I against storm water flooding? Yes! Am I against erosion? Yes! Am I for bird boxes and nature areas? Yes! Am I for recreation areas? Yes! BUT NOT at the expense and on the backs of the private individuals—many who are the victims of the irresponsible actions of others. This project places the overwhelming cost and burden of stormwater flooding on the VICTIMS instead of the VIOLATORS! The victims should not bear the cost of "solutions" while the violators keep violating: collecting, channeling and dumping stormwater.

First, I take issue with basic, deceptive approach of the plan. The CoE invites flooding victims to meet for the purpose of solving flooding problems but tempers their proposals by stating this project is NOT a flooding project—its purpose is ecosystem restoration with incidental flood damage reduction. The CoE says there is NO money for flood solutions—so spend what public money that is available on ecosystem restoration and throw in a little flood control....sort of a "bait and switch"... Work around "The System." Lull people into a sense of complacency with a feel-good slide show, overwhelm them with a 3,000 page report only available on a CD...and once again assure them that, "I'm from the government.....I'm here to help you."

I take issue with the project's favorite word and term of convenience, "restore." (Used some 207 times in the main body of the report.) The CoE proposal focuses on the
43-2 restoration of the bottoms to, I believe the term used was, "presettlement." That's fine and dandy for the bottoms.....but they are making no attempt to restore the bluffs (the source of the water causing the flooding) to that same era. Who picks and chooses what to restore? Since the focus is water, lets simplify this stormwater/flooding problem to a leaky roof: If you have a seriously leaky roof (the Bluffs: SIUE, commercial and residential development stormwater dumping), yes, temporarily you can get a bucket (expand/ "restore" bottom land retention) to catch the water, but you don't FOCUS on the bucket —you FOCUS on stopping the leak; you FIX the roof! Would it not be better to focus on the word, "RESPONSIBILITY" rather than restoration? Who/what is the CAUSE of the flooding? Who/what is RESPONSIBLE? Should they not be held accountable?

I take specific issue with the CoE and IDNR regulations, requirements and visions of Old Cahokia Creek and their CONTRADICTORY treatment between the private sector and the Project under discussion. As I understand the proposed "restoration" Project, upon entering the northern edge of BSF property, the water is supposed to proceed in a southeastern direction (with an elevation in grade) for approximately a mile, go through two ~48 inch culverts (bike path), continue south another ¼ mile through one, 36 inch culvert (Chain of Rocks Road), through box culverts under I-270 and shoot due west in a concrete lined portion of the channel for approximately one mile whereupon entering the COUNTY DITCH. For the past four years, BSF has been attempting to secure a permit from IDNR for a private, completely separate culvert project at the northern tip of the CoE Old Cahokia Creek Project area. IDNR has not yet deemed
43-3 four, 48-inch culverts adequate for the flow through that channel area. Yet south of our private project area, entering the CoE Project area, there are five significant bluff tributaries added to the flow of Old Cahokia Creek before reaching the Chain of Rocks **36-inch** culvert. Do a little simple math: IDNR finds four 48-inch culverts inadequate for the BSF privately funded project located at the northern tip of the CoE Project. Then, add FIVE MAJOR tributaries to the flow of Old Cahokia Creek and IDNR finds one 36-inch culvert adequate for the CoE Project. At the recent meeting, the CoE representatives were specifically asked about this situation, and they stated there is no intention of altering the existing culverts along this portion of the project.

CURRENTLY, the water in the Old Cahokia Creek does not come near the BSF property and has not since the construction of the Cahokia Diversion Canal (1920's?)

and more completely from the implementation of the 1948 Easement agreement between Gilbert and Barnhart creating an approximately ¼ mile channel leading the water of Old Cahokia Creek into the County Ditch. The current final destination as well as proposed CoE Project final destination of the Old Cahokia Creek is the same: THE COUNTY DITCH. Currently it arrives by a direct route created by the legal agreement between private parties described previously; the proposed CoE Project route meanders several miles, destroying many acres of PRIME sod and farmland, —and still goes into THE COUNTY DITCH—about one mile downstream from the present entrance!

43-4 Of specific personal interest, I have grave concern about the amount of land that this 300-meter strip will consume from our **productive sod farm**—and the overall detrimental effect this reduction will have on our long-established business. I also have serious concern about access to our now contiguous property. The CoE has expressed little concern over the bisection of our farm and has offered no acceptable solution for access. "Wait for a dry period and drive through the creek."

Ms. Roush, at the April 8 meeting you proudly shared the letters of support from the St. Clair and Madison County Boards. I have no doubt of their support. Madison County has allowed development stormwater dumping to go unfettered for years. Most recently, they not only allowed but facilitated the Route 111 enterprise zone development which has added greatly to the burden of the entire County Ditch area. The have no plan for stormwater or flood control—they will grasp at anything for which someone else will pay!

Finally, I question the possibility of "maintenance, repair, rehabilitation and replacements costs are estimated at $92,857, annually." You—**NO**, the counties—can maintain this $211,887,000 project: 9231 acres, 1521 duck boxes and bird perches and 25.9 miles of streams and embankments for $92,857 a year?!? You've got to be kidding! In looking through the CD of this Project, I could not find "specifics" of the maintenance costs. What is $92,000 a year going to do?

I cannot cast judgment on the rest of the CoE project, but I hope you will address these serious questions and legitimate concerns regarding the Old Cahokia Creek Restoration part of the CoE project.

Most sincerely,

43-5 The Brockmeiers

Kenneth Brockmeier Dorothy Brockmeier Ronna F. Blattner

Kenneth Brockmeier | Dorothy Brockmeier | Ronna F. Brockmeier Blattner

43. Brockmeier Sod Farms, LLC

43-1. The Project, as recommended, is an environmental restoration Project designed to restore important habitat that has been lost or degraded on the floodplain and along tributary streams. These are important resources to the region and the nation that have significance to a number of threatened and endangered species as well as supporting the important flyways of waterfowl and songbird migration routes.

43-2. Restoration efforts in the Bluffs are limited to the tributary streams since this is the geographic extent of the authority the Congress has granted to the Corps.

43-3. IDNR has not issued any permits for this Project to the Corps of Engineers. Construction permits would be obtained during the final design process.

43-4. Public Law 91-646 governs the acquisition of private lands for public projects and establishes the specific procedures to be followed. These procedures would be utilized to determine the value of the property and allow a negotiated settlement to be reached with the affected landowner for the property. BSF concerns about crossing the restored creek for farming purposes are understood and would be addressed during the design phase. No landowner can be left without access to his land as a result of this project. It is anticipated that a satisfactory accommodation can, and would be developed.

43- 5. The Project area encompasses approximately 4,634 acres, 10.8 miles of restored floodplain streams, and 178 miles of tributary streams. The $92,857 dollar estimate is a compilation of operation and maintenance activity costs that are required at the various restoration sites. This includes the cost of such things as mowing, periodic burning, performing repairs, and removing debris. As planned, this Project would largely function naturally. No mechanical augmentation has been incorporated into the plan. As the design process proceeds, operation and maintenance manuals would be developed and presented to the local sponsor. The manuals would detail these actions and their associated costs.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Larry L. Brown

Address: 209 Matterhorn Ct. Village/Town/City: Glen Carbon

State and Zip Code: IL Telephone Number: 288-7063

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

As always, I'm glad to have the chance to comment on government plans that will affect the local ecosystems and environment. However, I doubt that anything said by me or any other citizen will matter. It seems that gray color on the maps means that the overwhelming use projected is development, with "green" space, wetlands and wildlife habitat only incidental afterthoughts. As always, the big money of the development interests overrules and "trumps" any ~~environmental~~ possibility of a comprehensive plan of ecological preservation and ground water management system being initiated. over →

U.S. Army Corps of Engineers, St. Louis District

The "green" areas and wetlands on your maps were only small strips. The gray was overwhelming - This I think tells the story.

Thank you for taking the time to provide comments!To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

Ms. Deborah L. Roush E-Mail: Deborah.L.Roush@mvs02.usace.army.mil
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

44. Larry L. Brown

The referenced Project maps display approximately 136,000 acres. Of this amount, the Project would only affect approximately 4,900 acres and 178 miles of tributary streams. However, the fact that the remainder of the map is shown on a gray scale is not intended to depict the remaining area as either developed or desirable for development. The Project would not change the existing 100-year floodplain and as such, should not provide an inducement for development. It does however, provide for the restoration and protection of significant resources that may otherwise be lost in the future.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM

East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: ROBERT DECKARD

Address: 25 KELLY DR Village/Town/City GRANITE CITY

State and Zip Code: ILL 62040 Telephone Number: (618) 931-5566

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 -- address on back of this page.

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I'M CONCERNED ABOUT THE VALUE TO BE PLACED FOR MY PROPERTY. I COULD LOSE ABOUT 4 ACRES. I PAID $4000 PER ACRE 25 YEARS AGO. PROPERTY ADJACENT TO MINE IS ON THE MARKET FOR $16,000 PER ACRE. ALSO THIS INCLUDES 2 ACRES I USE FOR PASTURE FOR MY HORSES I ALSO HAD A POND DUG ON THE BACK OF MY LAND AT A COST OF $5,000.

45. Robert Deckard

Until further Project design occurs, it is difficult to determine the impacts to adjacent landowners. Where possible, impacts would be minimized. However, if your land would be required for the project, Public Law 91-646 governs the acquisition of private lands for public use. This law establishes specific procedures to determine the value of the property and allow a negotiated settlement to be reached with the affected landowner for the property.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM

East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: ROBERT D. SMITH

Address: 24 KELLY DR Village/Town/City: GRANITE CITY

State and Zip Code: IL, 62040 Telephone Number: 931-5931

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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46-1 1) BACK IN FEBRUARY 2003, THE PROPERTY OWNERS WERE TOLD THE BOUNDARY LINE FOR THE ELM SLOUGH WOULD BE RE-DRAWN TO ACCOMODATE PEOPLE WHO DID NOT WANT TO SELL PART OF THEIR PROPERTY. THE BOUNDARY LINE ~~HAVE~~ HAS MOVED IN TO THE BACK OF OUR OUT-BUILDINGS.

46-2 2) I WOULD PREFER NOT TO HAVE DENSE TREES COMING UP TO THE BACK OF MY HOUSE BECAUSE OF MISQUITOES BREEDING

46-3 3) COULD THE CORPS SELL BOUGHT PROPERTY FOR DEVELOPMENT IN THE FUTURE?

46. Robert D. Smith

46-1. Until further Project design occurs, it is difficult to determine the impacts to adjacent landowners. Where possible, impacts would be minimized. No buildings in the Elm Slough area would be removed under the current Plan. The mapping provided is a depiction of the general boundary of the area only.

46-2. Comment noted.

46-3. Once property is acquired for the Project, it is designated for the Project purpose in perpetuity.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Larry Heath / Eldin Rea, Trustees - Bethel Chapel Pentecost Church - Custodian Organization + Campground

Address: P.O. Box 1695 (Church) Village/Town/City: Granite City

State and Zip Code: Il, 62040 Telephone Number: 618-877-1618 (Church) Larry Heath 876-4102 Eldin Rea 452-3361

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Our comments concern the proposed project for the "Old Cahokia Creek" area - as it impacts the Sunset Hill Pentecostal Campground. We have reviewed the property and the improvements including buildings, RV park and athletic fields with your Ecologist, Timothy George, and understand that there will be an effort to route the new channel and berm so as to miss these improvements and to provide protection during periods of flooding -

One area which could provide some protection for the Campground and properties immediately (over)

U.S. Army Corps of Engineers, St. Louis District

north of us and the bike trail is the clearing (dredging and debris removal) of the present channel south of the Campground property –

In considering the priorities of the various projects please consider the Old Cahokia Creek area in the early stages of the overall project, since we have been affected by flooding from the creek during heavy rainfall.

Please contact us when you get into the detail planning for this project.

Thank you for taking the time to provide comments! To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

Ms. Deborah L. Roush E-Mail: Deborah.L.Roush@mvs02.usace.army.mil
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

47. Larry Heath/ Eldin Rea

Comments noted. Coordination on the Old Cahokia Creek site would continue through design and implementation. There is no intention of removing any existing structures within this proposed action area.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM

East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Tom M. Thomas

Address: 38 Cheshire Drive Village/Town/City: Maryville

State and Zip Code: IL 62062 Telephone Number: (618) 288-9464

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

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My family owns property located in and adjacent to the Elm Slough Action Area. Of the 110 acres owned by my family, approximately 75% is located inside the action area and 25% located outside the action area. The impact (value) to the property located outside (adjacent) of the Elm Slough Action Area will be very significant. The usability (value) of the adjacent property will be significantly reduced due to:

1) The significant increase in ground

U.S. Army Corps of Engineers, St. Louis District

and surface water in the area due to this project;

2) The significant decrease in useable property (from 110 acres to less than 30) - The ability to economically farm or develop this property would be significantly reduced; and

3) The access to the property will be significantly reduced (this loss creates a huge impact to this property).

We would be favorable to either including all of our property in the action area or none of it. Being left with a small parcel would not be acceptable or economically feasible for either party.

Thank you for taking the time to provide comments! To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

Ms. Deborah L. Roush E-Mail: Deborah.L.Roush@mvs02.usace.army.mil
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

48. Tom M. Thomas

Public Law 91-646 governs the acquisition of private lands for public projects and establishes the specific procedures to be followed. These procedures would be utilized to determine the value of the property and allow a negotiated settlement to be reached with the affected landowner for the property. The valuation procedure takes into account if the property owner would be left with an uneconomic remainder. Until the local sponsor is provided specific land requirements for the Project during the final design phase, a specific determination can't be made regarding your property.

copy furnished: DP
DE

25 April 2003

Department of the Army
St. Louis District, Corps of Engineers
Attn: C. Kevin Williams, Colonel U.S. Army
Planning, Programs, and Project Management Division
Planning and Project Development Branch
1222 Spruce Street
St. Louis, MO 63103-2833

Subject: East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project, Submittal of Comments

Dear U.S. Army Corps of Engineers, St. Louis District:

I have serious concerns over the recommended plan for the subject project in the Elm Slough area as to the impact of the project on adjacent property. Specifically, the impact to the 40 acres of land that I own which is located just east of the recommended new "funnel"-shaped waterway for Mitchell Ditch and just north of the recommended Elm Slough Action Area (note the attached map of the Elm Slough Action Area, Figure 8-4, Page 8-18, for the specific location of the 40 acres of land that I own that I contend will be seriously impacted by this project). My concerns are as follows:

49-1 1) The land in question is approximately 408 to 411 feet NGVD; the adjacent Elm Slough Action Area is approximately the same or slightly higher NGVD. As such, the six-foot and two-foot earthen berms that will be constructed to ensure that water is directed into and is able to pond into the action area will also cause water to pond in the land that I own that is adjacent to the action area.

49-2 2) The additional water directed into the area and ponded will cause the ground water to rise in the land adjacent to the action area (especially in the spring planting season).

49-3 3) The six-foot earthen berm that will be constructed to ensure that storm water is directed into the main habitat, along with the two-foot earthen berm that will help pond the water in the habit area, will trap surface water in the adjacent to the action area (especially in the spring planting season when it is critical to be able to get farm equipment into the area).

49-4 4) The Elm Slough Action Area will eliminate the optimal entrance (from the south) to the 40 acres that I own that is just north of the action area.

The impacts caused by the increase water in the area and limited access to my property as the result of this project will destroy the economical use and value of the land that I own that is located adjacent to and north of the Elm Slough Action Area.

I look forward to your consideration of my comments and concerns and the appropriate revisions to the project plan that will locate my area of concern into the Elm Sough Action Area. I have also attached an annotated map of the Elm Slough Action Area (Figure 8-4a, Page 8-19) showing all of the property that I own in this area.

Sincerely,

Patricia A Larsen

Patricia A. Larsen [(618) 344-0707]
#1 DeValle
Collinsville, IL 62234

Figure 8-4 Elm Slough Action Area

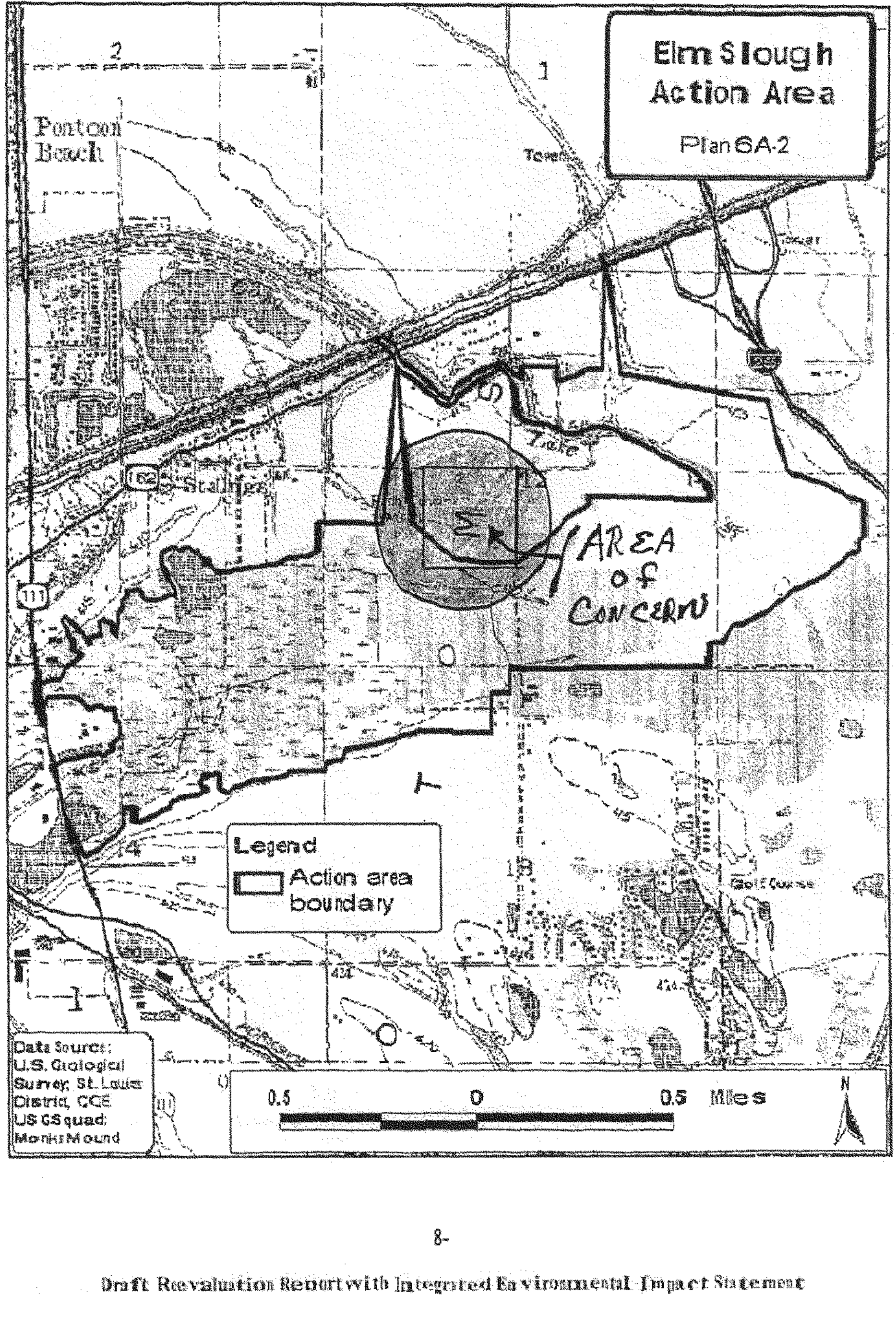
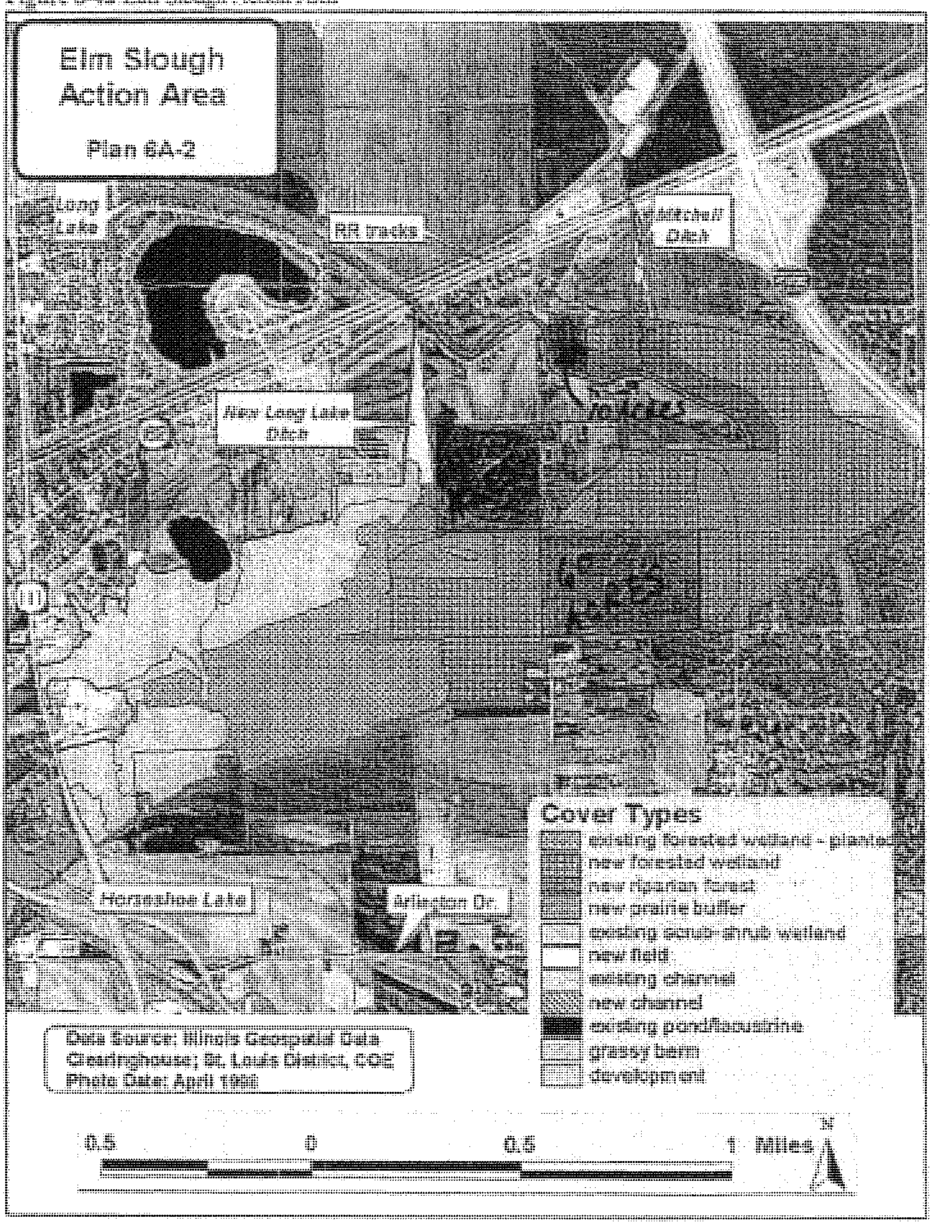


Figure 8-4a Elm Slough Action Area



49. Patricia A. Larsen

49-1. During the design process, drainage requirements of adjacent landowners would be analyzed. Areas that currently do not pond water are not expected to do so in the future.

49-2. There would be no impact to groundwater tables as a result of the construction within the Elm Slough action area. Water would pond in the Elm Slough action area during intense rainfall events and then for short durations. Ponding is expected to last no more than 60 hours, or 2.5 days. As design progresses, this data would be further analyzed, refined, and documented.

49-3. See comment 49-1.

49-4. During the design process when definitive locations are sited for the planned area, access issues, just like drainage issues, would be addressed. No landowner can be left without access to his land as a result of this project.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: ROBERT SCHWARTZ

Address: 5885 N. ST. RT 159 Village/Town/City: EDWARDSVILLE

State and Zip Code: IL 62025 Telephone Number: 618-656-5241

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I am making a comment in reference to the Burdick Creek and Judy Branch part of the above-mentioned project.

I am a property owner who will be affected by the action that is proposed. At the public hearing it was shown that a change in the natural flow of water would take place along Burdick Creek. A levee will be built along the south side of Burdick Creek, and when flooding occurs, it will force water to flow north towards Judy's Branch. In doing so this will change the natural flow of water across the land that I own and could cause soil damage and loss of crops.

This could be avoided by lowering the level of Burdick Creek and putting a levee or both sides of the creek to keep the flow of water in natural confinement. This would cause a minimal amount of water damage to the farming area. At the same time it would allow the water to flow to the sediment area that is proposed.

This land is use to produce a variety of crops and is planted regularly in horseradish and sweet corn. Capital improvements have been made to allow for these crops to be farmed. These improvements will be of no value if the land cannot be farmed.

directly into your sediment area (or created prairie). Their reason was the north side had indian artifacts and the south side did not. I can tell you from maps my son has kept of his recorded artifacts over the past twenty years that their are many more artifacts south of Burdick Creek than there are north of the creek. Thus, I feel that is not a good reason to only increase the height of the levee on the south side. If the height of the levee is to be increased then do it on both sides. Otherwise do not raise either side and let the water be shared equally by both sides of the levee: The land to the north is just as good horseradish ground as the land to the south of Burdick Creek, if not better. I am only asking that the land owners on both sides of Burdick Creek be treated equally.

Also, why are you not looking into reducing the flooding from Judys Branch? During large rainfall Judys Branch tends to rise higher and flood more in this area than does Burdick Creek.

If you have any questions regarding these comments I would be happy to meet with you and I can be reached at 618/659-1048.

William L. Schwarz

Thank you for taking the time to provide comments! To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

Ms. Deborah L. Roush E-Mail: Deborah.L.Roush@mvs02.usace.army.mil
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

50. Robert Schwartz

During extreme rainfall events, water currently ponds in the area east of Cahokia Canal and in between Judy's and Burdick Branches. Since the prairie restoration site that would be to the south of Burdick Branch would be surrounded by a containment berm, the drainage patterns of the area would be altered. In order to minimize potential damages a berm would be constructed along the South side of Burdick Branch to ensure any out of bank flows from Burdick are captured and directed into the prairie restoration site. The project real estate plan currently reflects the cost of acquiring a flood easement for approximately 278 acres between Judy's and Burdick Branch. This is required because as you have indicated this flooding would not normally occur without the project. The out of bank events that would cause temporary ponding in this area are currently estimated to be less than 15 hours in duration, and would be infrequent. However, compensation for this effect is a requirement and has been considered as a part of the project cost estimate. Placing a berm on both sides of Burdick Branch and Judy's Branch to protect the land in-between from infrequent flooding was not cost effective.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: William L. Schwartz

Address: 7030 N. State Route 159 Village/Town/City: Moro

State and Zip Code: Illinois 62067 Telephone Number: 618/659-1048

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I am writing in reference to the Burdick Creek - Judys Branch portion of the above named project.

I own 98 acres along State Highway 157 just north of Burdick Creek. At your open house on April 8, 2003 at the Collinsville Convention Center the Corps engineers explained to me the present plans were to increase the height of the levee on the south side of Burdick Creek, but to do nothing to the north levee. The result of this would be to allow the water at high levels to flow over my property and go into Judys Branch. Judys Branch would then carry the water back to the canal and to the same area as if it just went down Burdick Creek.

My questions to your three engineers who talked to me was why not just build the north side levee of Burdick Creek higher and run the water

51. William L. Schwartz

You are correct in your assessment that during out of bank rainfall events water from Burdick Branch would be directed onto the land east of Cahokia Canal and in between Judy's and Burdick Branch. Since the prairie restoration site that would be to the south of Burdick Branch would be surrounded by a containment berm, the drainage patterns of the area would be altered. In order to minimize potential damages, a berm would be constructed along the South side of Burdick Branch to ensure any out of bank flows from Burdick are captured and directed into the prairie restoration site. The project real estate plan currently reflects the cost of acquiring a flood easement for approximately 278 acres between Judy's and Burdick Branch. This is required because as you have indicated this flooding would not normally occur without the project. The out of bank events that would cause temporary ponding in this area would be infrequent, and are currently estimated to be less than 15 hours in duration. However, compensation for this effect is a requirement and has been considered as a part of the project cost estimate. Placing a berm on both sides of Burdick Branch and Judy's Branch to protect the land in-between from infrequent flooding was not cost effective.

Burns & McDonnell
SINCE 1898

FAXED

O'Fallon, Illinois

FAX MESSAGE

Date 5/6/03 Time 3:00 AM/PM

To: Deborah L. Rousch FAX No. 314 331-8325

Representing: C.O.E. Info. Acct.

From: Don Ferris

Project Name: Caseyville T.I.F. Project Project No.

Number of Pages (including this cover sheet): 3 Contract No.

24-hour Automatic FAX No.: (618) 632-0307

Deborah,

RE: Please accept the attached as comments from our Clients, Caseyville Sport Choice, LLC, regarding the E. St. Louis Ecosystem

Thank you

Don Ferris
Operator

TEL: (618) 632-0354

U.S. Mail Address: Eagle Center #4, O'Fallon, Illinois 62269

071594 Form G-9NA

MAY 06 '03 01:52PM BURNS & MCDONNELL

46 765 2587

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Don L. Ferris Jr., P.E.

Address: #4 Eagle Center, Suite 2 Village/Town/City: O'Fallon

State and Zip Code: IL 62269 Telephone Number: 618 632-0354

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Caseyville Sport Choice LLC has been selected by the Village of Caseyville, Illinois to develop a master-planned residential golf course community within the Corps of Engineers' study area. The 500-acre site is located between IL 157 and IL 159, south of the CSX Railroad, and north of Hollywood Heights Road. This project lies within a Tax Increment Financing (TIF) development district initiated by the Village in 1998, and will contribute significantly to the Village's tax base and community development objectives. Caseyville Sport Choice is currently in negotiations for acquisition of the property.

The golf course will be located primarily in the low-lying areas along Canteen Creek, with residences located outside the floodplain.

The project site includes four upland sediment detention basins that are proposed by the Corps of Engineers in connection with the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project. We are concerned about the possible impacts of these basins on the commercial value of these properties and the proposed development itself, especially the layout of golf course greens and fairways.

Caseyville Sport Choice LLC has recently contracted with Burns & McDonnell Engineering Company, Inc., of O'Fallon, Illinois for design and preparation of permit applications for the project. Burns & McDonnell staff have previously met with staff of the Corps of Engineers, St. Louis District, and with other regulatory agencies, in connection with this project, prior to the involvement of Caseyville Sport Choice.

We anticipate working closely with the Corps of Engineers, the Illinois Department of Natural Resources, and other regulatory agencies having jurisdiction over the project, toward the mitigation of impacts including erosion, sedimentation and stormwater volumes in the Canteen Creek watershed. We request that the Corps give due consideration to the requirements of our project, as the planning and design of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project proceed. We look forward to working in partnership with the Corps to the mutual benefit of both projects.

We have initiated informal contact with the Regulatory Branch of the Corps' St. Louis District in connection with this project. We request the St. Louis District to coordinate the actions of the Regulatory Branch, in connection with permitting for this project, with the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project.

Don Ferris and Joseph Gilroy, of the O'Fallon, Illinois office of Burns & McDonnell, have been designated as points of contact for this project and may be reached at (618) 632-0354.

Thank you for taking the time to provide comments!To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

Ms. Deborah L. Roush E-Mail: Deborah.L.Roush@mvs02.usace.army.mil
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

52. Burns and McDonnell

Comments noted.

Comment Form

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

Donald Gargac
4688 Gargac Acres
Granite City, IL 62040-6909
618-797-6521

53-1 1. Some flood control is required because of poor development planning in some areas of the proposed project. The project is very slanted to ecosystem restoration with some flood reduction/control as a bi-product. With the emphasis on ecosystem restoration, considerably more land is involved than if it were focused on flood control/reduction. Wildlife habitat and green spaces are needed near urban areas, but not at the expense of the economy and local residents.

- Hundreds of acres of fertile farm ground will be lost.
- Farm owner income will be drastically reduced or eliminated
- Property values of adjacent homes will be reduced

53-2 2. Current environmental conditions will be altered that may or may not have existed in 1800. Mosquitoes were an enormous problem in the area in the early 1800s and will likely be that bad again in the proposed ecosystem project. Malaria almost eliminated the entire population of East St. Louis in the early 1800s, yet it is stated in the proposed project that " a balanced ecosystem will control the mosquito problem". Guess it wasn't as balanced in 1800 as we believe today.
3. Have reservations on how mosquitoes will be controlled when most of the forested retention areas won't support fish. Birds alone can't control the mosquito population that will thrive in the dark damp forests.

Elm Slough –

53-3 1. The currently is no flooding problems in the area. Widening of Mitchell Ditch will likely cause there to be due to all the commercial development north of I-270.

53-4 2. Proposes reversing the flow of the east end of Long Lake.

- Water runoff from land in this area currently flows into Long Lake and moves to the west into Elm Slough. A small percentage moves through man made drainage ditches into Elm Slough.
- Proposal has Long Lake flowing onto these lands and then south westerly into Elm Slough
- This creates and "Island" around homes on lightly higher ground, but much of the remaining lands are lower than the

proposed "Wetlands". How will floodwaters flow **up** into the proposed retention areas?

- Not sure what affect the proposed retention areas of several hundred acres will have on the quality of life or property values.

53-5

3. Best solution for Elm Slough area is to clean out the beaver dams, fallen trees and other debris to speed up the flow of water from Long Lake and surrounding lands into Horseshoe Lake.

53-6

4. Ensure that development of lands draining into Mitchell Ditch build the required retention areas to hold runoff water until the current drainage systems lower and can handle the runoff.

53. Donald Gargac

53-1. The Project, as recommended, is an environmental restoration Project designed to restore important habitat that has been lost or degraded on the floodplain and along tributary streams. These are important resources to the region and the nation, and have significance to a number of threatened and endangered species as well as migratory birds. Project sites were determined based on historic conditions, soils mapping, and the likelihood of success.

53-2. Section 3.12.4.2 and Section 10.8 of the Draft Report discuss issues related to mosquitoes and the most recent problem involving the West Nile Virus. Documentation to-date indicates that diseases such as West Nile Virus proliferate in urban developed areas where mosquitoes are permitted to breed in back yards and other areas that do not provide a balanced habitat. Restoring healthy wetlands that sustain populations of predators, such as dragonflies, which can control mosquito populations. This approach has been used successfully in other cities. As further information is developed regarding these issues, they would be incorporated into Project considerations and designs.

53-3. See 53-1, above.

53-4. During the design process, drainage requirements of adjacent landowners would be analyzed. Areas that currently do not pond water are not expected to do so in the future. Several hundred acres of restored forest are anticipated to have a positive impact on the quality of life. The Elm Slough action area would not be a permanent retention area. During extreme events, water would pond in the area for a short duration of approximately 60 hours.

53-5. See 53-1, above.

53-6. Concur. This is dependent upon effective local zoning and permitting processes.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Lee Jenkins

Address: 3412 Hartzel Rd Village/Town/City: Edwardsville

State and Zip Code: IL 62025 Telephone Number: 618-659-4051

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

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At the meeting, according to maps, the levee will go right through our home. Our land is off Sand Rd & behind SIUE track Stadium. I was told at the meeting homes in this area would not be affected. I will hope that the levee could be moved to a point that won't affect our home

54. Lee Jenkins

Until further design on the Project occurs, determining the impacts to adjacent landowners cannot be accomplished. Where possible, impacts would be minimized. No buildings in the Cahokia Creek area have been designated for removal, including your home. The mapping provided is a just a depiction of the general boundary of the area only and not the final design.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
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General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

7

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Sheet Attached – I would also like some more time for comments

ELM SLOUGH PROJECT

5-4-03

After attending your meeting, at the Gateway Convention center I have discussed this project with some on the land owners and some of the home owners in the Arlington Heights subdivision; most of them knew nothing about it.

Anything I point out in this I want it only to be viewed as a concern for the whole area.

On some of the berms that are shown on the maps, I feel that there could be some natural flows of water disturbed. This is a lot of land that is included in this project. I have a few ideas that could trim the cost and maybe be better for the surrounding area.

55-1 Through the some of the reading on the CD for this project, I understand that the Illinois Department of Conservation does not want to participate, yet they can control the level of the lake at different times of the year. I thought Horseshoe Lake is supposed to be a retention area not for the benefit of some fishermen and duck hunters. Maybe the
55-2 Corp of Engineers can do this with the proposed property also. Would raising or putting more water in this berm area create a problem for the home owners already here by raising the water table? Now in the existing ditches that are narrow a few beavers can control the level of the water in Elm Slough keeping several men busy. This water if it is shallow and dries up wouldn't that be making a breeding ground for mosquitoes?

Here are a few quick ideas that I have:

55-3 In some of the reading you discussed cleaning the culverts under Hwy 203 that drain west by Bend Rd. I like this idea for it could add several hundred acres of retention that we once had. Let's go to Bend Rd area that the Corp of Engineers already has ownership of property. Let's take some of the sloughs that connect to the lake and clean, widen, berm etc... And get several hundred more acres. I have never understood the use for the purchase of this land in the Bend Rd area? Could we have another area like this in Arlington Heights? Lets go to Elm Slough and widen and clean all the big channels, then go north to Long Lake and Mitchell ditch towards the new development and clean some of these ditches put in some desilting areas towards the new development. On all new development we need to monitor the holding capacity, and if 20% is not enough, go more or even to some type of pump system. Empty these out when all the original drainage canals are back to normal flow.

55-4 For the land prices you quoted on your CD they are way below the standards for the area.

At this time I would like to thank The Metro East Sanitation District and Nameoki Township for all the help they have given me on some minor problems I have had over
55-5 the years. Recently the meetings I have attended with Dick Worthen and now Mike Fruit have been very interesting and informative.

In closing I feel that the people of Arlington Heights subdivision and some of the land owners have not been properly informed and surely have missed there comment period.

Sincerely,

Ken Mueller

Ken Mueller

55. Kenneth Mueller

55-1. During the design process, drainage requirements of adjacent landowners would be analyzed. Areas that currently do not pond water are not expected to so in the future.

55-2. There would be no impact to ground water tables as a result of construction within the Elm Slough action area. Water would only pond in the Elm Slough action area during extreme rainfall events and then for very short durations. Ponding is expected to last no more than 60 hours or 2.5 days.

55-3. The Project, as recommended, is an environmental restoration Project designed to restore important habitat that has been lost or degraded on the floodplain and along tributary streams. These are important resources to the region and the nation having significance to a number of threatened and endangered species as well as supporting the important flyways of waterfowl and songbird migration routes. The fact that the Project also provides temporary stormwater storage is incidental to the Project's overall purpose.

55-4. The land prices quoted in the report are an estimate only. When the final design for this area is completed the property would be appraised to determine the value. Public Law 91-646 governs the acquisition of private lands for public projects and establishes the specific procedures to be followed. These procedures would be utilized to determine the value of the property and allow a negotiated settlement to be reached with the affected landowner for the property.

55-5. Sites within the Arlington Heights subdivision were initially investigated and possible measures coordinated with golf course interests and affected landowners. Section 6 presents information as to why these sites were eliminated from further consideration.

June 5, 2003

Deborah L. Roush, Project Manager
Planning, Programs & Project Management Division
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO. 63103-2833

Dear Ms. Roush:

I was not present at your April 8th Public Hearing regarding the Wetlands known as Dobrey Slough.

I have reviewed the information from that hearing. As usual the fact sheet showed Dobrey Slough as the lowest area in Madison County.

For years the Army Corps of Engineers have done studies of our area of Dobrey Slough and presented them to congress. Congress would not approve these because of the cost affect reason. All these plans were presented to congress as necessary plans to prevent flooding whether it be surface or underground water.

Now, $200 million has been approved for a project named "East St. Louis and Vicinity Eco-Restoration and Flood Damage Reduction Project". This is just a big title to flood control. Before you approved the Donna Lynne Legacy Sub-division it was made clear to us that congress would not and did not approve money for flood control in our location of Dobrey Slough. Yet a year later by changing the name of the project around the Cahokia Mounds and East St. Louis vicinity the money is awarded.

It is clear to me if you would have changed the name for the project in our area we probably would have received the money to do the necessary project hear. Being the lowest point in the American Bottoms our area should have been the first project done. Know the changes that you are going to make on this $200 million project can and will cause a change of water flow that will automatically be drawn to the lowest point in the American Bottoms – where homeowners like myself live and have been seeking help which has always been denied. An every year we watch our homes and our neighbor's homes occur more damage.

I wish to state that I am glad that the designated project area will receive help but I must stress that I believe this is another action by the Army Corps of Engineers to let us down. This project and request for the money just did not happen in a year. That the planning had to be done for a couple of years and you knew how to change the name to receive approval and money from congress.

I believe this action shows the biased attitude that the Army Corps of Engineers has towards projects in this area. The selected area is made partially up of historical grounds. I cannot believe that the Corps of Engineers believes that historical grounds is more important than saving residential area from further disaster.

I personally believe that if you renamed our project years ago congress would have granted the money and then you could have put the present project thru secondly and congress would have approved it also.

This just shows once again the St. Louis Army Corps of Engineers has not been serious about helping us. That the St. Louis Army Corps of Engineers took actions to make residents of this area that you were truly interested in our problems.

Sincerely,

Cheri Fuchs

Cheri L. Fuchs

56. Cheri L. Fuchs

56-1. In 1965 the Army Corps of Engineers recommended a solution to the interior flooding problems for the American Bottoms that was authorized for construction by Congress. However, funding was only received for the Blue Waters Ditch portion of this project that was constructed in the early 1980's. A re-evaluation of the remaining areas of the authorized project was conducted in 1984, and solutions recommended in 1965 were found to be no longer economical. The current study has investigated the problems addressed in the 1965 report along with others that have developed since 1965 and provides recommended solutions to these problems. The ground water problems at the Dobrey Slough area were not investigated by either the 1965 authorized project or any of its re-evaluations; only interior flooding caused by surface water was studied. Ground water problems were investigated under a separate study in the 1980's and you are correct that this study found the proposed solutions to be uneconomical and therefore no project was recommended.

56-2. No funding has been approved for the construction of the East St. Louis and Vicinity project. A final report will be submitted for approval and authorization, however the outcome of this process is currently unknown.

56-3. The current report that is being finalized recommends a project to be constructed at Dobrey Slough that would restore a 75-acre wetland site while incidentally providing flood damage reduction for the area. The plan does not address the groundwater problems that have plagued the area since the surrounding industry has discontinued the use of groundwater to support their manufacturing processes. If this report is approved and a project ultimately authorized for construction by Congress, the local sponsor (Madison and St. Clair Counties) would determine the priority of sites for construction.

56-4. The project recommended for action in the report being finalized for submission now, has been formulated using environmental restoration authorities that were not in law during the 1984 re-evaluation of the authorized project. The report being submitted now addresses a broader range of problems that has evolved since the 1965 project was authorized, and for this reason the title of the project was changed in order to better reflect the solutions being recommended.

WEDGEWOOD ACTION AREA

Ninety-two comments from individuals in the Wedgewood action area were received regarding the recommended plan. All of the comments were opposed to the recommended Federal action. As detailed in Section 10 of the Draft Report, the Wedgewood action area originally was identified for consideration during the public involvement process.

During the development of alternatives for Wedgewood, those that emerged as viable candidates from the iterative planning process all required the closing of Summit Avenue through the action area site. As this was known to be a main thoroughfare for the citizens in the local area, the Corps of Engineers sought guidance from the city of East St. Louis and the Illinois Department of Transportation to see whether it made sense to proceed with any further analysis of the area at all (see Section G.8 of the Draft Report). It was agreed that closure of this thoroughfare should be given further consideration since potential environmental benefits appeared to be substantial.

The Wedgewood action area would be an ecologically marginal restoration site primarily because of its relatively small size and close proximity to the interstate highway and developed neighborhoods. Although habitat restoration at Wedgewood would produce benefits, they would cost substantially more to develop per acre than at other sites recommended in the plan. In addition, concerns regarding negative impacts to local drainage (see Appendix C of the Report) were of concern and were to be further investigated during the next project phase.

In the final analysis the comments received from the local affected citizens and the City of East St. Louis that indicated the closing of Summit Avenue as not being justified by the benefits produced was the determining factor. As a result of this public involvement and coordination process, the Wedgewood Action Area has been eliminated from further consideration for this Project.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM

East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: CRAIG LAWRENCE

Address: 618 N 52ND ST. Village/Town/City: EAST ST. LOUIS

State and Zip Code: IL. 62203 Telephone Number: (618) 397-5695

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

WE DON'T 59 ST. TO HARDING DITCH CLOSE. IT WOULD HAVE A BAD IMPACT ON TRAVEL FOR CITIZENS AND EMERGENCEY VEHICALS. WE WOULD LIKE FOR SUMMIT BETWEEN 59ND ST. AND THE HARDING DITCH TO REMAIN OPEN

SINCERELY

Craig Lawrence

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Lillie J. Butler

Address: 618 N 52nd Village/Town/City: East St Louis

State and Zip Code: Ill. 62203 Telephone Number: (618) 397-5695

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Closing down Summit ave. from 59th Street to the other side of the Harden Ditch is just out of the question because it would have such a tremendous impact on the mobility of the Citizens of Wedgewood and the surrounding Communities. Not only on the ~~~~~~ Adults, School children, but on the Emergency Vehicles (Fire, Ambulance, Etc.) also public transportation (bus, taxi, Etc.) and with anymore water setting in the middle of our city, Diseases like

U.S. Army Corps of Engineers, St. Louis District

West Nile, thyphoid fever maybe even Malaria. I don't what dangers might lurk. It would then be a Public Safety issue. So, here is a final Answer, We don't want the berm or the closing o Street. I know something has to be done but NOT that.

P.S. If you have anymore Public Hearing on this issue make sure you inform the public first hand.

Your's Sincerely

Lillie Butler

I am a Representative of Dayton / Wedgewood Neighborhood Organization & Pct Committe person in this area

Thank you for taking the time to provide comments! To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

Ms. Deborah L. Roush E-Mail: Deborah.L.Roush@mvs02.usace.army.mil
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Donna Samuels

Address: 5313 State Village/Town/City: East St Louis

State and Zip Code: IL 62203 Telephone Number: 618 398-1538

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

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I feel that the comments we are making should be considered and that the Summit Street should not be closed. This will have an adverse effect on the entire community. That street is a major thoroughfare. Emergency vehicles, fire trucks and buses will have to take alternate routes in order to get to the houses in the area that remain.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Robert CAmpbell
Address: 831 North 69th Village/Town/City: E. St. Louis
State and Zip Code: Ill 62203 Telephone Number: 1-618 397-7736

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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MY consern of closing Summit from 59th St. to The harding ditch IS Not A Good Idea, for The Well being of The communite because of The Traffic conjucted will be astounding. Thair will be No good ASSET out of here. Thair IS other ways It could be done by building A HWAY from State St. Along side of the harding ditch To ST Clair And 50 HWY on either side of The Levy raised The HWY Above The Levy. And put Large culving so It can drain Into the flood Area over

2

U.S. Army Corps of Engineers, St. Louis District

thair could be A VAdoct build over 255 Hwy IT could still be A flood AREA EAther WAY, by closing summit from 59th would be A TrAffic jam, could create A Mess.
P.S. please consired This PlAN I Live only A block or so from the Levy
Sincerely Yours Gilbert Campbell

Thank you for taking the time to provide comments! To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

Ms. Deborah L. Roush E-Mail: Deborah.L.Roush@mvs02.usace.army.mil
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Martha L. Neubern

Address: 683 N 55th Village/Town/City: E St Louis, Ill.

State and Zip Code: 62203 Telephone Number: (618) 398-2914

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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I am not in favor of the berm beening builted and I certainly don't want Summit Ave close down. We don't need a Conservation Park or anything of that sort.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Wilma Dunn

Address: 908 N 83 rd Village/Town/City: E. St. Louis

State and Zip Code: 62203 Telephone Number: 618)398-6108

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

BRO Dunn and I vote Against closing off 59th St to Harding Ditch

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: JoHNNY DuNN

Address: 908 N 83RD Village/Town/City: E. ST. Louis

State and Zip Code: 62203 Telephone Number: 618) 398-6108

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

No To THE CLOSING OF 59TH TO HARDING DRIVE.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM

East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: YAlanda Anthony

Address: 831 Success Court Village/Town/City: East St. Louis

State and Zip Code: IL 62203 Telephone Number: 398-2884

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I donot agree on [redacted] these street clothing. Please consider other alternative

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Bennie C. Ivory

Address: 224 N. 69th Village/Town/City: Centreville Ill

State and Zip Code: Ill. 62203 Telephone Number: 397-2181

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

My Concerns are, not to close Summitt Avenue, and the flooding issues East St. Louis and the Parkside area.
Don't want the grassy Berm.
Please think of alternative ways to closing summitt ave. because of fire trucks, Ambulance, the closing will affect our Church attendance.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: STACEY LUSTER

Address: 1101 DE COUANGE DR Village/Town/City: EDGE MONT

State and Zip Code: 62203 Telephone Number: 618 304-8553

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I DON'T AGREE TO CLOSE 59TH TO HARDING DITCH

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Mary Union

Address: 1719 Missouri Village/Town/City: E. St Louis

State and Zip Code: 62205 Telephone Number: 618-271-8746

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I do not agree with the plan to close Marybelle / Summit Ave from 59th St to the Harding ditch. Please consider another alternative to this plan to eliminate the flooding.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Michele LaCrone

Address: 704 West Village/Town/City: 62207

State and Zip Code: Centreville Illinois Telephone Number: 618-337-3696

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I DON'T AGREE TO THE CLOSING of Marybelle Ave from 59th St to the Harding ditch.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: BERNARD LOVE

Address: 512 N. 50th Street Village/Town/City: East St. Louis

State and Zip Code: Il - 62205 Telephone Number (618) 271-1120

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

As a concerned citizen of this city, I would like to think that my tax dollars that has been alloted for the improvement of our streets, roads & Bridges are being used for that purpose. Certain areas, I have been informed are subject to be closed for Flood control. Most of those areas are major theorofares & should be reconsidered for closing.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Robert Whitelaw

Address: 622 N 40th Village/Town/City: St Clair

State and Zip Code: E, St Louis, ILL Telephone Number: 271-5603

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I Am Aginest Closing Any Street Just because Of Some problems. What are we paying Taxes For? We Need This Area To Stay open For Our Church Members in This Area, which is Located At 5803 Belmont Ave. Which is New Bethel Bapt Church Please Give This Some Though before you Take Some Action, What if This was in you Neighhood.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: JUANITA MAYES

Address: 737 N. 60th ST. Village/Town/City: EAST ST LOUIS

State and Zip Code: IL. 62203 Telephone Number: ____________

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

PLEASE DO NOT CLOSE SUMMIT.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Jimmie L. Mayes

Address: 237 N. 60th St Village/Town/City: East St. Louis

State and Zip Code: IL 62203 Telephone Number: 618-235-9237

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Please do not close Summit Avenue

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: MArgie Duff

Address: 618 n 37th Village/Town/City: ______

State and Zip Code: East St Louis IL 62205 Telephone Number: 271-8226

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

If you Close That area, it will be a incanvience to me, I take my daughter to school at Sis Thea Bowman, now I will have to make a detour.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print
My Name: Elizabeth McCray
Address: 872 Nth 45th Village/Town/City: E. St. Louis
State and Zip Code: Il. 62203 Telephone Number: 189-5244

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

We the Citizens of E. St. Louis would like to express our concerns about options of Closing 59th Summit to prevent floods with a 100 yr rage or the surrounding communities! I don't believe that in 100 yrs there will be any floods coming to the outer or inner cities. If you need a solution find another way. Please don't hinder or inconvient us from transporting back & forth to our homes! Mrs. Elizabeth McCray

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print
My Name: Angela McCray
Address: 812 N. 75th Village/Town/City: E. St. Louis.
State and Zip Code: Il. 62203 Telephone Number: 789-5241

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

To whom it may concern. I beleve there is a solution to the flood problem but closing 59th Summit isn't it. We are closed in enough our generation gap don't need to have excess at selling drugs and people dumping trash making it hardous to us. So please find another means for the flood problem.

Angela McCray

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Jimmie Hopson

Address: 7201 Church Ln. Village/Town/City: E. St. Louis

State and Zip Code: IL 62203 Telephone Number: 397-6175

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I believe the citizens have the right to voice their opinion on other options than for you to say for us in E. St. Louis to close 59th Summit for the final solution for the flood problem.

Pastor Jimmie Hopson

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print
My Name: Valery Hopson
Address: 7201 Church Ln. Village/Town/City: E.St.Louis
State and Zip Code: Il. 62203 Telephone Number: 397-6185

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

My concern is that we as Citizens of E.St. Louis would not want 59th Summit closed. the detour would be a hindrance to our Status of life. I believe you need to consult the citizens on other options. Here their solutions and see if any would work out before thousands of dollars be wasted.

Concern Citizen
Minister Valery Hopson

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Leanna m Hall McLemore

Address: 7115 Church Village/Town/City: East St Louis

State and Zip Code: ILL62203 Telephone Number: 1618-397-6699

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

To Whom it may Concern I used To Live on 55 and State St it is not a Bad area to live in But if you Close it it would Be a Great missTake for The people who live on Summit. and I Know you can make Some other place to Close down so Please come up with some other street to Close we need Summit open Thats the only street thats not Bad. we all go Down That street walking and rideing

Leanna McLemore

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Rot Earl

Address: unKnow Village/Town/City: E St Louis

State and Zip Code: Il 62203 Telephone Number: None

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Im a Homeless person I have
To Walk those's streets day & night
Summit is the only one I have
To go on I live on that Street
and 59. in the open where no
one Know's Im there Yall all
realey have you mind maked
up on this one. But not if God
has something to do with it
we Will Be praying on this one
and Whe Will Win this one too
you see We Know and We have Been there

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM

East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Lede Hall

Address: 1115 Church Lane Village/Town/City: E St Louis

State and Zip Code: Ill 62203 Telephone Number: None

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

God can do any thing and he will stop you people today we stand with him God the Father God the Son and so — on. You can not do this without his say so. I know that there is some thing wrong with you all with God in mind Body and Soul together as one Stop Now are elas Begone.

Lede Hall

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Rose

Address: unKnow Village/Town/City: East St Louis

State and Zip Code: Ill/62205 Telephone Number: None

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

We Know you have your mind made up and We can not Change it, But God Can do it for us he can do Everything he is I am That I am. What little mind That you have left so do the right thing and go some where elsa. Stop playing With Someone's life not yours if it where your street you Would do what we are doing Now.

Rose

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Yolanda Brown

Address: 556 N 82 Village/Town/City: East St. Louis IL

State and Zip Code: Illinois 62203 Telephone Number: 397-6698

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

it Will Be So hard for me when I get off from Work or School I have 2 Kid's sometimes my car is not working I have to work + walk down summit its the only way for me to get where I'm going How I have to take summit to get there an to work get real people Think for the Good of all the people not just your selfs The lord is on I: side not yours we are his Children,

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Roy W Wallace JR

Address: 7115 Church Lane Village/Town/City: E St Louis

State and Zip Code: Ill 62203 Telephone Number: None

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

We the people think that you are making a real Big mis-BooBoo. as you Know That To accomplish something you Should think a Bout it you have not you must have a quick responses are something and your ideas are not good at all. I have Knowledge and Know E St Louis you don't. you should think before you do any thing else. on summit St. and 59.

Roy Wallace JR.

P.S.

do right not wrong. RWW.
your people.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: REV Myron Taylor

Address: 861 N 73rd Village/Town/City: E. St Louis, IL

State and Zip Code: 62203 Telephone Number: 618-397-8155

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I disagree with the proposed plan to establish a wetlands area in the Wedgewood action area. We are opposed to the closing of Summit Ave

, St

Corps

er

problem of flooding in the bluffs were it originates.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Congress Dickerson Sr

Address: 6/6/6 N. 32nd Village/Town/City: E. St Louis, IL

State and Zip Code: IL 62205 Telephone Number: 406-3371

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

inconvince me. I would have to go all around State Street.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Nicky Edmond

Address: 1503 N 55th Village/Town/City: E. St Louis

State and Zip Code: IL 62204 Telephone Number: (618) 875-3072

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I have family member that stay right off 69th & trail off summit ave that would take a way out to go around.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Lisa Howard

Address: 1723 Missouri ave Village/Town/City: East St. Louis

State and Zip Code: IL 62205 Telephone Number: 618-274-9276

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Construction is good for development but needs to take in consideration the livelihoods of people the changes affect directtly.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: CHARLIE UNION JR

Address: 1719 MISSOURI AVE Village/Town/City: EAST ST. LOUIS

State and Zip Code: ILL 62205 Telephone Number: 271-8746

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

CONSTRUCTION TO CONTROL FLOOD DAMAGE THAT ALL GOOD. BUT YOU GOT TO THINK ABOUT THE PEOPLE THAT LIVE IN THAT AREA. THEY DON'T WANT NO CUT OF. THINK YOU.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM

East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: PRISCELLA SMITH

Address: 1719 MISSOURI AVE Village/Town/City: EAST ST. LOUIS

State and Zip Code: ILL 62205 Telephone Number: 271-8746

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

AS FOR PREVENTING FLOOD THAT. GOOD BUT. CANT THEY PREVENT FLOOD SOME OTHER WAY WITHOUT. BLOCKING THE STREET. DONT BLOCKI THE STREET. THINK YOU.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: EDWARD FLEMING JR

Address: 843 N 73RD Village/Town/City: E. ST. LOUIS

State and Zip Code: ILL 62203 Telephone Number: (618) 397 4814

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I SAY (NO) TO THE CLOSING OF SUMMIT AVE. AT KINGS HIGHWAY.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Eunice M. Taylor

Address: 861 N. 73rd St Village/Town/City:

State and Zip Code: IL 62203 Telephone Number: (618) 398-3491

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I do not concur with the proposal to close off the above mentioned street. There has to be another alternative. Please use it!

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Charles Mayweather

Address: 914 N 83rd Village/Town/City: ____

State and Zip Code: 62203 Telephone Number: (618) 397-1371

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Find another Alternative

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: ERma Morgan

Address: 216 N. 71 Village/Town/City: East Louis

State and Zip Code: 62203 Telephone Number: 618-293 6641

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Need Highway
Open To The Public

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Michael Riddle

Address: 419 N 59TH St Village/Town/City: Centreville

State and Zip Code: ILL 62203 Telephone Number: 397-0057

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 -- address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Need Highway

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM

East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Gracie Anthony

Address: 624 No 57th Village/Town/City: E. St. Louis

State and Zip Code: E. St. L. Il. 62203 Telephone Number: ———

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

It's an inconvenuet to a lot of people.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Charles Duff

Address: 632 north 53 Village/Town/City: Est Louis

State and Zip Code: Ill 62203 Telephone Number: 874-5742

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Find another Alternative

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Ethel M Green

Address: 545 N 32 St Village/Town/City: ________

State and Zip Code: East St Louis Telephone Number: ________

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

These are your main roads

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Anthony D. Green

Address: 545 N. 32 st Village/Town/City: E. St. Louis

State and Zip Code: Il. 62205 Telephone Number: (618) 875-5913

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

two many streets close off for this purpose

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Emma Johnson

Address: 1312 N. 51 Village/Town/City: St. Clair

State and Zip Code: Washington Pk Il. Telephone Number: 482-9855

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Find another alternative or another City.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: SHARON Ellis

Address: 1356 N. 35th Village/Town/City: St. Clair

State and Zip Code: 62204 Telephone Number: 618 274-6685

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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My Concern would be that
you Don't Block us in As
~~A~~ Citizen Residents As to
be came a deserted Area.
and leave E. St. Louis Area and
surrounding a Like Ghost town
We do need Easy Asses to
Local travel.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Minnie Rodgers

Address: 804 S. 49th St Village/Town/City: Centreville Ill.

State and Zip Code: 62207 Telephone Number: None

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

leave thing like IS, any thing other, will become a problem for lots of people.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Earslene McDougles

Address: 706 No 68th St Village/Town/City: E. St. Louis, Ill.

State and Zip Code: Ill. 62203 Telephone Number: 618 398-2207

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

find an attenate rout
too inconvient

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Blokin L Washington

Address: 706 N. 68TH St Village/Town/City:

State and Zip Code: IL 62203 Telephone Number: 398-2207

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I live off N. 68th st these streets are accessible to me

(Please Do Not Close)

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Stanley McDougle

Address: 6794 Macy Ave Village/Town/City: E. St. Louis

State and Zip Code: 62203 Telephone Number: 3982207

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Find another alternative..

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Nathaniel Sanders

Address: 816 North 80 State Village/Town/City: City

State and Zip Code: 62203 Telephone Number: 397-5104

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Find anothe alternative

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: JACQUeline Slaughter

Address: 501 N 48th Village/Town/City: E. ST. Louis

State and Zip Code: IL, 62205 Telephone Number: 618-274-7348

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

We would have to take a scenic route just to get to family members close buy. That flood area needs to be taken care of by solving the flood problem rather than closing entrance to the area.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Slaughter, Dorothy

Address: 501 N. 48th St. Village/Town/City: ______

State and Zip Code: East St. Louis, Ill Telephone Number: 274-7348

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I have Family that stay in the Area. That would have to take us around another way just to get to them.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: George Stallion

Address: 841 N. 81 Village/Town/City: E St Louis

State and Zip Code: IL 62207 Telephone Number: ____________

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Please use a further [illegible] Route

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Lora Thornton

Address: 213 N. 68th St Village/Town/City: Centerville IL

State and Zip Code: IL 62207 Telephone Number: (618) 398-2955

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Find another route.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Marie Smith

Address: 1229 Division Village/Town/City: St. Clair

State and Zip Code: E. St Louis IL 62201 Telephone Number: 6182714994

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Finded another route

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Levon Hamburg

Address: 8320 Church Lane Village/Town/City: East St. Louis

State and Zip Code: Il. 62203 Telephone Number: (618) 397-8644

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Find another route

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Wilma Anthony

Address: 1705 N. 50th STR. Village/Town/City: Washington Park

State and Zip Code: ILL 62204 Telephone Number: 874-8409

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Find Another Alternative

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Cleo Granberry

Address: 114 Kingsway Village/Town/City: Belleville

State and Zip Code: 62226 Telephone Number: 222-8137

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Envi... mental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Find another route! My mom & dad lives in that area & I use that street all the time.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: Clarica Hall

Address: 910 N 71st Village/Town/City: E. St Louis

State and Zip Code: 62226 Telephone Number: [illegible] 398-7514

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Find anotha route

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Carvel Hall

Address: 5730 West moreland Village/Town/City: Belleville/Washington Park

State and Zip Code: 62204 Telephone Number: 482-2990

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: LaTanya Harvey

Address: 830 Success St　Village/Town/City: E. St. Louis

State and Zip Code: ~~E. St. Louis~~ IL 62203　Telephone Number: 398-6595

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Find another route.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Rosetta Loveless

Address: 5520 Rosemont Village/Town/City: Washington Park

State and Zip Code: Il 62204 Telephone Number: ____________

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Found another alternative.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Lillian Watts

Address: 1860 M ST St Village/Town/City: ____

State and Zip Code: E St LOUS Telephone Number: 789 2925

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Find another alternative

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Teresa Pasley

Address: 1850 N 57 Village/Town/City:

State and Zip Code: E. St Louis Telephone Number: 8773900

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

Find another alternative

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Rosie Watts

Address: 1850 N 57 Village/Town/City: ____

State and Zip Code: E St Louis Telephone Number: 789-2925

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

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Find another altrnative

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: PRENTICE HYde

Address: 408 N 70TH Village/Town/City: E. ST. LOUIS ILL

State and Zip Code: 62203 Telephone Number: 618 397 1647

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Find another way

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM

East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: LoNell Williams

Address: 5889 Summit AVE Village/Town/City: E. ST. LOUIS

State and Zip Code: Ill - 62203 Telephone Number: 397-7663

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I AM CONCERNED THAT YOUR PROPOSAL will CAUSE FREQUENT Flooding TO OUR Neighborhood. Plus the Closing Of Summit Ave will mean INCONVENIENCE AND hardship FOR Those who use it.

IT will Also make STATE ST. (which is in badly Need of Repairs) AND ST. Clair AVE. overly CONGESTED.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM

East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Willie C. LeFlore Jr.

Address: ~~[illegible]~~ 807 N 81st Village/Town/City: EAST ST LOUIS

State and Zip Code: ILLINOIS Telephone Number: 789-4104

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Because ~~I~~ am ~~[illegible]~~ Employee at prompt Auto Service and it will hinder the flow of traffic to the business by closing off Summit and Maryvill

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Oza L. Reed

Address: 750 N 61st Village/Town/City: E St. Louis

State and Zip Code: Ill Telephone Number: 271-7116

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

You may complete this comment form at the 8 April 2003 Public Meeting to be held at the Gateway Center, 1 Gateway Drive, Collinsville, IL 62234, or you may furnish it by mail it to the St. Louis District by May 7, 2003 – address on back of this page.

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it will be inconvenie for the people that lives in the area because of block and buliding a flood gate will cause people to worry everytime it rain of we get above flood level that gate will break. This is a resident area not a rural area, We need more ways to get in out of house. It would be a great incovence with this project.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Ricardo Stewart

Address: 725 N. 25ST Village/Town/City: East St. Louis

State and Zip Code: IL, 62205 Telephone Number: (618)482-3405

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

I work between Kingshighway and summit Ave.
and this will limit cars from seeing our business
and will stop cash flow money to support my family.

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Ruby Williams

Address: 5889 SUMMIT AVE Village/Town/City: E ST. LOUIS

State and Zip Code: IL. 62203 Telephone Number: 618 397-7663

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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Comments regarding the restoration of ecosystem resources and incidental reduction of flood damages as recommended in the Re-evaluation Report and Draft Programmatic Environmental Impact Statement of the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project:

MY HUSBAND + I ARE OWNERS OF PROMPT AUTO SERVICE WHICH IS SITUATED ON THE CORNER OF KINGSHIGHWAY AND SUMMIT AVES. OUR CONCERNS ARE: IF RAIN AND FLOOD WATERS ARE DIRECTED INTO OUR AREA, WILL THE WATER OVERFLOW AND FLOOD OUR BUSINESS. ALSO THE CLOSING OF SUMMIT AVE. WILL REDUCE THE FLOW OF TRAFFIC AND EXPOSER OF OUR BUSINESS TO CLIENTS. PLUS, IF THIS GREAT AMOUNT OF WATER IS NOT PROPERLY CONTAINED, IT WILL MEAN DISASTER FOR OUR NEIGHBORHOOD.

U.S. Army Corps of Engineers, St. Louis District

Will WATER STAND IN These AReas
And ATTRACT DIEAESE CARRYING INSECTS?
Please INFORM US OF ANY PlANNed
FUTURE MEETING ON THIS SubJECT.

Thank you for taking the time to provide comments! To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

Ms. Deborah L. Roush E-Mail: Deborah.L.Roush@mvs02.usace.army.mil
Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement

Please Print

My Name: Paulette Hill

Address: 1309 N. 89th Village/Town/City: E. St. Louis

State and Zip Code: Ill 62203 Telephone Number: 397-0225

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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the street need re[illegible] my that is true but there are people who live on that street & others who have to come that way to get home please find another solution this closing down business is not the answer please [illegible] to touch your heart in making the right decision

U.S. Army Corps of Engineers, St. Louis District

COMMENT FORM
East St. Louis and Vicinity, Illinois Ecosystem Restoration and
Flood Damage Reduction Project
General Reevaluation Report with Integrated Draft Programmatic Environmental Impact
Statement

Please Print

My Name: William Wallace JR

Address: 5313 State St. Village/Town/City: East St. Louis

State and Zip Code: Illinois 62203 Telephone Number: 398-1558

Your comments will assist the St. Louis District in finalizing the Draft General Reevaluation Report and Draft Programmatic Environmental Impact Statement.

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I am opposed to the plan to built a bern in the Maryhill and Summit Avenue area. I think we should re-evaluate the drainage study more further. The people who have houses in the area who be isolated from getting to the State Street or Kings highway. I would like to evaluate other alternative to this drainage study. I also would like to compare

U.S. Army Corps of Engineers, St. Louis District

any other solution to the problem
I think we can come up with
other solutions.

Thank you for taking the time to provide comments! To ensure compliance with the National Environmental Policy Act of 1969 (NEPA), written comments will become a permanent component of the written record for the East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project General Reevaluation Report with Integrated Draft Programmatic Environmental Impact Statement. Comments may be mailed to:

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Attn: CEMVS-PM-F
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Comment period ends 7 May 2003

June 1, 200?

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

Re: General Reevaluation Study and Draft EIS - East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project in Madison and St. Clair Counties, Illinois

Dear Colonel Williams:

We are opposed to the closing of Marybelle Av. in the Wedgewood project. It is an important street to East St. Louis residents.

We are also opposed to constructing an 8-foot berm around the proposed site.

We expressed these concerns to the Corps two years ago and you did not change the project.

We urge you to find another alternative to help East St. Louis flooding to be included in this project. We want you to keep the bluff part of the Wedgewood project. We think people on bluff should manage their stormwater there and not send it down on us.

Thank you.

[signature]

Address 745 N Kingshighway [illegible]
E St Louis IL 62203

June , 2003

Coi. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

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Thank you

[signature]

Address 745 N. 59th E St. Louis Il 62203

June , 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

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Thank you.

Craig Lawrence

Address 618 52ND St.

June 1, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

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Thank you.

[signature]

Address 800 N 71st.

June 1, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

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Thank you.

James Perry

Address 808 Ana Dr.
East St. Louis, Il. 62203

June 1, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

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Thank you

Cleophas Carr

Address 6901 Church Lane
East St. Louis, IL.
62203

June 1, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

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Thank you.

[signature]

Address 504 N. 58

June 1, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

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Thank you.

Frederick Stoner

Address 504 N 58

June 1, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

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Thank you.

Lillie Butler Pct. Committeewoman + member of the Board of Directors for Dayton/Wedgewood Neighborhood Organization

Address 618 N 52nd
E St Louis, Ill 62203

June 1, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

Re: General Reevaluation Study and Draft EIS -
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We urge you to find another alternative to help East St. Louis flooding to be included in this project. We want you to keep the bluff part of the Wedgewood project. We think people on bluff should manage their stormwater there and not send it down on us.

Thank you.

Harold F. Johnson

Address 721 No. 62nd Street

PS I also live right across the street where you are talking about put up a wall from mine (or) our house and we don't want it up there or nowhere at all so I don't like that idea period!

June 1, 2003

Col. C. Kevin Williams
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, MO 63103

Re: General Reevaluation Study and Draft EIS -
East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project in Madison and St. Clair Counties, Illinois

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Thank you.

Mrs. Betty Ledbetter
Address 721 North 62ND Street

I live right across the street where you are talking about put up a wall from mine house! And I don't want it (or) like it.

APPENDIX H - REAL ESTATE PLAN

Real Estate Plan
East St. Louis & Vicinity, Illinois
Ecosystem Restoration
And
Flood Damage Reduction (ERFDR)

Project Description

The East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Protection Project is located in Madison and St. Clair Counties, Illinois, along the left bank of the Mississippi River between river miles 175 and 195 above the Ohio River. The project area includes approximately 55,000 acres of floodplain that is protected by a levee system along the Mississippi River, the Chain of Rocks Canal, the Prairie du Pont canal, and the Cahokia Creek diversion channel. An additional 51,000 acres of upland area that are tributary to and drain into these bottomlands are also apart of the project area. The project sponsors are Madison and St. Clair Counties for the acquisition program. The State of Illinois will provide funding for construction.

1. Purpose

This area was evaluated for flood protection in 1965 but only the Blue Water Ditch was constructed. The areas not receiving benefit from the Blue Water Ditch were reevaluated in 1985 but the cost/benefit ratio was not sufficient to support the project. In December 2000, Congress requested that the Corps of Engineers, St. Louis District (SLD) reevaluate the area using ecosystem restoration as a project purpose. This Real Estate Plan is programmatic and supports the recommended plan for the entire Ecosystem Restoration and Flood Damage Reduction Report. The project will take approximately 12 years to complete. Individual Real Estate plans will be developed as Engineering Design Reports are prepared for each construction phase. The first phase is estimated to begin in 2005 for construction. The recommended plan provides improvements to the natural system for ecosystem restoration that will restore the biodiversity of the historic floodplain and provide incidental flood damage reduction.

2. Lands, Easements, Right-of-Way, Relocation and Disposal (LERRD) Areas Required for Construction

There are eight areas that will be involved in this project. This report will discuss the LERRD requirements for each area separately. No disposal areas are necessary for the project. The acreage numbers in the uplands have been rounded as necessary. Temporary Easements will be required for construction but at this time their locations can't be determined.

Old Cahokia Creek

The project area is located in Madison County. The floodplain area lies parallel to the bluff, and extends from the Norfolk and Southern Railroad track on the north, to I-270 on the south. The "Bluff 1" watershed, to the north of Judy's Branch, comprises the tributary stream area. The area encompasses 519 acres. There are 10 tributary stream sites.

Fee

a. Approximately 298 acres will be acquired in fee on the floodplain. Fee title is necessary for the sponsors to control the environmental restoration, habitat development and operation and maintenance in the area per ER 1165-2-502 (17)(b), ER 1105-2-100 (F-8) (a)(1), and ER 1165-2-501 (17). The plan will require that the creek channel be restored, an earthen hydraulic feature be constructed on the west side of the creek to restrict flow, and a 330 foot forested corridor will be developed on both sides of the creek. Approximately 52 parcels and 22 landowners will be affected.

Permanent Easement

b. Approximately 5 acres will be acquired in permanent easement to construct sediment detention basins at 10 tributary stream sites. Each basin structure will require .3 acre and .2 acre will be required for access to construct and maintain the sediment detention basins. Approximately 15 parcels and 15 landowners will be affected.

Flowage Easement

c. Approximately 205 acres will be acquired in flowage easement for ponding water along the west side of Cahokia Creek. Approximately 30 parcels and 22 landowners will be affected.

d. Approximately 11 acres will be acquired in flowage easement in the uplands for sediment detention basins. Each basin will be approximately 1.1 acres. Approximately 19 parcels and 19 landowners will be affected.

The following is a summary of the estimated lands and parcels to be acquired and landowners to be affected at Cahokia Creek. Some landowners will have more than one estate acquired. Differences are due to rounding:

- **Fee-298 acres**
- **Permanent Easement-5 acres**
- **Flowage Easement-216 acres**
- **Parcels-116**
- **Landowners 78**

Judy's/Burdick Branch

The project area is located in Madison County. The floodplain area is southeast of the junction of I-255 and Route 162, at the confluence of the Judy's Branch, Burdick Branch, and Cahokia Canal. The watersheds of Judy's Branch, Burdicks Branch, and Bluff 1 comprise the tributary stream component. The area encompasses 878 acres. There are 28 tributary stream sites.

Fee

a. Approximately 507 acres will be acquired in fee. Fee title is necessary for the sponsors to control the environmental restoration, habitat development and operation and maintenance of the area per ER 1165-2-502 (17)(b), ER 1105-2-100 (F-8) (a)(1), and ER 1165-2-501 (17). The plan will require prairie restoration, an earthen ring surrounding the area, and creek channel restoration. Approximately 17 parcels and 10 landowners will be affected.

Permanent Easement

b. Approximately 14 acres will be acquired in permanent easement to construct sediment detention basins at 28 tributary stream sites. Each basin structure will be .3 acre and .2 acre will be required for access to construct and maintain the structure. Approximately 35 parcels from 35 landowners will be affected.

Flowage Easement

c. Approximately 278 acres of flowage easement will be acquired in the floodplain as a result of the earthen levee. The area of the flowage easement will be north of the Burdick Creek and south of Judy's Creek. Approximately 7 parcels and 4 landowners will be affected.

d. Approximately 79 acres of flowage easement will be required in the uplands for 28 sediment detention basins. Each basin will be approximately 2.8 acres. Approximately 52 parcels and 52 landowners will be affected.

The following is a summary of the estimated lands and parcels to be acquired and landowners to be affected at Judy's/Burdick Branch. Some landowners will have more than one estate acquired. Differences are due to rounding:

- **Fee-507 acres**
- **Permanent Easement-14 acres**
- **Flowage easement-357 acres**
- **Parcels-111**
- **Landowners-101**

Dobrey Slough

The project area is located in Madison County. The area is north of Horseshoe Lake, near Granite City and Pontoon Beach. It lies north of Pontoon Road and east of Maryville Road. There are no tributary stream sites because there are no bluff tributaries draining into Dobrey Slough. The area encompasses 75 acres.

Fee

a. Approximately 75 acres will be acquired in fee. Fee title is necessary to allow the sponsors to control the environmental restoration, habitat development and operation and maintenance of the area per ER 1165-2-502 (17)(b), ER 1105-2-100 (F-8) (a)(1), and ER 1165-2-501 (17). The plan will require the re-creation of a wetland marsh east of the railroad, planting a forested corridor 245 feet wide along both sides of the slough, reconnection of the hydraulic system under the railroad overpass, and an earthen hydraulic feature on the east side of the slough. It is estimated 50 parcels and 29 landowners will be affected. No permanent or flowage easements are required

The following is a summary of the estimated lands and parcels to be acquired and landowners to be affected at Dobrey Slough. Differences are due to rounding:

- **Fee-75 acres**
- **Parcels-50**
- **Landowners-29**

Elm Slough

The project area is located in Madison County. The area is northeast of Horseshoe Lake in Madison County, west of Route 111, north of Route 162, and east of I-255. There are no bluff tributaries draining into Elm Slough. The area encompasses 670 acres.

Fee

a. Approximately 670 acres will be acquired in fee. Fee title is necessary for the sponsor to control the environmental restoration, habitat development and operation and maintenance in the area per ER 1165-2-502 (17)(b), ER 1105-2-100 (F-8) (a)(1), and ER 1165-2-501 (17). The plan requires that a wetland forest be created, improvement to the hydraulic system between Long Lake and Mitchell Ditch and Horseshoe Lake, and as elevations dictate earthen berms will be built to prevent induced damages to adjoining lands. It is estimated that 71 parcels and 47 landowners will be affected. No permanent or flowage easements will be required in this area.

The following is a summary of the estimated lands and parcels to be acquired and landowners to be affected at Elm Slough. Differences are due to rounding:

- **Fee-670 acres**
- **Parcels-71**
- **Landowners-47**

Brushy Lake

The project area is located in Madison County. The floodplain component is east of Horseshoe Lake, and is bounded by Cahokia Canal on the west, Route 157 on the east, I-55/70 on the south and Horseshoe Lake Road on the north. The Schoolhouse Branch and Snyder Ditch ("Bluff 3") watersheds comprise the tributary stream component. The area encompasses 746 acres. There are 15 tributary stream sites.

Fee

a. Approximately 717 acres will be acquired in fee. Fee title is necessary for the sponsor to control the environmental restoration, habitat development and operation and maintenance in the area per ER 1165-2-502 (17)(b), ER 1105-2-100 (F-8) (a)(1), and ER 1165-2-501 (17). The plan requires improvements to Schoolhouse Branch Creek from 157 to the site, restore a forested wetland, restore the historic Cahokia Creek channel within the habitat area, and construct earthen berms as elevations dictate to prevent induced damages. Approximately 40 parcels and 17 landowners will be affected. The State of Illinois, Madison County and Metro East Sanitary District own property in this area.

Permanent Easement

b. Approximately 8 acres will be acquired in permanent easement in the uplands to construct 15 sediment detention basins. Each basin structure will require .3 acre and .2 acre will be required for access to construct and maintain. Approximately 15 parcels and 15 landowners will be affected.

Flowage easement

c. Approximately 21 acres will be acquired in flowage easement in the uplands for the sediment detention basins. Each basin will be approximately 1.4 acre. Approximately 23 parcels and 23 landowners will be affected.

The following is a summary of the estimated lands and parcels to be acquired and landowners to be affected at Brushy Lake. Some landowners will have more than one estate acquired. Differences are due to rounding:

- **Fee-717 acres**
- **Permanent Easement-8 acres**
- **Flowage Easement-21 acres**
- **Parcels-78**
- **Landowners-55**

Cahokia Mounds

The Cahokia Mounds State Historic Site is located in the bottoms of Madison and St. Clair County. The project area is located between of Collinsville Road on the north, Route 111 on the west, I-255 on the east, and Forest Avenue on the south. The area encompasses 525 acres. There are no tributary stream sites.

Fee

a. Approximately 525 acres will be acquired in fee. Fee title is necessary for the sponsor to control the environmental restoration, habitat development and operation and maintenance of the area per ER 1165-2-502 (17)(b), ER 1105-2-100 (F-8) (a)(1), and ER 1165-2-501 (17). The plan requires the restoration of the floodplain to support prairie plants and animal communities similar to pre-settlement conditions as practical. Illinois Historic Preservation is the owner of the property and will cooperate with the sponsors on the land required for this project area. One owner is affected.

The following is a summary of the estimated lands and parcels to be acquired and landowners to be affected at Cahokia Mounds. Differences are due to rounding:

- **Fee-525 acres**
- **Parcels-2**
- **Landowner-1**

Mullens Slough

The project area is located in St. Clair County. The flood plain area lies between the bluff and Canal No.1/Harding Ditch. It is a lake-like body of water near the City of Centerville. The Powdermill and "Bluff 6" watersheds comprise the tributary stream component. The area encompasses 371 acres. There are 20 tributary stream sites.

Fee

a. Approximately 312 acres will be acquired in fee. Fee title is necessary for the sponsor to control the environmental restoration, habitat development and operation and maintenance of the area per ER 1165-2-502 (17)(b), ER 1105-2-100 (F-8) (a)(1), and ER 1165-2-501 (17). The plan requires connecting the hydraulic system, improving the fish habitat in the slough, creation of prairie west of the slough, and reconnecting the hydraulic system between the bluff and canal no. 1. Approximately 48 parcels and 29 landowners will be affected.

Permanent Easement

b. Approximately 10 acres will be acquired in permanent easement for the 21 tributary stream sediment detention basins. Each basin structure will require .3 acre and .2 acre will be required for access to construct and maintain. Approximately 21 parcels and 21 landowners would be affected.

Flowage Easement

c. Approximately 49 acres of flowage easement will be acquired in the uplands for sediment detention. Each basin will be approximately 2.4 acres. Approximately 35 parcels and 35 landowners will be affected.

The following is a summary of the estimated lands and parcels to be acquired and landowners to be affected at Mullens Slough. Some landowners will have more than one estate acquired. Differences are due to rounding:

- **Fee-312 acres**
- **Permanent Easement-10 acres**
- **Flowage Easement-49 acres**
- **Parcels-104**
- **Landowners-85**

Spring Lake

The project area is located in both Madison and St. Clair County. It is the largest area in the project. The floodplain component consists of three major areas, in addition to Harding Ditch. Each of the area boundaries are discussed below:

1. Cell 1 is bounded by Forest Boulevard to the north, I-255 to the east, and Bunkum Road to the south.

2. St. Clair Farms is bounded by I-64 to the north, Harding Ditch and I-255 to the east, and St. Clair Avenue to the south.

3. Indian lake is bounded by I-55/70 to the north, Route 111 to the east, Collinsville Road to the south, and Route 203 to the west.

The watersheds of Canteen Creek and Little Canteen Creek comprise the tributary stream sites. The area encompasses 1615 acres. There are 58 tributary stream sites.

Fee

a. Approximately 1364 acres will be acquired in fee on the floodplain. Fee title is necessary for the sponsor to control the environmental restoration, habitat development and operation and maintenance in the area per ER 1165-2-502 (17)(b), ER 1105-2-100 (F-8) (a)(1), and ER 1165-2-501 (17). The plan will require improvement of the Harding Channel to Cell 1, Cell 1 re-created as a wetland marsh, St. Clair Farms created into a wetland marsh, a new channel built through Fairmont City, channel restoration through Indian Lake, and the reconnection of Indian Lake to the hydraulic system. St. Clair County owns 134 parcels through a FEMA buy-out program. The Illinois Department of Natural Resources (IDNR) owns18 parcels and MESD owns 17 parcels. The restrictions placed on the property by FEMA will not affect our project. Our plan of habitat restoration is compatible with FEMA deed restrictions. The above acreage includes a sand plant business that will be purchased in fee. It has been estimated by the project team that the sand is almost exhausted and within 10 years it is likely that this business will have abandoned the sight. Approximately 365 parcels and 129 landowners are affected. Of these numbers, 196 parcels are owned by 126 private landowners.

Permanent Easement

b. Approximately 29 acres will be acquired in permanent easement for sediment detention basins at 58 tributary stream sites. Each basin structure will require .3 acre and .2 acre will be required for access to construct and maintain. Approximately 34 parcels and 34 landowners would be affected in St. Clair County and 30 parcels and 30 landowners in Madison County.

Flowage Easement

c. Approximately 222 acres will be acquired in flowage easement in the uplands for sediment detention basins. Each basin will be approximately 3.8 acres. Approximately 43 parcels and 43 landowners will be affected in Madison County. Approximately 45 parcels and 45 landowners will be affected in St. Clair County.

The following is a summary of the estimated lands and parcels to be acquired and landowners to be affected at Spring Lake. Some landowners will have more than one estate acquired. Differences are due to rounding:

- **Fee-1,364 acres**
- **Permanent Easement-29 acres**
- **Flowage Easement-222 acres**
- **Parcels-517**
- **Landowners-281**

Eight Area Acquisition Summary

- **Fee-4,468 acres**
- **Permanent Easement-66 acres**
- **Flowage Easement-864 acres**
- **Parcels-1,049**
- **Landowners-677**

Corps approved estates are depicted in Exhibit "A".

3. LERRD required that is Owned by Sponsor

Madison County owns approximately 26 acres at Cahokia Creek and 93 acres at Brushy Lake. St. Clair County owns 95 acres at Mullins Slough, and 100 acres at Spring Lake. MESD and the State of Illinois own property in the project areas. Both of these entities are willing partners in the ERFDR project and have been involved in all meetings regarding the project. They will not be involved in the land acquisition but have stated that their lands can be used for project purposes. MESD owns 170 acres at Brushy Lake, 47 acres at Judy's/Burdick, 170 acres at Mullins Slough, and 68 acres at Spring Lake. The State of Illinois owns 425 acres at Brushy Lake, 519 acres at Cahokia Mounds and 547 acres at Spring Lake.

4. Proposed non-standard estates

The Real Estate Division Chief has approved a Detention Basin Dam Easement. It is a modification to the Flood Protection Levee Easement. It provides the sponsor the ability to operate and maintain the structures at the detention basins in the tributary streams. The estate is shown in Exhibit A of this report and a copy of the approval is attached.

5. Existing Federal Project within the LERRD Required for the Project

No federal project exists within the project areas.

6. Federally Owned Land Required for the Project

No federally owned land is required in the project areas.

7. Navigation Servitude

Navigation servitude does not apply to this project. No navigable waters exist within the project areas.

8. Map depicting the area

A map of the area is included as Exhibit E.

9. Possibility of Induced Flooding Due to Project

Induced flooding will occur on approximately 205 acres west of Cahokia Creek and 278 acres at Judy's/Burdick between the two creeks. Flowage easements will be purchased to provide compensation to the landowners.

In addition, induced flooding will occur in the tributary stream detention basins during storm events and flowage easements will be purchased to provide compensation to those landowners. The duration of the induced flooding is estimated to be 6 days at Cahokia Creek, 1 day at Judy's/Burdick, and 2 days in the tributary stream detention basins. The ERFDR was designed to not induce flood damages to any properties in our proposed permanent fee takings and will be documented in the hydrology section of this report.

10. Baseline Cost Estimate

A cost estimate is attached as Exhibit B.

11. Relocation Assistance Benefits under Public Law 91-646

Relocation Assistance will be required to landowners located in the St. Clair Farms Area. In this area three homeowners and a mobile homeowner will require assistance under the public law. Replacement housing will be available for the homeowners. One business in the Spring Lake area will require relocation assistance under the public law. The business owner has a truck repair business and a replacement location can be found. It should be noted that the number of relocations could change. Some properties may still be acquired under FEMA buy-out authority project construction is not scheduled in the St. Clair Farms for ten years.

12. Mineral Activity in Project Area

No known mineral activity exists in the project areas.

13. Sponsors Legal and Professional Capability to Acquire LERRD

Madison and St. Clair counties have acquired real property interests to support projects in their counties. Madison County was most recently involved in the Chouteau Island buy-out after the flood of 1993 and is presently working on the Route 159 road extension. St. Clair County was involved in the St. Clair Farms FEMA buyouts as a result of the 1995 flood. Neither county has the in-house staff necessary for acquisition of the properties required for the size of this project. They have requested that USACE Real Estate Division provide assistance in the negotiations to acquire the properties. They can sub-contract for surveys, legal descriptions, appraisals, legal assistance and title evidence. Both counties have their own legal support. Capability Assessments are provided as Exhibit C and D for both counties.

14. Zoning ordinances proposed

No zoning ordinances are proposed.

15. Schedule of Land Acquisition Milestones

A detailed schedule will be developed when final ROW is determined. Normally, an estimate of one-year is allowed for the sponsor to acquire the ROW after receipt of the final ROW limits from the Real Estate Division. There will be a one-year period to acquire the real estate for each area. This does not include land that may have to be condemned. The project will occur over at least a 12-year period. At this time, it is contemplated that construction will begin in 2005. An area has not been selected to begin construction.

16. Facility or Utility Relocations/Alterations

Since this report is programmatic in nature, it is not possible at this time to indicate the number of facility/utility relocations or alterations, which will be involved in the project. As a Real Estate Plan (REP) is prepared for each area of the project the utility relocations/alterations will be identified in more detail. At this time no surveying has been done to identify where the relocations will occur. An estimate of 20 utility relocations/alterations will be incorporated into the cost estimate. In addition, there will be nine bridge relocations/alterations in the Spring Lake Area. An Attorney's Opinion of Compensability will be initiated for each relocation/alteration, as the exact requirements are determined.

17. Impacts of Suspected or Known Contaminants

At this time, a Phase I Environmental Site Assessment has not been accomplished. It will be conducted for each area as the areas are prioritized. A report prepared by USEPA, Region 5 indicates that there are no known hazardous are toxics sites in the project footprint.

18. Landowner Support or Opposition to the Project

Some private landowners within the project area are not supportive of the project. The most vocal opposition has been from landowners with a large number of acres that will be affected by construction of the project. Some of this land is presently being used for a sod farm, growing of horseradish, housing and for commercial development. Two of the landowners most opposed to the project are located in the Cahokia Creek project area and one is located in the Elm Slough project area.

19. Notification to the Non-Federal Sponsor Regarding the Risks Associated Land before Execution of the Project Cooperation Agreement (PCA).

The Sponsors do not intend to acquire any real estate until final ROW drawings are provided and the PCA is signed, however, a letter will be sent regarding the risk associated with acquiring land before execution of the PCA.

20. Other Real Estate Issues Relevant to the Project

None are known to exist at this time.

Thomas R. Hewlett
Thomas R. Hewlett
Chief, Real Estate Division
USACE, St.Louis District NOV 04 2003

Real Estate Plan-Sharon Wolf-7/03/03
Cost Estimate-Tim Nelson

EXHIBIT A

CORPS APPROVED ESTATES

1. FEE. The fee simple title to (the land described in Schedule (A) Tract No.___), subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

2. TEMPORARY WORK AREA EASEMENT. A temporary easement and right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. ____, ____ and ____), for a period not to exceed _______________, beginning with date possession of the land is granted to the United States, for use by the United States, its representatives, agents, and contractors as a work area, including the right to move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the Ecosystem Restoration and Flood Damage Reduction Project, together with the right to trim, cut, fell and remove there from all trees, underbrush, obstructions, and any other vegetation, structures or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

3. FLOWAGE EASEMENT (Occasional Flooding). The perpetual right, power, privilege and easement occasionally to overflow, flood and submerge (the land described in Schedule A)(Tracts Nos.____, ____ and ____)(and to maintain mosquito control) in connection with the operation and maintenance of the Ecosystem Restoration and Flood Damage Reduction project as authorized by-the Act of Congress approved _____________, together with all right, title and interest in and to the structure; and improvements now situate on the land, except fencing (and also excepting __________________ (here identify those structures not designed for human habitation which the District Engineer determines may remain on the land); provided that no structures for human habitation shall be constructed or maintained on the land, except as may be approved in writing by the representative of the United States in charge of the project, and that no excavation shall be conducted and no landfill placed on the land without such approval as to the location and method of excavation and/or placement of land-fill; the above estate is taken subject to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used and enjoyed without interfering with the use of the project for the purposes authorized by Congress or abridging the rights and easement hereby acquired; provided further that any use of the land shall be subject to Federal and State laws with respect to pollution.

NON-STANDARD ESTATE (Memo of Approval is Attached)

5. DETENTION BASIN DAM EASEMENT

A perpetual and assignable right and easement in (the land described in Schedule A) (Tract No. ________) to construct, maintain, repair, operate, and replace a dam for detention of water, including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, and railroads and pipelines.

EXHIBIT A

CEMVS-RE-A

3 May 01

MEMORANDUM FOR RECORD

SUBJECT: Approval of Modification to a Standard Estate for Construction and Maintenance of Dams to Form Detention Basins in the Uplands for E. St. Louis Ecosystem Restoration and Flood Damage Reduction Project.

1. The following is a modification to the [Flood Protection Levee] Easement #5 that will be used as a non-standard estate for the above subject dams. Changes to the estate are in italics and the original wording is in brackets:

DETENTION BASIN DAM EASEMENT

A perpetual and assignable right and easement in (the land described in Schedule A) (Tract No. ________) to construct, maintain, repair, operate, and replace a *dam for detention of water* [flood protection levee], including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, and railroads and pipelines.

2. Per ER 405-1-12, Section 12-10(c), the District Chief of Real Estate may approve non-standard estates if they serve the project intended purpose, substantially conform with and do not materially deviate from the corresponding standard estate contained in Chapter 5 and do not increase the costs nor potential liability of the Government.

3. Request approval for this modification in order that this estate can be incorporated into the Real Estate Report for the above subject project. Signature of this memorandum is your approval of the estate.

4. Submitted by Sharon Wolf at x8166.

Thomas R. Hewlett

THOMAS R. HEWLETT
Chief, Real Estate Division

EXHIBIT B

SUMMARY/ESTIMATE OF COSTS/LANDS AND DAMAGES

EXHIBIT C

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE CAPABILITY St. Clair County

I. Legal Authority:

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? Yes, per a discussion held on April 11, 2001 with Mr. Mike Mitchell, Supervisor of Permits and Zoning for St. Clair County, Illinois, the county has this authority. The County has acquired property for numerous road projects within the County's boundaries and has been involved to some extent on the FEMA buyouts in St. Clair Farms, this area is part of the E. St. Louis & Vicinity ERFDR.

b. Does the sponsor have the power of eminent domain for this project? Yes, St. Clair County has this power under the laws of the State of Illinois.

c. Does the sponsor have "quick-take" authority for this project? No, St. Clair County does not have quick take authority. The Southwest Illinois Development Agency does have this authority and could be requested by the County to exercise this action for properties required.

d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? No, all of the property is located within St. Clair County's boundary.

e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? Yes, the property owned by Illinois Historic Preservation at Cahokia Mounds cannot be condemned. Illinois Historic Preservation is very supportive of the project in their area and condemnation would not be required.

II. Human Resource Requirements:

a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of the Federal project including P.L. 91-646, as amended? Yes, St. Clair County has one Specialist who was involved in the FEMA buyouts under P.L. 91-646. This person would not require training but could not handle a program this large. St. Clair County does not have the Real Estate Specialists necessary at this time to conduct an acquisition program of this magnitude. The County has requested that USACE negotiate the purchase of the properties.

b. If the answer to II.a. is "yes," has a reasonable plan been developed to provided such training? If USACE conducts the negotiations for the properties no training would be required.

c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? No, they do not have the staff as described above.

d. Is the sponsor's projected in-house staffing levels sufficient considering its other workload, if any, and the project schedule? No, the County does not have sufficient staff.

e. Can the sponsor obtain contractor support, if required in a timely fashion? Yes, the County has sub-contracted for surveying, legal descriptions, appraisal and title evidence work. They would do this on this project and have USACE conduct the negotiations.

f. Will the sponsor likely request USACE assistance in acquiring real estate? Yes, the County has requested USACE conduct the negotiations with the landowners.

III. <u>Other Project Variables:</u>

a. Will the sponsor's staff be located within reasonable proximity to the project site? Yes, the project areas of Spring Lake, and Mullins Slough are located in St. Clair County.

b. Has the sponsor approved project/real estate schedule/milestones? No, the project schedule has not been provided to the County at this time.

IV. <u>Overall Assessment:</u>

a. Has the sponsor performed satisfactorily on other USACE projects? St. Clair County has provided work-in-kind on the Canteen Creek Rehabilitation project with USACE.

b. With regard to this project, St. Clair County would be marginally capable. The County will require assistance by USACE to negotiate the purchase of the properties. The County can provide the surveying, legal descriptions, title evidence, appraisal and legal support necessary for the project.

EXHIBIT D

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE CAPABILITY
Madison County

I. Legal Authority:

a. Does the sponsor have legal authority to acquire and hold title to real property for project? purposes? Yes, per a discussion held on April 24, 2001 with Mr. Dave Dietzel, County Engineer for Madison County, Illinois, the County has this authority. The County has acquired property for numerous road projects within the County's boundaries. The County is presently acquiring 30 properties for the Route 159 road extension. They provided equal housing under P.L. 91-646 to two homeowners.

b. Does the sponsor have the power of eminent domain for this project? Yes, Madison County has this power under the laws of the State of Illinois.

c. Does the sponsor have "quick-take" authority for this project? No, Madison County does not have quick take authority.

d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? No, all of the property is located within Madison County's boundary.

e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? No, Madison County can condemn landowners necessary to acquire the property. Other state or local agencies owning property in the project areas are supportive partners in this project and would not require condemnation.

II Human Resource Requirements:

a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of the Federal project including P.L. 91-646, as amended? No, Madison County's staff understands the requirements of P. L. 91-646 but does not have adequate staffing necessary to conduct an acquisition program of this magnitude. The County has requested that USACE negotiate the purchase of the properties and would sub-contract for surveying, legal descriptions, title evidence, and appraisal. The County has its own legal support for the acquisition program.

b. If the answer to II.a. is "yes," has a reasonable plan been developed to provided such training? If USACE conducts the negotiations for the properties, no training would be required.

c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? No, the County does not have the staff as described above.

d. Is the sponsor's projected in-house staffing levels sufficient considering its other workload, if any, and the project schedule? No, the County does not have sufficient staff at this time.

e. Can the sponsor obtain contractor support, if required in a timely fashion? Yes, the County has previously sub-contracted for surveying, legal descriptions, appraisal and title evidence work. The County would do so on this project and have USACE conduct the negotiations. The County has its own legal staff to support the project.

f. Will the sponsor likely request USACE assistance in acquiring real estate? Yes, the County has requested USACE conduct the negotiations with the landowners.

III. <u>Other Project Variables:</u>

a. Will the sponsor's staff be located within reasonable proximity to the project site? Yes, the project areas of Old Cahokia Creek, Judy's and Burdick Branch, Dobrey Slough, Elm Slough and Brushy Lake are all located within Madison County. USACE is also within reasonable distance to conduct negotiations for the county.

b. Has the sponsor approved project/real estate schedule/milestones? No, the project schedule has not been determined.

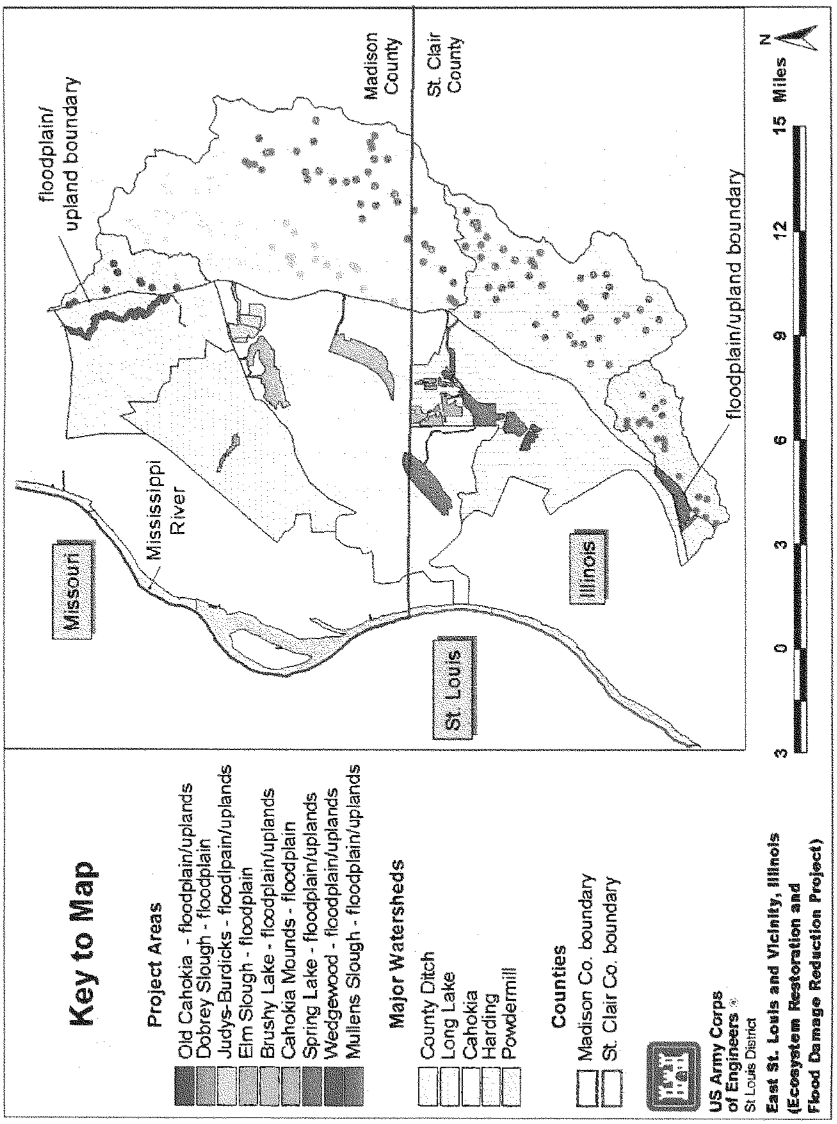
IV. <u>Overall Assessment:</u>

a. Has the sponsor performed satisfactorily on other USACE projects? Madison County previously provided ditch cleanup on County Ditch and Cahokia Canal and purchased land and dwellings on Chouteau Island in 1994. These projects had USACE participation.

b. With regard to this project, the sponsor is anticipated to be moderately capable. The County can provide the surveying, legal descriptions, title evidence, appraisal and legal support necessary for the project. The County can sub-contract for the acquisition of the lands but prefers that USACE negotiate the purchase of the properties.

East St. Louis and Vicinity, Illinois Ecosystem Restoration And Flood Damage Reduction Project

EXHIBIT E



Summary/Estimate of Costs/Lands and Damages **Exhibit B**

East St. Louis Internal Flood Control Project
St. Clair and Madison Counties, Illinois
Old Cahokia Creek Segment

	Area Acres	Unit Value (Per SF)	Percentage of Fee Value	
Fee Simple				
Commercial	10	8000	100	80000
Residential	16	6000	100	96000
Average Quality Agriculture Land	95	3500	100	332500
Low Quality Agriculture Land	185	2000	100	370000
Total Fee Simple Land				**878500**
Permanent Flowage Easements				
Average Quality Agriculture Land	205	3500	0.2	**143500**

10 Upland Detention Basins Consisting of 1.1 Acre Flowage Easement, 0.30 Acres Permanent Easement and 0.2 Acres of Permanent Access Easement. Values for each site are outlined below.
(Total Upland Flowage Easements 11 Acres; Total Permanent Easements 5.5 Acres, rounded to 6 Acres)

Site ob1-10		13721
Site ob1-11		13721
Site ob1-12		13721
Site ob1-16		5040
Site ob1-20		3600
Site ob1-21		2520
Site ob1-9		3600
Site ob3-b1		3600
Site ob4-b1		3600
Site ob4-b2		3600
	Subtotal	**66723**
Total Land Cost for Old Cahokia Creek		1088723
	CALL	1085000

Old Cahokia Creek Segment – Cont.

Severance Damages (estimated to be 10 percent of land value)		108500
Contingencies (estimated to be 25 percent of land value and damages)		298375
Acquisition Cost @ $8,000 per ownership	56 Ownerships	448000
Relocation Assistance (Public Law 91-646) (estimated to be 500 per ownership)		28000
TOTAL REAL ESTATE COST FOR OLD CAHOKIA CREEK		1967875
	CALL	**1968000**

Summary/Estimate of Costs/Lands and Damages **Exhibit B**

East St. Louis Internal Flood Control Project
St. Clair and Madison Counties, Illinois
Dobrey Slough

	Area AC/SF	Unit Value Acres/SF	Percentage of Fee Value		
Fee Simple					
Residential	435600	0.75	100		326700
Suburban Residential	30	7000	100		210000
Low Quality Agriculture Land	41	2000	100		82000
Total Fee Simple Land					618700
Severance Damages (estimated to be 10 percent of land value)				Rounded	62000
Contingencies (estimated to be 25 percent of land value and damages)				Rounded	170000
Acquisition Cost @ $8,000 per ownership			29 Ownerships		232000
Relocation Assistance (Public Law 91-646) (estimated to be 500 per ownership)					14,500
TOTAL REAL ESTATE COST FOR DOBREY SLOUGH BASIN					1,097,200
				CALL	**1,097,000**

Summary/Estimate of Costs/Lands and Damages **Exhibit B**

East St. Louis Internal Flood Control Project
St. Clair and Madison Counties, Illinois
Judy's/Burdick Branch

	Area Acres	Unit Value (Per SF)	Percentage of Fee Value	
Fee Simple				
Agriculture/Minor Commercial	50	5500	100	275000
Average Quality Agriculture	417	3500	100	1459500
Total Fee Simple Land				**1734500**
Permanent Flowage Easements				
Average Quality Agriculture Land	278	3500	0.2	**194600**

28 Upland Detention Basins Consisting of 1.1 Acre Flowage Easement, 0.30 Acres Permanent Easement and 0.2 Acres of Permanent Access Easement. Values for each site are outlined below.
(Total Acreage Upland Flowage Easements 30.80, Rounded 31; Permanent Easements 14 Acres)

Site ob1-6	3600
Site ob1-7	2520
Site ob1-8	18295
Site ob1-10	3600
Site obb11	2520
Site obb9	2520
Site ojb1	18295
Site ojb12	18295
Site ojb13	3600
Site ojb14	18295
Site ojb15	3600
Site ojb16	7200
Site ojb17	18295
Site ojb18	18295
Site ojb19	18295
Site ojb2	6861

Judy's/Burdick Branch – Cont.

Site ojb25		18295
Site ojb27		3600
Site ojb3		6861
Site ojb32		4270
Site ojb34		4270
Site ojb38		4270
Site ojb4		18295
Site ojb46		18295
Site ojb5		18295
Site ojb6		4270
Site ojb7		4270
Site osh9		4270
		273347
Total Land Cost for Judy's/Burdick Branch	Subtotal	2202447
		2202000
Severance Damages (estimated to be 10 percent of land value)	CALL	220200
Contingencies (estimated to be 25 percent of land value and damages)		60555[illegible]
Acquisition Cost @ $8,000 per ownership		808000
Relocation Assistance (Public Law 91-646) (estimated to be 500 per ownership)		50500
TOTAL REAL ESTATE COST FOR JUDY'S/BURDICK BRANCH		3886250
	CALL	**3886000**

Summary/Estimate of Costs/Lands and Damages **Exhibit B**

East St. Louis Internal Flood Control Project
St. Clair and Madison Counties, Illinois
Elm Slough

	Area AC/SF	Unit Value Acres/SF	Percentage of Fee Value		
Fee Simple					
Suburban Residential	35	7000	100		245000
Average Quality Agricultural	380	3500	100		1330000
Low Quality Agriculture Land	253	2000	100		506000
Total Fee Simple Land					2081000
Severance Damages (estimated to be 10 percent of land value)				Rounded	208100
Contingencies (estimated to be 25 percent of land value and damages)				Rounded	572275
Acquisition Cost @ $8,000 per ownership			47 Ownerships		376000
Relocation Assistance (Public Law 91-646) (estimated to be 500 per ownership)					23,500
TOTAL REAL ESTATE COST FOR ELM SLOUGH BASIN					3,260,875
				CALL	**3,261,000**

Summary/Estimate of Costs/Lands and Damages **Exhibit B**

East St. Louis Internal Flood Control Project
St. Clair and Madison Counties, Illinois
Brushy Lake

	Area Acres	Unit Value (Per SF)	Percentage of Fee Value	
Fee Simple				
Minor Commercial	20	8000	100	160000
Suburban Residential	40	7000	100	280000
Average Quality Agriculture	330	5500	100	1815000
Low Quality Agriculture	417	2000	100	834000
Total Fee Simple Land				**3089000**

15 Upland Detention Basins Consisting of 1.1 Acre Flowage Easement, 0.30 Acres Permanent Easement and 0.2 Acres of Permanent Access Easement. Values for each site are outlined below.
(Total Upland Site 16.5 Acres, rounded to 17; Permanent Easements 7.5 Acres, Rounded to 8.0 Acres)

Site ob3-1		18295
Site ob3-3		18295
Site osh-1		13721
Site osh10		3600
Site osh11		18295
Site osh12		18295
Site osh13		18295
Site osh14		3600
Site osh15		3600
Site osh17		18295
Site osh2		4270
Site osh3		4270
Site osh4		4270
Site osh5		4270
Site osh7		4270
		155641
Total Land Cost for Brushy Lake	Subtotal	3244641
		3245000

Brushy Lake – Cont.

Severance Damages (estimated to be 10 percent of land value)	CALL	324500
Contingencies (estimated to be 25 percent of land value and damages)		892375
Acquisition Cost @ $8,000 per ownership		440000
Relocation Assistance (Public Law 91-646) (estimated to be 500 per ownership)		27500
TOTAL REAL ESTATE COST FOR BRUSHY LAKE		4929375
	CALL	**4929000**

Summary/Estimate of Costs/Lands and Damages **Exhibit B**

East St. Louis Internal Flood Control Project
St. Clair and Madison Counties, Illinois
Cahokia Mounds

	Area AC/SF	Unit Value Acres/SF	Percentage of Fee Value		
Fee Simple					
Average Quality Agricultural	519	3500	100		1816500
Severance Damages (estimated to be 10 percent of land value)				Rounded	181650
Contingencies (estimated to be 25 percent of land value and damages)				Rounded	499537.5
Acquisition Cost @ $8,000 per ownership			1 Ownership		8000
Relocation Assistance (Public Law 91-646) (estimated to be 500 per ownership)					500
TOTAL REAL ESTATE COST FOR CAHOKIA MOUNDS					2,506,188
				CALL	**2,506,000**

Summary/Estimate of Costs/Lands and Damages **Exhibit B**

East St. Louis Internal Flood Control Project
St. Clair and Madison Counties, Illinois
Mullens Slough

	Area Acres	Unit Value (Per SF)	Percentage of Fee Value	
Fee Simple				
Low Quality Agricultural	340	2000	100	680000
Average Quality Agriculture	36	3500	100	126000
Total Fee Simple Land				**806000**

20 Upland Detention Basins Consisting of 1.1 Acre Flowage Easement, 0.30 Acres Permanent Easement and 0.2 Acres of Permanent Access Easement. Values for each site are outlined below.
(Total Upland Flowage Easements 22 Acres; Total Permanent Easements 10 Acres)

Site 78		4320
Site 49		4320
Site 50		4320
Site 79		4320
Site 48		4320
Site 47		2520
Site 84		4320
Site 80		4320
Site 81		4320
Site 82		4320
Site 83		4320
Site 85		4320
Site 86		4320
Site 87		2160
Site 88		4320
Site 90		4320
Site 91		4320
Site 92		4320
Site 69		4320
Site 118		4320
		82440
Total Land Cost for Mullens Slough	Subtotal	888440
		888000

Mullens Slough – Cont.

Severance Damages (estimated to be 10 percent of land value)	CALL	88800
Contingencies (estimated to be 25 percent of land value and damages)		244200
Acquisition Cost @ $8,000 per ownership		680000
Relocation Assistance (Public Law 91-646) (estimated to be 500 per ownership)		42500
TOTAL REAL ESTATE COST FOR MULLENS SLOUGH		1943500
	CALL	**1944000**

Summary/Estimate of Costs/Lands and Damages **Exhibit B**

East St. Louis Internal Flood Control Project
St. Clair and Madison Counties, Illinois
Spring Lake

	Area Acres	Unit Value (Per SF)	Percentage of Fee Value	
Fee Simple				
Low Quality Agriculture	800	2000	100	1600000
Average Quality Agriculture	579	3500	100	2026500
Total Fee Simple Land				**3626500**
Contributory Value of 10 Dwellings				**139100**

58 Upland Detention Basins Consisting of 1.1 Acre Flowage Easement, 0.30 Acres Permanent Easement and 0.2 Acres of Permanent Access Easement. Values for each site are outlined below.
Total Upland Flowage Easements 63.8 Acres, rounded to 64 Acres; Total Permanent Easements 29 Acres)

Site obc-38	4320
Site obc-89	4320
Site obc-75	4320
Site obc-69	4320
Site obc-71	4320
Site obc-65	4320
Site obc-23	4320
Site obc-3	4320
Site obc-31	4320
Site obc-93	4320
Site obc-104	4320
Site obc-94c	4320
Site obc-91	4320
Site obc-94	4320
Site obc-107	4320
Site obc-32	4320
Site obc-111	4320
Site obc-112	4320

Spring Lake – Cont.

Site obc-88	4320
Site obc-87	4320
Site obc-110	4320
Site obc-79	4320
Site obc-14	4320
Site obc-58	4320
Site obc-84	4320
Site obc-56	4320
Site obc-43	4320
Site obc-42	4320
Site obc-41	4320
Site obc-114	4320
Site obc-30	4320
Site obc-31	4320
Site obc-63	4320
Site obc-69	4320
Site obc-70	4320
Site obc-71	4320
Site obc-72	4320
Site 29	2160
Site 62	4320
Site 73	4320
Site 75	4320
Site 76	4320
Site 34	4320
Site 117	4320
Site 35	4320
Site 45	4320
Site 116	4320
Site 115	4320
Site 44	4320
Site 43	4320
Site 42	4320
Site 28	2160
Site 61	2160
Site 33	4320
Site 38	4320

Spring Lake – Cont.		
Site 77		6480
Site 37		4320
Site 36		4320
		246240
Total Land and improvement Cost for Spring Lake Basin	Subtotal	4011840
		4012000
Severance Damages (estimated to be 10 percent of land value)	CALL	401200
Contingencies (estimated to be 25 percent of land value and damages)		1103300
Acquisition Cost @ $8,000 per ownership		2248000
Relocation Assistance (Public Law 91-646)		
Title III payments		140500
Supplemental Replacement Housing Payments		225000
TOTAL REAL ESTATE COST FOR SPRING LAKE		8130000
	CALL	**8130000**

Summary of Total Real Estate Cost

East St. Louis Internal Flood Control Project
St. Clair and Madison Counties, Illinois

Madison County		
Old Cahokia Creek Basin	1958000	
Dobrey Slough	1060000	
Judy's/Burdick Branch	4369000	
Elm Slough	3267000	
Brushy Lake	4701000	
Total Madison County	**15355000**	
St. Clair County		
Cahokia Mounds	2535000	
Mullens Slough	1816000	
Spring Lake	8307000	
Total St. Clair County	**12658000**	
Total Project Real Estate Costs		**28013000**

APPENDIX I –
LOCAL COOPERATION/FINANCIAL ANALYSIS

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APPENDIX I - LOCAL COOPERATION/FINANCIAL ANALYSIS

The Metro East Sanitary District (MESD) is the Local Sponsor for the entire planning, engineering and design (PED) phase of this effort. To this end, a Design Agreement including an estimated total cost of $4,000,000 was executed between the Federal Government and the MESD on 18 May 1998. This Design Agreement covers the study (re-evaluation) phase and the design phase and is being cost shared 25% Non-Federal and 75% Federal.

During the identification of Project Action Areas and the development of specific alternatives, it became apparent that any project that might be recommended as a result of the re-evaluation effort would, in part, be located outside of MESD's jurisdictional boundary. In order to address this situation, Madison and St. Clair Counties formally expressed their intent to become sponsors for any project that might be implemented since they had demonstrated the interest, financial capability, and the jurisdictional authority to do so. Soon afterward, the State of Illinois, Department of Natural Resources, Office of Water Resources, expressed their intent to help with the Project and to cooperate financially in its implementation. In order to formalize this arrangement, these three entities entered into a separate third party agreement to sponsor the Project. This Agreement also served to help ensure that all concerns and interests were considered equally during the plan formulation process. Representatives from these three agencies participated as equal voting members on the Sponsor's Selection Team during evaluation of alternatives and the selection of the Recommended Plan.

With the advent of the third party agreement, it was agreed that the MESD's financial responsibilities would terminate with the completion of work under the terms of the Design Agreement. Both Madison and St. Clair Counties have formally executed a letter of intent to serve as joint Local Sponsors for the implementation of the Project. The State has also expressed their intent to support the Project. These letters are included below.

The Project sponsors for implementing the Project, Madison County, St. Clair County, and the Illinois Department of Natural Resources, will provide the non-Federal share of funds. Madison and St. Clair Counties have expressed their intent to provide all Project lands, easements, rights-of-way, relocations, and disposal areas (LERRD's) and, upon the Project's completion, provide for its operation, maintenance, repair, and replacement.

The non-Federal share of costs is estimated to be $67,681,840, of which, $1,000,000 will have already been contributed during PED. The Illinois Department of Natural Resources has expressed their intent to provide funds totaling approximately $10,000,000. The estimated $34,207,400 in LERRD's costs will be borne by the two Counties. The remainder of the Sponsors' share, estimated to be $22,474,440, will be divided among the two counties and the State of Illinois. These figures include the restoration project costs that are shared at a 35%-65% rate and recreation features that are shared at a 50%-50% rate. Madison and St. Clair Counties and the State of Illinois have the capability of performing some of the required work themselves. During the development and negotiation of the Project Cooperation Agreement these work-in-kind possibilities will be further examined.

Table I-1 Funding Requirements including PED

		2	3	4	5	7	9
FY	**Phase**	**Total Project Implementation Cost**	**LERRDs**	**PED or Construction**	**%**	**Additional Non-Fed Cash**	**Federal Cash Schedule**
Prior FY's	PED	2407.00	0.00	2407.00		601.75	1805.25
FY03	PED	800.00	0.00	800.00		200.00	600.00
FY04	PED	793.00	0.00	793.00		198.25	594.75
FY05	Constr	4865.43	3343.89	1521.54	0.01	371.99	1149.55
FY06	Constr	1348.91	130.47	1218.44	0.01	308.35	910.09
FY07	Constr	5018.77	2074.02	2944.75	0.02	670.84	2273.91
FY08	Constr	11589.60	4182.30	7407.30	0.05	1607.91	5799.39
FY09	Constr	12626.80	6880.12	5746.68	0.04	1259.20	4487.48
FY10	Constr	12242.21	6881.97	5360.24	0.04	1178.06	4182.18
FY11	Constr	18987.80	6230.54	12757.26	0.08	2731.31	10025.95
FY12	Constr	16344.35	1620.66	14723.69	0.09	3144.23	11579.46
FY13	Constr	18853.90	633.87	18220.03	0.12	3878.40	14341.63
FY14	Constr	22284.47	968.57	21315.90	0.14	4528.48	16787.42
FY15	Constr	16491.59	791.19	15700.40	0.10	3349.32	12351.08
FY16	Constr	14666.30	469.70	14196.60	0.09	3033.55	11163.05
FY17	Constr	13120.50	0.00	13120.50	0.08	2807.58	10312.92
FY18	Constr	11529.21	0.00	11529.21	0.07	2473.44	9055.77
FY19	Constr	8845.00	0.00	8845.00	0.06	1909.80	6935.20
FY20	Constr	193.26	0.00	193.26	0.00	93.08	100.18
Total		**193008.10**	**34207.30**	**158800.80**	**1.000**	**33345.54**	**124455.27**

*Displayed in $1,000s

After reviewing all necessary and pertinent financial materials, the St. Louis District's conclusion is that the Local Sponsors clearly have the capability both to finance this project, and to operate, maintain, repair, replace and rehabilitate it once implementation is complete. As an example of recent funding levels, Madison and St. Clair Counties generated revenues totaling approximately $150,000,000 as of July 1, 2002. In general, the Local Sponsors have sufficient taxing authority, ability to issue bonds, if required, and, the jurisdictional authority to acquire all LERRD's when needed.

ST. CLAIR COUNTY BOARD

10 Public Square • Room B561 • Belleville, Illinois 62220-1623

JOHN BARICEVIC
CHAIRMAN

(618) 277-6600
FAX: 277-2868

March 7, 2001

Commander
U.S. Army Engineer District, St. Louis
ATTN: CEMVS-PM-F
1222 Spruce Street
St. Louis, MO 63103

Dear Colonel Morrow:

I am writing on behalf of St. Clair County to express our support for the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Project. The County in partnership with Madison County and IDNR intends to participate in this project as a local sponsor upon completion of the Pre-engineering and Design Phase, which is underway. St. Clair County does not have the financial ability to fund the entire project immediately, however it is our understanding that the project can be divided into smaller components with each being funded separately. It is also St. Clair County's intent that recreation is a needed component of this plan and that it be included in future design. St. Clair County is willing to pursue entering into a future Project Cooperation Agreement with the U.S. Army Corps of Engineers for the construction of this project once a breakdown of the project is available for review and presentation to the St. Clair County Board.

We understand that the non-Federal sponsor is required to pay a minimum of 35 percent of the total project cost, which includes the cost of lands, rights-of-way, relocations and cash. Further it is understood that the contribution is equal to a minimum of 5 percent of the total project cost and under no circumstances will the non-Federal sponsor's share of the project exceed 50 percent. As a non-Federal sponsor we also agree to assume responsibility to operate and maintain the project once constructed.

Please contact me if you have any questions.

Sincerely,

JOHN BARICEVIC, Chairman
St. Clair County Board

JB/dh

cc: Wade Brunsmann
Debra Roush
Pam Hogan

Printed on recycled paper

MADISON COUNTY BOARD

157 NORTH MAIN STREET STE 165
EDWARDSVILLE ILLINOIS 62025-1963
(618) 692-6200 EXT. 4341 FAX (618) 692-7476

March 6, 2001

Commander
U.S. Army Engineer District, St. Louis
ATTN: CEMVS-PM-F
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Colonel Morrow:

I am writing on behalf of Madison County to express our support for the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration Project. The County in partnership with St. Clair County and IDNR intends to participate in this project as a local sponsor upon completion of the Pre-engineering and Design Phase which is underway. With this partnership we are financially able and willing to enter into a future Project Cooperation Agreement with the U.S. Army Corps of Engineers for the construction of this project. We understand that the non-Federal sponsor is required to pay a minimum of 35 percent of the total project cost, which includes the cost of lands, right-of-way, relocations and cash. Further it is understood that the cash contribution is equal to a minimum of 5 percent of the total project cost and under no circumstances will the non-Federal sponsor's share of the project exceed 50 percent. As a non-Federal sponsor we also agree to assume responsibility to operate and maintain the project once constructed.

Please contact me if you have any questions.

Yours truly,

Rudolph Papa

Rudolph Papa
Chairman, Madison Co. Board

cc: Congressman Costello
Congressman Shimkus
Senator Durbin
Senator Fitzgerald

Brady
PM
Roush ?

ILLINOIS
DEPARTMENT OF
NATURAL RESOURCES
Office of Water Resources

524 South Second Street, Springfield 62701-1787 George H. Ryan, Governor ● Brent Manning, Director

March 14, 2002

Colonel Michael R. Morrow
District Engineer
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103

Dear Colonel Morrow:

The Illinois Department of Natural Resources/Office of Water Resources (IDNR/OWR) is pleased to support the East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project. The IDNR/OWR in partnership with Madison and St. Clair Counties intends to participate in this project as a local sponsor upon completion of the Pre-engineering and Design Phase which is under way. With this partnership we are financially able and willing to enter into a future Project Cooperation Agreement with the U.S. Army Corps of Engineers for the construction of this project. We understand that the non-federal sponsors are required to pay a minimum of 35 percent of the total project cost, which includes the cost of lands, rights-of-way, relocations and cash. Further, it is understood that, as a minimum, the non-federal cash contribution must equal 5 percent of the total project cost and under no circumstances will the non-federal sponsors' share of the project exceed 50 percent. Madison and St. Clair Counties of the non-federal sponsor partnership also agree to assume responsibility to operate and maintain the project once constructed.

If you have any questions, please feel free to call me at 217/782-2152.

Sincerely,

Donald R. Vonnahme
Director

APPENDIX J – ENVIRONMENTAL COORDINATION

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Marion Illinois Suboffice (ES)
8588 Route 148
Marion, IL 62959
(618) 997-3344

June 5, 2001

Colonel Michael R. Morrow
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

ATTN: Tim George, CEMVS-PM-EA

Dear Colonel Morrow:

This constitutes our Draft Fish and Wildlife Coordination Act Report (DFWCAR) for the East St. Louis and Vicinity, Illinois, Ecosystem Restoration and Flood Damage Reduction Project. This study is being conducted under the authority of Section 206 of the Water Resources Development Act of 1996. This report is prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 stat. 401, as amended; 16 U.S.C. 661 et. seq.); and the Endangered Species Act of 1973, as amended. It is provided in partial fulfillment of the reporting requirements of the Fish and Wildlife Service (Service) under Section 2(b) of the Fish and Wildlife Coordination Act.

This report describes existing fish and wildlife resources in the project area and adjacent areas subject to potential impact by structural development and identifies associated resource problems with emphasis on those related to or likely to be affected (positively or negatively) by water and land resource development. The report describes impacts to fish and wildlife resources associated with the proposed plan. It also includes recommendations to achieve maximum benefits to fish and wildlife resources. If adverse impacts due to construction are identified during future planning, recommendations for mitigation will be provided at that time.

Description of the Project Area

The proposed project site is located in the floodplain of the Mississippi River in an area known as the American Bottoms, including sections of both Madison and St. Clair Counties, Illinois. Situated just downstream from the Mississippi's confluence with the Missouri River and the Illinois River, this area receives most of the drainage from the Upper Mississippi River basin.

The American Bottoms is a vast floodplain formed by the erosive force of the historically meandering Mississippi River. As the Mississippi River carved out the American Bottoms, it left behind a maze of meander loops resulting in diverse geomorphic microenvironments, including an array of wetlands. This unique formation resulted in a diverse and natural resource-rich environment. The American Bottoms' position within the Mississippi River flyway has also increased its value by providing a resting and feeding area for countless migrating birds.

This project also includes the bluff and upland areas east of the American Bottoms that drain directly into the floodplain. These uplands are characterized by rapidly growing urban areas and steep intermittent streams with forested corridors. The following streams currently drain into the American Bottoms: Judy's Branch, Burdick's Branch, School House Branch, Big Canteen Creek, Little Canteen Creek, Schoenberger Creek, Powdermill Creek, and six unnamed streams referred to as Bluff 1-6 in this study. Urban development has caused an increase in the amount and velocity of stormwater draining into the American Bottoms. This has resulted in increased flooding and an altered hydrological regime in many wetlands located in the American Bottoms. An indirect effect has been increased erosion, particularly in stream channels, that has also led to degradation of many wetlands in the American Bottoms.

Resource Problems and Opportunities

Today the Mississippi River is isolated from most of this floodplain by a system of levees. Many of the former wetlands have been drained and filled to make way for development. Isolating the river from the floodplain prevents the natural reformation of floodplain wetlands and can inhibit a wetland's ability to provide flood storage, sediment control/erosion reduction, pollution control and wildlife habitat. Destroying wetlands and preventing the formation of new wetlands has led to a dramatic loss of wetland habitats in the American Bottoms. Even though draining of wetlands has been effective, many low spots in the Bottoms area are still prone to flooding. Restoring the habitat and floodplain hydrology to these and other drained and degraded wetlands would have significant environmental benefits including flood storage, groundwater recharge, sediment control/erosion reduction, pollution control, recreation, and valuable wildlife habitat.

The upland stream channels and associated riparian corridors which enter the American Bottoms have also been significantly degraded, largely due to commercial and residential developments. Aquatic habitat for fish has been lost due to channel degradation. Migratory bird habitat has been lost due to erosion and development. The filtering and nutrient cycling capability of these areas have been significantly modified. Controlling erosion, reducing water velocity and discharge and restoration of the riparian corridor will have many significant environmental benefits, including improving fish and wildlife habitat, reducing sedimentation in wetlands and improving water quality.

Description of the Project

In 1998 Congress authorized the U.S. Army Corps of Engineers to evaluate an ecosystem approach to resolve flooding problems and ecosystem restoration in East St. Louis and the surrounding areas. To address both ecosystem restoration and reduce flooding the proposed project includes the development and restoration of nine large habitat areas, some of which will provide temporary storage of flood water during heavy rains. Restoration and flood control will also be teamed together in the adjacent upland streams. A combination of dry-detention basins and other stream stabilizing actions are expected to reduce in-stream erosion and damages resulting from swift flood waters. Reducing in-stream erosion and the speed of flood water should result in higher quality stream habitat and decrease the amount of sediment deposited in the floodplain.

Federally Threatened and Endangered Species

In accordance with Section 7(c) of the Endangered Species Act, we have determined that the following federally-listed species may occur in the project areas. No designated critical habitat occurs within the project areas.

The threatened bald eagle (*Haliaeetus leucocephalus*) is listed as breeding and wintering in Madison and St. Clair Counties, Illinois. During the winter, this species feeds on fish in the open water areas including those created by dam tailwaters, the warm water effluents of power plants, municipal and industrial discharges, or in power plant cooling ponds. The more severe the winter, the greater the ice coverage and the more concentrated the eagles become. They roost at night in groups in large trees adjacent to the river in areas that are protected from the harsh winter elements. They perch in large shoreline trees to rest or feed on fish. Bald eagles nest in large trees with an unobstructed view of the surrounding area. There is no critical habitat designated for this species in Illinois. The eagle may not be harassed, harmed, or disturbed when present nor may nest trees be cleared.

The least tern (*Sterna antillarum*) is listed as endangered in Madison County, Illinois. It nests on bare alluvial or dredge spoil islands and sand/gravel bars in or adjacent to rivers, lakes, gravel pits and cooling ponds. It nests in colonies with other least terns and sometimes with the piping plover. This species forages in shallow water areas along the river and in backwater areas, such as, side channels and sloughs. Foraging habitat must be located in close proximity to nesting habitat. It must not be harmed, harassed or disturbed when present.

The gray bat (*Myotis grisescens*) is listed as endangered in Madison County, Illinois, where it inhabits caves during both summer and winter. This species forages over rivers and reservoirs adjacent to forests. A search for this species should be made prior to any cave impacting activities.

Colonel Michael R. Morrow 4.

The endangered Indiana bat (*Myotis sodalis*) is listed as occurring in Madison and St. Clair Counties, Illinois. Potential habitat for this species occurs statewide, therefore, Indiana bats are considered to potentially occur in any area with forested habitat. Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula include caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. Females form nursery colonies under the loose bark of trees (dead or alive) and/or cavities, where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. A single colony may utilize a number of roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near the winter hibernacula during the summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females. The species or size of trees does not appear to influence whether Indiana bats utilize a tree for roosting provided the appropriate bark structure is present. However, the use of a particular tree does appear to be influenced by weather conditions such as temperature and precipitation. During the summer, the Indiana bat frequents the corridors of small streams with well-developed riparian woods as well as mature upland forests. It forages for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of crop lands, along wooded fence rows, and over farm ponds and in pastures. It has been shown that the foraging range for the bats varies by season, age, and sex and ranges up to 81 acres (33 ha). To avoid impacting this species, tree clearing activities should not occur during the period of April 1 to September 30. If a proposed action occurs within a 5-mile radius of a winter hibernacula, tree clearing should be prohibited from April 1 to November 15. If it is necessary to clear trees during this time frame, mist net surveys may be necessary to determine if Indiana bats are present. A search for this species should be made prior to any cave impacting activities.

The endangered pallid sturgeon (*Scaphirhynchus albus*) is found in the Mississippi River downstream of the Melvin Price Locks and Dam. Pallid sturgeon are adapted to large rivers with extensive micro-habitat diversity, turbid water, braided channels, irregular flows and flood cycles. Little is known of its micro-habitat preferences, however, it is suspected that sand/gravel bars and the mouths of major tributaries may be utilized for spawning. This species feeds on aquatic invertebrates and small fish.

The decurrent false aster (*Boltonia decurrens*) is listed as threatened in Madison and St. Clair Counties, Illinois. It is considered to potentially occur in any county bordering the Illinois River and the counties bordering the Mississippi River between the mouths of the Missouri River and the Ohio River. It occupies disturbed alluvial soils in the floodplains of these rivers.

The Illinois cave amphipod (*Gammarus acherondytes*) is listed as endangered in St. Clair County, Illinois. It is currently known to occur in only three cave streams of the Illinois sinkhole plain in southwestern Illinois. The contamination of groundwater is probably the greatest threat to this species.

Colonel Michael R. Morrow 5.

In accordance with Section 7(c), the Federal agency responsible for actions authorized, funded or carried out in furtherance of a construction project that significantly affects the quality of the human environment is required to conduct a biological assessment. The purpose of the assessment is to identify listed or proposed species likely to be adversely affected by its action and to assist the Federal agency in making a decision as to whether it should initiate consultation. The biological assessment is to be completed within 180 days of initiation and before contracts are entered into or construction begun.

When conducting a biological assessment, the following steps should be taken:

1. Conduct an on-site inspection of the area affected by the proposed activity or program. This may include a detailed survey to determine if species are present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of populations.

2. Interview recognized experts on the species at issue, including those within the Fish and Wildlife Service, State conservation department, universities and others who may have data not yet found in scientific literature.

3. Review literature and other scientific data to determine the species' distribution, habitat needs and other biological requirements.

4. Review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration for the cumulative effects of the proposal on the species and its habitat.

5. Analyze alternative actions that may provide conservation measures.

Section 7(d) of the Endangered Species Act underscores the requirement that the Federal agency and permit or license applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which in effect would deny the formulation or implementation of reasonable alternatives regarding their actions on any endangered or threatened species.

State Threatened and Endangered Species

When reviewing land and water development projects the Service solicits information from state natural resource agencies regarding state-listed threatened and endangered species that may occur in a project area. Protecting state-listed species is an important step in ensuring they do not become federally-listed. For more information regarding the below listed species please contact the Illinois Department of Natural Resources.

This proposed project includes work in and near floodplain wetlands. Several state threatened or endangered migratory birds rely heavily on such habitats. State-listed migratory birds that may be found in the project area include the Pied-billed Grebe, Common Moorhen, Least Bittern, Snowy Egret, Little Blue Heron, Black-Crowned Night Heron, and Yellow-Crowned Night Heron. Not only should the site be surveyed for the presence of these birds, but also for nests and/or rookeries.

Habitat Evaluation Analysis: Methods

Habitats in each of the nine habitat areas, including their associated upland stream work, were analyzed using Habitat Evaluation Procedures (HEP). HEP analyses produce a rating of habitat quality for different habitat types based on the habitats' suitability for a suite of selected wildlife species. This rating is referred to as a Habitat Suitability Index (HSI). The HSI, a value ranging from 0.1 to 1.0, measures the existing, future without project, and future with project habitat conditions. This value, when multiplied by the acres of each habitat in the project area, provides a measure of available habitat quality and quantity known as habitat units. These habitat units are then converted to Average Annual Habitat Units (AAHU's) for each species evaluated to reflect the expected habitat conditions over a fifty-year project life. This analysis was conducted by an interagency team with members representing the Corps of Engineers, Illinois Department of Natural Resources, U.S. Environmental Protection Agency, Natural Resource Conservation Service, and the Service.

Wildlife species selected to calculate HSI values include: black crappie, Eastern meadowlark, fox squirrel, great blue heron, marsh wren, mink, slider turtle, white crappie, and wood duck. This suite of species was selected based on their different habitat needs. It is necessary to have one or more species to represent each habitat type located in the study area. Relative Value Indices (RVI) were also assigned to each species. RVI's are used to express value judgments made during a resource planning effort. RVI's are based on the abundance or scarcity, vulnerability, replaceability, aesthetic value, and management efforts afforded to each species and its associated habitat. The AAHU's for each species is multiplied by its assigned RVI to reflect the above listed value judgments.

Baseline data was collected from the various habitat areas to determine the existing habitat quantity and quality, or habitat units, of each area. In order to predict the future without project conditions of the nine habitat areas, various assumptions were made regarding development rates over the next fifty years. AAHU's were then calculated to reflect the without project habitat conditions over the next fifty years. To predict the future with project conditions the interagency team of biologists made predictions on how different project alternatives in each habitat area would affect conditions over the next fifty years.

Table 1

Species	Relative Value Index (RVI)
black crappie	4.00
Eastern meadowlark	4.00
fox squirrel	0.50
great blue heron	0.75
marsh wren	0.75
mink	1.00
slider turtle	1.00

Each of the nine habitat areas had several different project alternatives evaluated. AAHU's were then calculated for each of the different project alternatives in each of the habitat areas. Alternatives within each habitat area were then compared to determine which one produced the greatest number of AAHU's, or the greatest quantity and quality of habitats. In five out of the nine habitat areas the alternative that produced the greatest number of AAHU's was selected as the preferred alternative. Selection of preferred alternatives for the remaining four habitat areas was based on feasibility of alternatives, new information, and cost. Each of the habitat areas and the rationale used to select preferred alternatives are described in the "Habitat Evaluation Analysis: Results" section of this report.

Habitat Evaluation Analysis: Results

The Habitat Evaluation Analysis conducted by the Waterways Experiment Station, with input from the interagency biology team, predicted that habitat quality and quantity will be significantly increased in all nine habitat areas by the proposed project. Results of this analysis are presented in Table 2 and Charts 1-10 of this section. Results for each of the nine habitat areas are broken out by species to demonstrate the low occurrence of habitat loss for any individual species. The charts reveal a consistent effort to maintain and enhance the existing or without project habitat types represented by the nine different species.

Colonel Michael R. Morrow 8.

Table 2: Net AAHU's With Project

Site Name	AAHU's Without Project	AAHU's With Project	Net AAHU's
Cahokia Mounds	802.08	1651.3	849.22
Judy's/Burdick Branches	51.96	1203.92	1151.96
Elm Slough	341.69	1086.44	744.75
Dobrey Slough	8.66	94.56	85.9
Mullens Slough	490.91	1365.76	874.85
Old Cahokia Creek	121.63	323.49	201.86
Brushy Lake	471.02	1393.69	922.67
Spring Lake	1388.86	3954.34	2565.48
Wedgewood	134.15	419.48	285.33

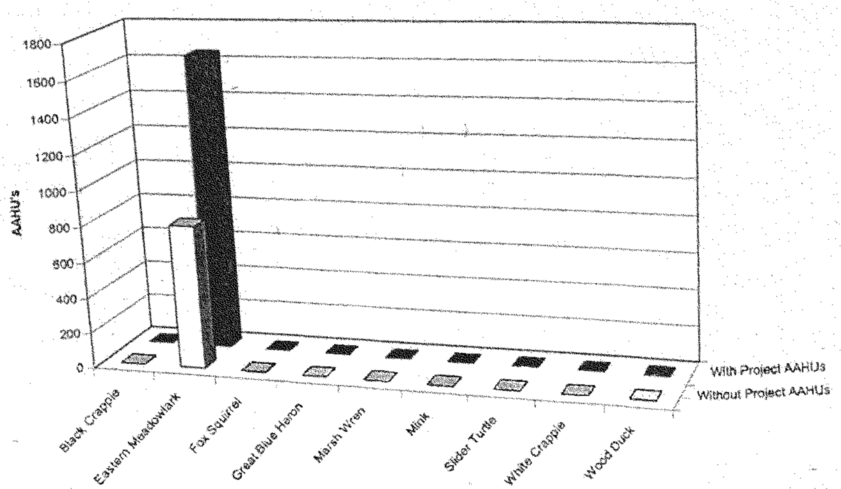

Chart 2: Cahokia Mounds

Cahokia Mounds habitat area is located on the Cahokia Mounds State Historic Site, in the floodplain of Madison and St. Clair Counties. This habitat area is not directly connected to any upland streams so there is no associated upland work. The selected alternative will, over a 10-year time period, restore a total of 525 acres of high quality tall grass prairie in areas currently used for hay production. The alternative that produced the greatest number of AAHU's would have completed the conversion from hay to prairie in just a 5-year period. A 10-year plan was selected due to seed availability and cost. The AAHU chart indicates this area will provide quality habitat for prairie dwelling species like the Eastern meadowlark.

Colonel Michael R. Morrow

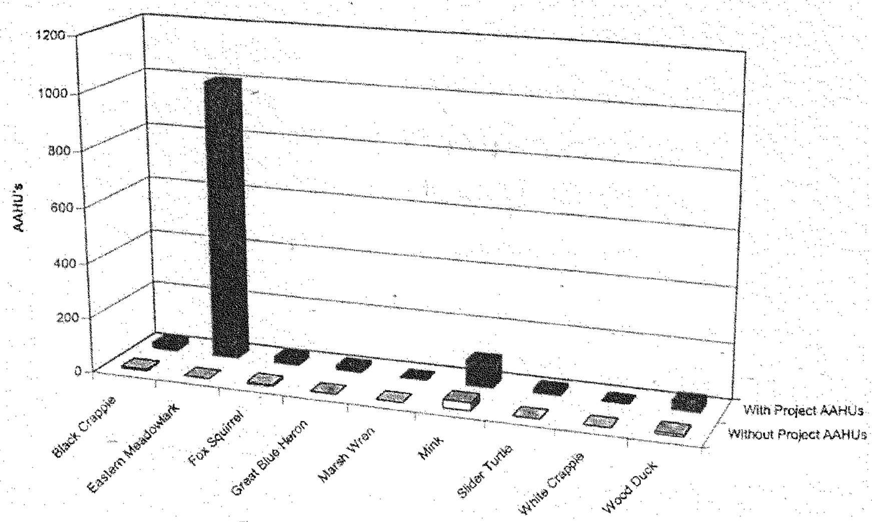

Chart 3: Judy's/Burdick's Branches

This habitat area is in Madison County at the confluence of Judy's Branch, Burdick's Branch, and the Cahokia Canal. The watersheds of Judy's Branch, Burdick's Branch, and a portion of the "Bluff 1" tributary comprise the upland stream work area. The selected alternative produced the greatest number of AAHU's and will result in a 350-acre habitat area, including wet prairie habitats and a restored stream.

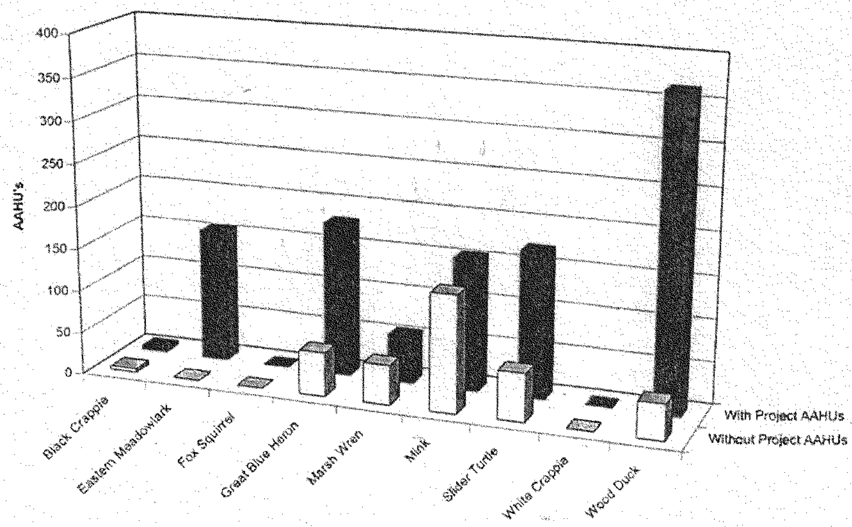

Chart 4: Elm Slough

Elm Slough is northwest of Horseshoe Lake in Madison County. This habitat area is not directly connected to any upland streams so there is no associated upland work. The selected alternative produced the greatest number of AAHU's and will result in a 670-acre habitat area including forested wetlands, scrub-shurb wetlands, and prairie. The AAHU chart indicates this area will provide quality habitats for both wetland and prairie dependent species.

Colonel Michael R. Morrow 13.

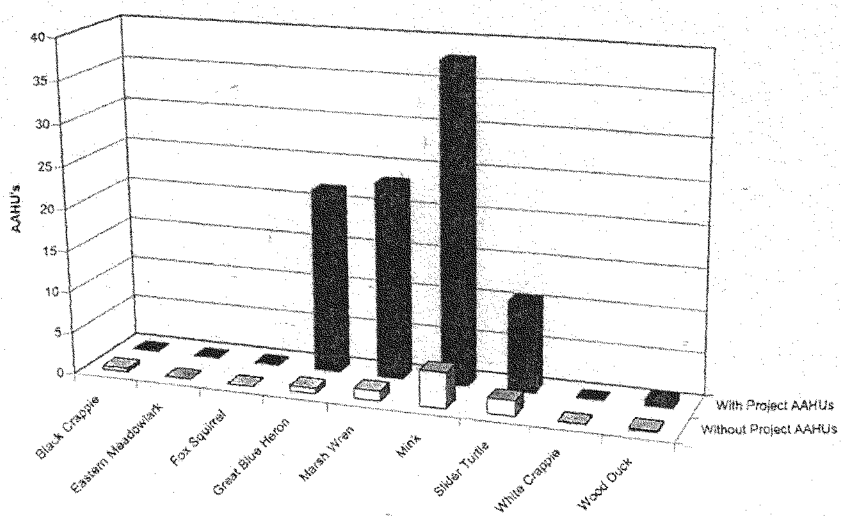

Chart 5: Dobrey Slough

Dobrey Slough is north of Horseshoe Lake in Madison County. This habitat area is not directly connected to any upland streams so there is no associated upland work. The selected alternative produced only two AAHU's less than the highest producing alternative yet was significantly less expensive. This alternative will result in the restoration of herbaceous wetlands and a 75-meter wide forested corridor along the existing slough. The AAHU chart indicates this alternative will greatly increase the quality and quantity of habitat for wetland dependent species.

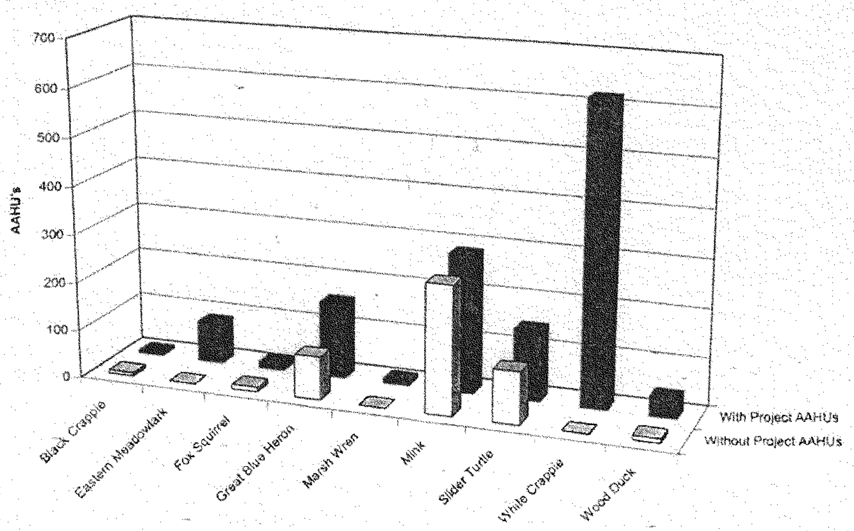

Chart 6: Mullens Slough

Mullens Slough is in the southeast corner of the American Bottoms, near Centreville. The Powdermill and "Bluff 6" watersheds comprise the upland stream work area. The selected alternative produced the greatest number of AAHU's and will result in a 310-acre total habitat area, this includes the existing 205-acre Mullens Slough. In addition to increasing the size of the area, habitat quality will be improved. The AAHU chart indicates this alternative will greatly increase quality open water habitat for species like the white crappie.

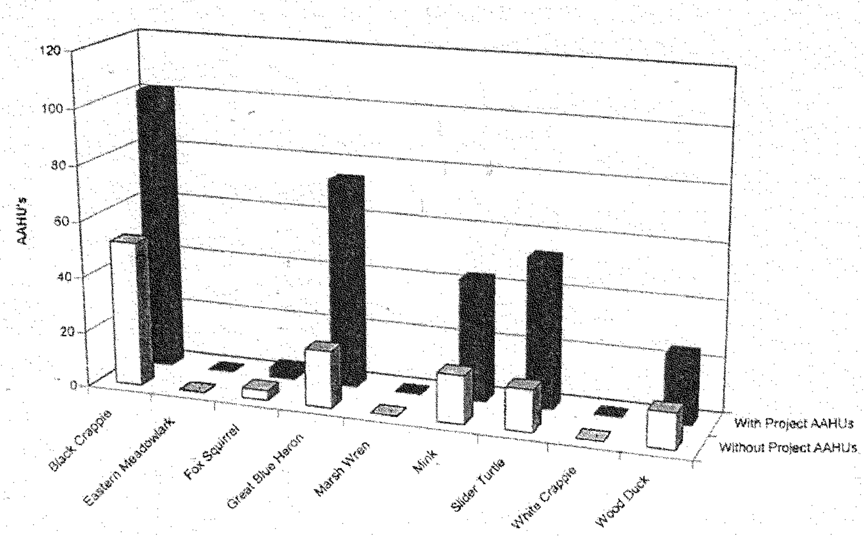

Chart 7: Old Cahokia Creek

Old Cahokia Creek is in Madison County and consists of remnants of the historic Cahokia Creek and its adjacent floodplain. The "Bluff 1" watershed comprises the upland stream work area. The alternative that produced the greatest number of AAHU's was not selected due to the need to install a pumping station to bring water into the floodplain from the other side of the levee. It was decided this alternative was not viable due to public opinion regarding pumping water back over the levee and the added cost of pumping. The selected alternative does not require any mechanical pumping and will result in 2.9 miles of channel restoration with a 100-meter wide forested corridor. The AAHU chart indicates this alternative will produce quality stream habitat for species like the black crappie, slider turtle, mink, and great blue heron.

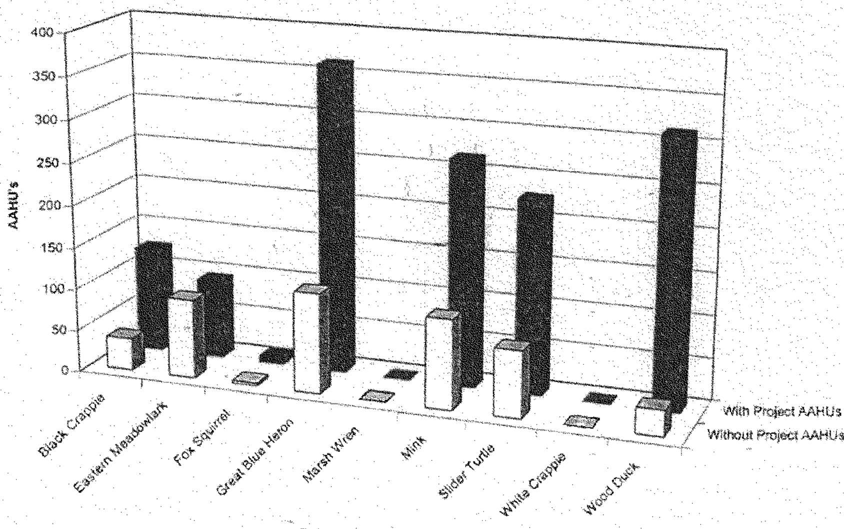

Chart 8: Brushy Lake

Brushy Lake is in Madison County, east of Horseshoe Lake. The Schoolhouse Branch and Snyder Ditch watersheds comprise the upland stream work area. The selected alternative produced the greatest amount of AAHU's and will result in a 710-acre habitat area including a restored channel and forested wetlands. The AAHU chart indicates this alternative will produce quality forested wetland habitat and stream habitats for a variety of species.

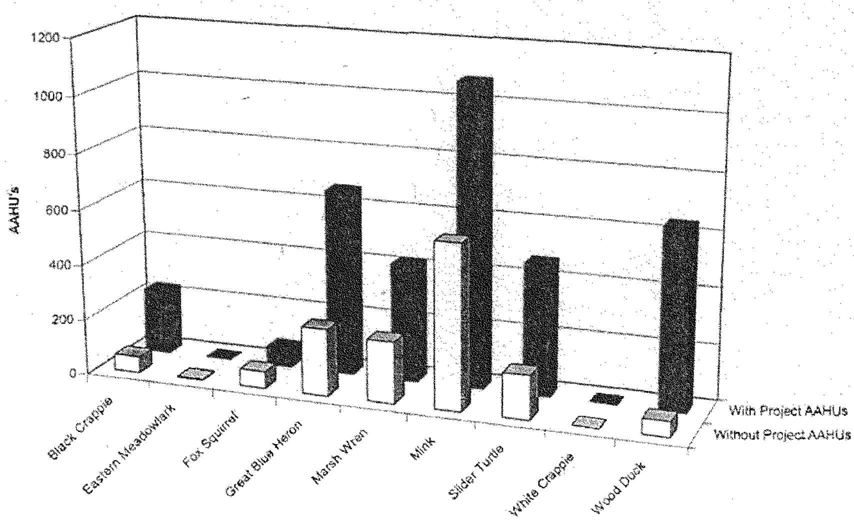

Chart 9: Spring Lake

The Spring Lake habitat area is located in both Madison and St. Clair Counties and is made of three separate areas: Cell One, St. Clair Farms, and Indian Lake. The watersheds of Canteen Creek and Little Canteen Creek comprise the upland stream work area. The alternative that produced the greatest number of AAHU's was not selected due to new information regarding the predicted effectiveness of the upland stream work in reducing sedimentation. Upon further investigation it was determined that work in the uplands will not eliminate all sediment transport to the bottoms. In light of this, an alternative was selected that would allow for accumulating sediment to be periodically cleaned out of the channel in the habitat area. The selected alternative will result in 370 acres in Cell 1, 180 acres in St. Clair Farms, and 620 acres in Indian Lake. These three areas will be predominantly herbaceous and forested wetlands. The AAHU chart indicates this alternative will produce quality habitats for all species associated with marshes.

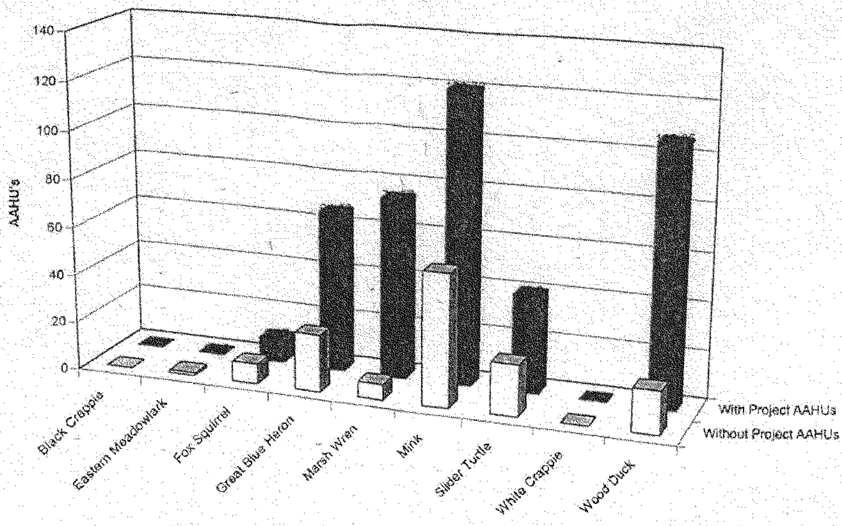

Chart 10: Wedgewood

Wedgewood is in East St. Louis, St. Clair County. The watershed of Schoenberger Creek comprises the upland stream work area. The selected alternative produced the greatest number of AAHU's and will result in a large herbaceous wetland restoration area.

Fish and Wildlife Impacts and Mitigation

After engineering plans for each habitat area and the upland stream work are completed, the number of acres and types of any wetlands that may be negatively impacted should be calculated. If wetlands or other important habitat areas are adversely affected, a mitigation plan should then be developed to address these impacts. Emergent wetlands should be replaced at a 1.5 to 1.0 ratio and forested wetlands should be replaced at a minimum of 2.0 to 1.0 ratio. Emergent wetlands may be allowed to naturally regenerate. Native tree species, including hard mast producing trees, should be planted to compensate for impacts to bottomland forests.

Surveys for the decurrent false aster (*Boltonia decurrens*) should be conducted prior to construction activities. If impacted by the construction, this species should be reestablished in suitable wetland sites.

Conclusions

The proposed project represents an ambitious effort by various agencies to address resource concerns in the American Bottoms. As proposed this project will result in significant habitat gains for a variety of species. Restoration of wetlands will not only provide valuable wildlife habitat, but it will improve flood storage, groundwater recharge, sediment control/erosion reduction, and pollution control. The Service fully supports measures to reduce upland stream erosion and degradation. The benefits of these measures to fish and wildlife resources is difficult to measure with existing evaluation techniques. Overall, project features in the upland areas will improve water quality and ensure protection of the riparian corridor. The Service applauds the Corps and project sponsors for selecting alternatives that truly reflect an ecosystem restoration initiative.

Recommendations

Results from the Habitat Evaluation Analysis predict the proposed plans for restoration of the nine habitat areas in the floodplain will be beneficial to a wide variety of wildlife. However, plans for the associated upland stream work are not as fully developed as the floodplain habitat areas. Successful development of high quality habitats in several of the habitat areas is dependent on reduction of sediment loads coming from the upland streams. A variety of stream restoration/stabilization measures should be evaluated and implemented to reduce sediment transport into the American Bottoms. Such efforts should not only utilize dry detention basins, where appropriate, but include bioengineering techniques to reduce stream bank erosion.

The Service also recommends establishing the decurrent false aster (*Boltonia decurrens*) in all appropriate wet prairie sites.

Colonel Michael R. Morrow 20

Thank you for the opportunity to provide this Draft Fish and Wildlife Coordination Act Report. Please contact this office should you have any questions or require additional information.

Sincerely,

Joyce A. Collins
Assistant Field Supervisor

cc: IDNR (Stuewe, Malone, Messinger, Tecic)
NRCS (Harryman, Starr)
USEPA (White)

Illinois Department of Agriculture George H. Ryan, Governor • Joe Hampton, Director

Bureau of Land and Water Resources
State Fairgrounds • P.O. Box 19281 • Springfield, IL 62794-9281 • 217/782-6297 • TDD 217/524-6858 • Fax 217/557-0993

December 17, 2001

Mr. Tim George
U.S. Army Corps of Engineers, St. Louis District
CEMVS-PD-A
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: East St. Louis Ecosystem Restoration
St. Clair and Madison Counties, IL
USDA NRCS Form AD-1006
US Army Corps of Engineers, St. Louis District Funds

Dear Mr. George:

In response to your request for completion of the USDA NRCS Form AD-1006 for the above referenced project, enclosed are two copies of the completed form. Also enclosed is a copy of the revised Illinois LESA System for your future reference.

The Illinois Department of Agriculture (IDA) looks forward to providing comments for the project's draft environmental impact statement to determine its potential impacts to agricultural land and its compliance with the Illinois Farmland Preservation Act (505 ILCS 75/1 et seq.). Our analysis also relates to the federal Farmland Protection Policy Act (7 USC 4201 et seq.) that specifies federal actions affecting farmland conversion shall be consistent with state and local programs to protect farmland.

Sincerely,

Steve Frank, Chief
Bureau of Land and Water Resources

SF:TS

Enclosures-3

cc: Director Joe Hampton, IDA
Joan Messina, IDA
Mike Williams, IDA
Anita Kratochvil, IDA
John Herath, IDA
Warren Goetsch, IDA

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

(36)

PART I *(To be completed by Federal Agency)* — Date Of Land Evaluation Request: July 11, 2001

Name Of Project: East St. Louis Ecosystem Restoration — Federal Agency Involved: St. Louis Dist., US Army COE

Proposed Land Use: Fish & Wildlife Habitat — County And State: Madison & St. Clair, Illinois

PART II *(To be completed by SCS)* — Date Request Received By SCS: 7-19-01

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply — do not complete additional parts of this form).* Yes: X No: ☐ — Acres Irrigated: — Average Farm Size: 372

Major Crop(s): Corn, Soybeans, Wheat, Hay — Farmable Land In Govt. Jurisdiction: Acres: 29,633,500 %97 — Amount Of Farmland As Defined in FPPA: Acres: 27,695,900 %91

Name Of Land Evaluation System Used: Illinois — Name Of Local Site Assessment System: Statewide — Date Land Evaluation Returned By SCS: 7-25-01

	Maximum Points	Site A	Site B	Site C	Site D
PART III *(To be completed by Federal Agency)*					
A. Total Acres To Be Converted Directly		3,874.			
B. Total Acres To Be Converted Indirectly		27.			
C. Total Acres In Site		3,901.			
PART IV *(To be completed by SCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		2,380.5			
B. Total Acres Statewide And Local Important Farmland		72.5			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		0.014			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		11.8			
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*		51.0			
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b))*					
1. Area In Nonurban Use		(See attached ILLINOIS LESA Site Assessment factors)			
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS *200	~~160~~				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	51			
Total Site Assessment *(From Part VI above or a local site assessment)* *200	~~160~~	70			
TOTAL POINTS *(Total of above 2 lines)* *300	~~260~~	121			

Site Selected: — Date Of Selection: — Was A Local Site Assessment Used? Yes ☐ No X

Reason For Selection:

*When using the Illinois Site Assesment Factors, 200 Points assigned to the Site Assessment section of the LESA System for a maximum score of 300 Points.

(See Instructions on reverse side) — Form AD-1006 (10-83)

East St. Louis Ecosystem Restoration
St. Clair and Madison Counties, Illinois
U.S. Army Corps of Engineers, St. Louis District

PART VI-A Illinois Site Assessment Criteria	Maximum Points	Site A
1. Land Use on the Site	20	10
2. Adjacent Land Use	20	12
3. General Character of Area Within 1½ Miles of Site	20	5
4. Distance to City	20	8
5. Zoned Use of Proposed Site	20	10
6. Zoned Use of Land Adjacent to Proposed Site	20	10
7. Planned Land Use of Proposed Site	20	0
8. Compatibility of Proposed Use with Surrounding Land Uses	20	0
9. Alternative Sites Proposed on Less Productive Land	10	0
10. Availability of Central Water System	10	4
11. Availability of Central Waste Disposal System (Sewer)	10	6
12. Transportation	10	5
TOTAL SITE ASSESSMENT POINTS	**200**	**70**

PART VII		
Relative Value of Farmland	100	51
Total Site Assessment	200	70
TOTAL ILLINOIS LESA POINTS	**300**	**121**

121301
ts

APPENDIX K – MCACES COST ESTIMATE, SCHEDULE, AND RECREATION PLAN JUSTIFICATION

EAST ST. LOUIS and VICINITY, IL
REEVALUATION REPORT
ECOSYSTEM RESTORATION AND FLOOD
DAMAGE REDUCTION PROJECT

Designed By: ST. LOUIS DISTRICT, COE
Estimated By: ST. LOUIS DISTRICT, COE

Prepared By: GREGORY DYN, CCET

Preparation Date: 10/15/03
Effective Date of Pricing: 10/01/03

Sales Tax: 0.0%

There are eight major action areas considered for this estimate. This plan was selected from various alternatives during the formulation process. Due to the large number of alternatives and the many variables that had to be considered for differing site conditions, cost curves were developed for pricing of specific construction items. Some of these cost curves will be utilized for pricing specific items in this estimate and will be noted as such.

SUMMARY REPORTS SUMMARY PAGE

DETAILED ESTIMATE DETAIL PAGE

Withdrawn
Available
as pdf.

DETAILED ESTIMATE DETAIL PAGE

Thu 30 Oct 2003
Eff. Date 10/01/03
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BACKUP REPORTS BACKUP PAGE

* * * END TABLE OF CONTENTS * * *

Thu 30 Oct 2003 Tri-Service Automated Cost Engineering System (TRACES) TIME 15:13:38
Eff. Date 10/01/03 PROJECT ESLREV: EAST ST. LOUIS and VICINITY, IL - REEVALUATION REPORT
SUMMARY PAGE 1

** PROJECT OWNER SUMMARY - Level 1 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 Lands and Damages		23,568,400	4,444,000	28,012,400	
02 Relocations		4,956,000	1,239,000	6,195,000	
06 Fish and Wildlife Facilities		95,823,100	22307200	118,130,300	
14 Recreation Facilities		206,400	51,600	258,000	
30 Planning, Engineering, & Design		22,363,300	2,235,100	24,598,400	
31 Construction Management		10,976,500	1,095,500	12,072,000	
TOTAL EAST ST. LOUIS and VICINITY, IL		157,893,700	31372400	189,266,100	

Reevaluation Report with Intregated Environmental Impact Statement

LABOR ID: ESLIFC EQUIP ID: NAT99A Currency in DOLLARS CREW ID: NAT99A UPB ID: UP99EA

** PROJECT OWNER SUMMARY - Level 2 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 Lands and Damages					
01 01 Old Cahokia, 2A-1-(0)-X		1,661,800	296,500	1,958,300	
01 02 Judy's/Burdick, 3A-4-(0)		3,667,000	702,100	4,369,100	
01 03 Brushy Lake, 4A-3-(0)		3,854,200	846,700	4,700,900	
01 04 Spring Lake, 1B-3-X		7,168,200	1,138,700	8,306,900	
01 06 Mullens Slough, 7A-2		1,597,000	218,600	1,815,600	
01 07 Dobrey Slough, 5A-Y		897,400	162,700	1,060,100	
01 08 Elm Slough, 6A-2		2,693,000	573,400	3,266,400	
01 09 Cahokia Mounds, 8-1-H		2,029,800	505,300	2,535,100	
TOTAL Lands and Damages		23,568,400	4,444,000	28,012,400	
02 Relocations					
02 04 Spring Lake, 1B-3-X		4,357,200	1,089,300	5,446,600	
02 10 Misc. Utility Relocations		598,800	149,700	748,500	
TOTAL Relocations		4,956,000	1,239,000	6,195,000	
06 Fish and Wildlife Facilities					
06 01 Stream Restoration		43,368,700	10599000	53,967,700	
06 02 Habitat Facilities		52,454,400	11708200	64,162,700	
TOTAL Fish and Wildlife Facilities		95,823,100	22307200	118,130,300	
14 Recreation Facilities					
14 01 Old Cahokia, 2A-1-(0)-X		206,400	51,600	258,000	
TOTAL Recreation Facilities		206,400	51,600	258,000	
30 Planning, Engineering, & Design					
30 00 Engineering Analysis		828,000	82,000	910,000	
30 01 Old Cahokia, 2A-1-(0)-X		2,327,700	232,000	2,559,700	
30 02 Judy's/Burdick, 3A-4-(0)		2,581,000	259,000	2,840,000	
30 03 Brushy Lake, 4A-3-(0)		2,562,000	256,300	2,818,300	
30 04 Spring Lake, 1B-3-X		8,012,000	802,000	8,814,000	
30 06 Mullens Slough, 7A-2		2,998,000	299,900	3,297,900	
30 07 Dobrey Slough, 5A-Y		1,009,300	99,600	1,108,900	
30 08 Elm Slough, 6A-2		1,004,000	99,500	1,103,500	
30 09 Cahokia Mounds, 8-1-H		451,300	44,800	496,100	
30 10 Project Close-Out		590,000	60,000	650,000	

** PROJECT OWNER SUMMARY - Level 2 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
TOTAL Planning, Engineering, & Design		22,363,300	2,235,100	24,598,400	
31 Construction Management					
31 01 Old Cahokia, 2A-1-(0)-X		750,000	75,000	825,000	
31 02 Judy's/Burdick, 3A-4-(0)		1,352,000	135,000	1,487,000	
31 03 Brushy Lake, 4A-3-(0)		944,000	94,000	1,038,000	
31 04 Spring Lake, 1B-3-X		6,118,000	611,000	6,729,000	
31 06 Mullens Slough, 7A-2		925,000	92,000	1,017,000	
31 07 Dobrey Slough, 5A-Y		207,000	21,000	228,000	
31 08 Elm Slough, 6A-2		510,000	51,000	561,000	
31 09 Cahokia Mounds, 8-1-H		170,500	16,500	187,000	
TOTAL Construction Management		10,976,500	1,095,500	12,072,000	
TOTAL EAST ST. LOUIS and VICINITY, IL		157,893,700	31372400	189,266,100	

** PROJECT OWNER SUMMARY - Level 3 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 Lands and Damages					
01 01 Old Cahokia, 2A-1-(0)-X					
01 01 1 Land Value		1,078,000	269,500	1,347,500	
01 01 2 Severance Damages		107,800	27,000	134,800	
01 01 3 Aquisition Costs		448,000	0	448,000	
01 01 4 Relocation Assistance		28,000	0	28,000	
TOTAL Old Cahokia, 2A-1-(0)-X		1,661,800	296,500	1,958,300	
01 02 Judy's/Burdick, 3A-4-(0)					
01 02 1 Land Value		2,553,200	638,300	3,191,500	
01 02 2 Severance Damages		255,300	63,800	319,100	
01 02 3 Aquisition Costs		808,000	0	808,000	
01 02 4 Relocation Assistance		50,500	0	50,500	
TOTAL Judy's/Burdick, 3A-4-(0)		3,667,000	702,100	4,369,100	
01 03 Brushy Lake, 4A-3-(0)					
01 03 1 Land Value		3,078,800	769,700	3,848,500	
01 03 2 Severance Damages		307,900	77,000	384,900	
01 03 3 Aquisition Costs		440,000	0	440,000	
01 03 4 Relocation Assistance		27,500	0	27,500	
TOTAL Brushy Lake, 4A-3-(0)		3,854,200	846,700	4,700,900	
01 04 Spring Lake, 1B-3-X					
01 04 1 Land Value		4,140,600	1,035,200	5,175,800	
01 04 2 Severance Damages		414,100	103,500	517,600	
01 04 3 Aquisition Costs		2,248,000	0	2,248,000	
01 04 4 Relocation Assistance		365,500	0	365,500	
TOTAL Spring Lake, 1B-3-X		7,168,200	1,138,700	8,306,900	
01 06 Mullens Slough, 7A-2					
01 06 1 Land Value		795,000	198,800	993,800	
01 06 2 Severance Damages		79,500	19,900	99,400	
01 06 3 Aquisition Costs		680,000	0	680,000	
01 06 4 Relocation Assistance		42,500	0	42,500	
TOTAL Mullens Slough, 7A-2		1,597,000	218,600	1,815,600	

** PROJECT OWNER SUMMARY - Level 3 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 07 Dobrey Slough, 5A-Y					
01 07 1 Land Value		591,700	147,900	739,600	
01 07 2 Severance Damages		59,200	14,800	74,000	
01 07 3 Aquisition Costs		232,000	0	232,000	
01 07 4 Relocation Assistance		14,500	0	14,500	
TOTAL Dobrey Slough, 5A-Y		897,400	162,700	1,060,100	
01 08 Elm Slough, 6A-2					
01 08 1 Land Value		2,085,000	521,300	2,606,300	
01 08 2 Severance Damages		208,500	52,100	260,600	
01 08 3 Aquisition Costs		376,000	0	376,000	
01 08 4 Relocation Assistance		23,500	0	23,500	
TOTAL Elm Slough, 6A-2		2,693,000	573,400	3,266,400	
01 09 Cahokia Mounds, 8-1-H					
01 09 1 Land Value		1,837,500	459,400	2,296,900	
01 09 2 Damages to the Remainder		183,800	46,000	229,800	
01 09 3 Aquisition Costs		8,000	0	8,000	
01 09 4 Relocation Assistance		500	0	500	
TOTAL Cahokia Mounds, 8-1-H		2,029,800	505,300	2,535,100	
TOTAL Lands and Damages		23,568,400	4,444,000	28,012,400	
02 Relocations					
02 04 Spring Lake, 1B-3-X					
02 04 1 Mobilization and Demobilization		215,600	53,900	269,500	
02 04 2 Bridge Replacement		2,265,000	566,200	2,831,200	
02 04 3 New Bridges		1,876,700	469,200	2,345,900	
TOTAL Spring Lake, 1B-3-X		4,357,200	1,089,300	5,446,600	
02 10 Misc. Utility Relocations					
02 10 1 Utility Relocations/Alterations	20.00 EA	598,800	149,700	748,500	37424
TOTAL Misc. Utility Relocations		598,800	149,700	748,500	
TOTAL Relocations		4,956,000	1,239,000	6,195,000	

** PROJECT OWNER SUMMARY - Level 3 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
06 Fish and Wildlife Facilities						
06 01 Stream Restoration						
06 01 04 Dams			30,905,100	7,483,100	38,388,200	
06 01 16 Bank Stabilization			12,463,500	3,115,900	15,579,400	
TOTAL Stream Restoration			43,368,700	10599000	53,967,700	
06 02 Habitat Facilities						
06 02 09 Channels and Canals			52,454,400	11708200	64,162,700	
TOTAL Habitat Facilities			52,454,400	11708200	64,162,700	
TOTAL Fish and Wildlife Facilities			95,823,100	22307200	118,130,300	
14 Recreation Facilities						
14 01 Old Cahokia, 2A-1-(0)-X						
14 01 1 Bike Trail			206,400	51,600	258,000	
TOTAL Old Cahokia, 2A-1-(0)-X			206,400	51,600	258,000	
TOTAL Recreation Facilities			206,400	51,600	258,000	
30 Planning, Engineering, & Design						
30 00 Engineering Analysis						
30 00 1 Flow Model			182,000	18,000	200,000	
30 00 2 Sediment Analysis			145,500	14,500	160,000	
30 00 3 Stream Stabilization			45,500	4,500	50,000	
30 00 4 Geotechnical Analysis			91,000	9,000	100,000	
30 00 5 ED Report			45,500	4,500	50,000	
30 00 6 Mapping			273,000	27,000	300,000	
30 00 7 Project Management			45,500	4,500	50,000	
TOTAL Engineering Analysis			828,000	82,000	910,000	
30 01 Old Cahokia, 2A-1-(0)-X						
30 01 1 Engineering Design Report (EDR)			696,000	69,000	765,000	
30 01 2 Plans and Specs			1,300,000	130,000	1,430,000	
30 01 3 Engineering During Const. (EDC)			149,700	15,000	164,700	

** PROJECT OWNER SUMMARY - Level 3 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
30 01 4 Project Management		182,000	18,000	200,000	
TOTAL Old Cahokia, 2A-1-(0)-X		2,327,700	232,000	2,559,700	
30 02 Judy's/Burdick, 3A-4-(0)					
30 02 1 Engineering Design Report (EDR)		768,000	77,000	845,000	
30 02 2 Plans and Specs		1,345,000	135,000	1,480,000	
30 02 3 Engineering During Const. (EDC)		286,000	29,000	315,000	
30 02 4 Project Management		182,000	18,000	200,000	
TOTAL Judy's/Burdick, 3A-4-(0)		2,581,000	259,000	2,840,000	
30 03 Brushy Lake, 4A-3-(0)					
30 03 1 Engineering Design Report (EDR)		777,000	78,000	855,000	
30 03 2 Plans and Specs		1,409,000	141,000	1,550,000	
30 03 3 Engineering During Const. (EDC)		194,000	19,300	213,300	
30 03 4 Project Management		182,000	18,000	200,000	
TOTAL Brushy Lake, 4A-3-(0)		2,562,000	256,300	2,818,300	
30 04 Spring Lake, 1B-3-X					
30 04 1 Engineering Design Report (EDR)		2,141,000	214,000	2,355,000	
30 04 2 Plans and Specs		4,113,000	412,000	4,525,000	
30 04 3 Engineering During Const. (EDC)		1,349,000	135,000	1,484,000	
30 04 4 Project Management		409,000	41,000	450,000	
TOTAL Spring Lake, 1B-3-X		8,012,000	802,000	8,814,000	
30 06 Mullens Slough, 7A-2					
30 06 1 Engineering Design Report (EDR)		1,068,000	107,000	1,175,000	
30 06 2 Plans and Specs		1,559,000	156,000	1,715,000	
30 06 3 Engineering During Const. (EDC)		189,000	18,900	207,900	
30 06 4 Project Management		182,000	18,000	200,000	
TOTAL Mullens Slough, 7A-2		2,998,000	299,900	3,297,900	
30 07 Dobrey Slough, 5A-Y					
30 07 1 Engineering Design Report (EDR)		445,000	45,000	490,000	
30 07 2 Plans and Specs		356,000	34,000	390,000	
30 07 3 Engineering During Const. (EDC)		26,300	2,600	28,900	

** PROJECT OWNER SUMMARY - Level 3 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
30 07 4 Project Management		182,000	18,000	200,000	
TOTAL Dobrey Slough, 5A-Y		1,009,300	99,600	1,108,900	
30 08 Elm Slough, 6A-2					
30 08 1 Engineering Design Report (EDR)		491,000	49,000	540,000	
30 08 2 Plans and Specs		323,000	32,000	355,000	
30 08 3 Engineering During Const. (EDC)		85,000	8,500	93,500	
30 08 4 Project Management		105,000	10,000	115,000	
TOTAL Elm Slough, 6A-2		1,004,000	99,500	1,103,500	
30 09 Cahokia Mounds, 8-1-H					
30 09 1 Engineering Design Report (EDR)		164,000	16,000	180,000	
30 09 2 Plans and Specs		168,000	17,000	185,000	
30 09 3 Engineering During Const. (EDC)		28,300	2,800	31,100	
30 09 4 Project Management		91,000	9,000	100,000	
TOTAL Cahokia Mounds, 8-1-H		451,300	44,800	496,100	
30 10 Project Close-Out					
30 10 1 Audit		136,000	14,000	150,000	
30 10 2 Finalize EDD		227,000	23,000	250,000	
30 10 3 Project Management		227,000	23,000	250,000	
TOTAL Project Close-Out		590,000	60,000	650,000	
TOTAL Planning, Engineering, & Design		22,363,300	2,235,100	24,598,400	
31 Construction Management					
31 01 Old Cahokia, 2A-1-(0)-X					
31 01 1 Construction Management		659,000	66,000	725,000	
31 01 4 Project Management		91,000	9,000	100,000	
TOTAL Old Cahokia, 2A-1-(0)-X		750,000	75,000	825,000	
31 02 Judy's/Burdick, 3A-4-(0)					
31 02 1 Construction Management		1,261,000	126,000	1,387,000	
31 02 4 Project Management		91,000	9,000	100,000	

** PROJECT OWNER SUMMARY - Level 3 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
TOTAL Judy's/Burdick, 3A-4-(0)		1,352,000	135,000	1,487,000	
31 03 Brushy Lake, 4A-3-(0)					
31 03 1 Construction Management		853,000	85,000	938,000	
31 03 4 Project Management		91,000	9,000	100,000	
TOTAL Brushy Lake, 4A-3-(0)		944,000	94,000	1,038,000	
31 04 Spring Lake, 1B-3-X					
31 04 1 Construction Management		5,936,000	593,000	6,529,000	
31 04 4 Project Management		182,000	18,000	200,000	
TOTAL Spring Lake, 1B-3-X		6,118,000	611,000	6,729,000	
31 06 Mullens Slough, 7A-2					
31 06 1 Construction Management		834,000	83,000	917,000	
31 06 4 Project Management		91,000	9,000	100,000	
TOTAL Mullens Slough, 7A-2		925,000	92,000	1,017,000	
31 07 Dobrey Slough, 5A-Y					
31 07 1 Construction Management		116,000	12,000	128,000	
31 07 4 Project Management		91,000	9,000	100,000	
TOTAL Dobrey Slough, 5A-Y		207,000	21,000	228,000	
31 08 Elm Slough, 6A-2					
31 08 1 Construction Management		374,000	37,000	411,000	
31 08 4 Project Management		136,000	14,000	150,000	
TOTAL Elm Slough, 6A-2		510,000	51,000	561,000	
31 09 Cahokia Mounds, 8-1-H					
31 09 1 Construction Management		125,000	12,000	137,000	
31 09 4 Project Management		45,500	4,500	50,000	
TOTAL Cahokia Mounds, 8-1-H		170,500	16,500	187,000	

** PROJECT OWNER SUMMARY - Level 3 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
TOTAL Construction Management		10,976,500	1,095,500	12,072,000	
TOTAL EAST ST. LOUIS and VICINITY, IL		157,893,700	31372400	189,266,100	

** PROJECT OWNER SUMMARY - Level 4 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 Lands and Damages					
01 01 Old Cahokia, 2A-1-(0)-X					
01 01 1 Land Value		1,078,000	269,500	1,347,500	
01 01 2 Severance Damages		107,800	27,000	134,800	
01 01 3 Aquisition Costs		448,000	0	448,000	
01 01 4 Relocation Assistance		28,000	0	28,000	
TOTAL Old Cahokia, 2A-1-(0)-X		1,661,800	296,500	1,958,300	
01 02 Judy's/Burdick, 3A-4-(0)					
01 02 1 Land Value		2,553,200	638,300	3,191,500	
01 02 2 Severance Damages		255,300	63,800	319,100	
01 02 3 Aquisition Costs		808,000	0	808,000	
01 02 4 Relocation Assistance		50,500	0	50,500	
TOTAL Judy's/Burdick, 3A-4-(0)		3,667,000	702,100	4,369,100	
01 03 Brushy Lake, 4A-3-(0)					
01 03 1 Land Value		3,078,800	769,700	3,848,500	
01 03 2 Severance Damages		307,900	77,000	384,900	
01 03 3 Aquisition Costs		440,000	0	440,000	
01 03 4 Relocation Assistance		27,500	0	27,500	
TOTAL Brushy Lake, 4A-3-(0)		3,854,200	846,700	4,700,900	
01 04 Spring Lake, 1B-3-X					
01 04 1 Land Value		4,140,600	1,035,200	5,175,800	
01 04 2 Severance Damages		414,100	103,500	517,600	
01 04 3 Aquisition Costs		2,248,000	0	2,248,000	
01 04 4 Relocation Assistance		365,500	0	365,500	
TOTAL Spring Lake, 1B-3-X		7,168,200	1,138,700	8,306,900	
01 06 Mullens Slough, 7A-2					
01 06 1 Land Value		795,000	198,800	993,800	
01 06 2 Severance Damages		79,500	19,900	99,400	
01 06 3 Aquisition Costs		680,000	0	680,000	
01 06 4 Relocation Assistance		42,500	0	42,500	
TOTAL Mullens Slough, 7A-2		1,597,000	218,600	1,815,600	

** PROJECT OWNER SUMMARY - Level 4 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 07 Dobrey Slough, 5A-Y					
01 07 1 Land Value		591,700	147,900	739,600	
01 07 2 Severance Damages		59,200	14,800	74,000	
01 07 3 Aquisition Costs		232,000	0	232,000	
01 07 4 Relocation Assistance		14,500	0	14,500	
TOTAL Dobrey Slough, 5A-Y		897,400	162,700	1,060,100	
01 08 Elm Slough, 6A-2					
01 08 1 Land Value		2,085,000	521,300	2,606,300	
01 08 2 Severance Damages		208,500	52,100	260,600	
01 08 3 Aquisition Costs		376,000	0	376,000	
01 08 4 Relocation Assistance		23,500	0	23,500	
TOTAL Elm Slough, 6A-2		2,693,000	573,400	3,266,400	
01 09 Cahokia Mounds, 8-1-H					
01 09 1 Land Value		1,837,500	459,400	2,296,900	
01 09 2 Damages to the Remainder		183,800	46,000	229,800	
01 09 3 Aquisition Costs		8,000	0	8,000	
01 09 4 Relocation Assistance		500	0	500	
TOTAL Cahokia Mounds, 8-1-H		2,029,800	505,300	2,535,100	
TOTAL Lands and Damages		23,568,400	4,444,000	28,012,400	
02 Relocations					
02 04 Spring Lake, 1B-3-X					
02 04 1 Mobilization and Demobilization		215,600	53,900	269,500	
TOTAL Mobilization and Demobilization		215,600	53,900	269,500	
02 04 2 Bridge Replacement					
02 04 2 1 Highway 157	3800.00 SF	568,800	142,200	711,100	187.12
02 04 2 2 CSX Railroad	3000.00 SF	449,100	112,300	561,400	187.12
02 04 2 3 Black Lane	8900.00 SF	1,247,000	311,800	1,558,800	175.14
TOTAL Bridge Replacement		2,265,000	566,200	2,831,200	
02 04 3 New Bridges					

** PROJECT OWNER SUMMARY - Level 4 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
02 04 3 1 Forest Blvd.	2200.00	SF	308,300	77,100	385,300	175.14
02 04 3 2 Maryland Ave	2200.00	SF	308,300	77,100	385,300	175.14
02 04 3 3 Highway 111	2200.00	SF	329,300	82,300	411,700	187.12
02 04 3 4 North 51st Street	2200.00	SF	308,300	77,100	385,300	175.14
02 04 3 5 Collinsville Road	2200.00	SF	308,300	77,100	385,300	175.14
02 04 3 6 Penn. Central Railroad	2100.00	SF	314,400	78,600	393,000	187.12
TOTAL New Bridges			1,876,700	469,200	2,345,900	
TOTAL Spring Lake, 1B-3-X			4,357,200	1,089,300	5,446,600	
02 10 Misc. Utility Relocations						
02 10 1 Utility Relocations/Alterations	20.00	EA	598,800	149,700	748,500	37424
TOTAL Misc. Utility Relocations			598,800	149,700	748,500	
TOTAL Relocations			4,956,000	1,239,000	6,195,000	
06 Fish and Wildlife Facilities						
06 01 Stream Restoration						
06 01 04 Dams						
06 01 04 01 Old Cahokia, 2A-1-(0)-X			1,895,800	460,400	2,356,200	
06 01 04 02 Judy's/Burdick, 3A-4-(0)			6,699,500	1,618,900	8,318,300	
06 01 04 03 Brushy Lake, 4A-3-(0)			3,709,300	897,700	4,607,000	
06 01 04 04 Spring Lake, 1B-3-X			14,033,700	3,398,700	17,432,500	
06 01 04 06 Mullens Slough, 7A-2			4,566,900	1,107,400	5,674,300	
TOTAL Dams			30,905,100	7,483,100	38,388,200	
06 01 16 Bank Stabilization						
06 01 16 01 Old Cahokia, 2A-1-(0)-X			845,300	211,300	1,056,700	
06 01 16 02 Judy's/Burdick, 3A-4-(0)			2,650,500	662,600	3,313,200	
06 01 16 03 Brushy Lake, 4A-3-(0)			1,511,500	377,900	1,889,400	
06 01 16 04 Spring Lake, 1B-3-X			5,559,100	1,389,800	6,948,900	
06 01 16 06 Mullens Slough, 7A-2			1,897,000	474,300	2,371,300	
TOTAL Bank Stabilization			12,463,500	3,115,900	15,579,400	
TOTAL Stream Restoration			43,368,700	10599000	53,967,700	
06 02 Habitat Facilities						

** PROJECT OWNER SUMMARY - Level 4 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
06 02 09 Channels and Canals					
06 02 09 01 Old Cahokia, 2A-1-(0)-X		3,696,300	839,100	4,535,400	
06 02 09 02 Judy's Burdick, 3A-4-(0)		3,296,100	790,800	4,087,000	
06 02 09 03 Brushy Lake, 4A-3-(0)		3,383,200	739,100	4,122,300	
06 02 09 04 Spring lake, 1B-3-X		33,925,500	7,543,100	41,468,500	
06 02 09 06 Mullens Slough, 7A-2		1,915,500	396,600	2,312,000	
06 02 09 07 Dobrey Slough, 5A-Y		1,186,000	244,900	1,430,900	
06 02 09 08 Elm Slough, 6A-2		3,804,500	846,200	4,650,700	
06 02 09 09 Cahokia, Mounds, 8-1-H		1,247,300	308,400	1,555,800	
TOTAL Channels and Canals		52,454,400	11708200	64,162,700	
TOTAL Habitat Facilities		52,454,400	11708200	64,162,700	
TOTAL Fish and Wildlife Facilities		95,823,100	22307200	118,130,300	
14 Recreation Facilities					
14 01 Old Cahokia, 2A-1-(0)-X					
14 01 1 Bike Trail					
14 01 1 1 Mobilization and Demobilization		18,000	4,500	22,500	
14 01 1 2 Geotextile	20800 SY	30,600	7,600	38,200	1.84
14 01 1 3 CA-6 Base Course	18000 SY	114,000	28,500	142,500	7.92
14 01 1 4 Prime Coat	18000 SY	7,100	1,800	8,900	0.49
14 01 1 5 Bituminous Surface Treatment	18000 SY	31,000	7,800	38,800	2.15
14 01 1 6 Striping	16200 LF	3,700	900	4,600	0.29
14 01 1 7 Misc. Signs		2,000	500	2,500	
TOTAL Bike Trail		206,400	51,600	258,000	
TOTAL Old Cahokia, 2A-1-(0)-X		206,400	51,600	258,000	
TOTAL Recreation Facilities		206,400	51,600	258,000	
30 Planning, Engineering, & Design					
30 00 Engineering Analysis					
30 00 1 Flow Model		182,000	18,000	200,000	
30 00 2 Sediment Analysis		145,500	14,500	160,000	
30 00 3 Stream Stabilization		45,500	4,500	50,000	
30 00 4 Geotechnical Analysis		91,000	9,000	100,000	
30 00 5 ED Report		45,500	4,500	50,000	
30 00 6 Mapping		273,000	27,000	300,000	
30 00 7 Project Management		45,500	4,500	50,000	

** PROJECT OWNER SUMMARY - Level 4 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
TOTAL Engineering Analysis		828,000	82,000	910,000	
30 01 Old Cahokia, 2A-1-(0)-X					
30 01 1 Engineering Design Report (EDR)		696,000	69,000	765,000	
30 01 2 Plans and Specs		1,300,000	130,000	1,430,000	
30 01 3 Engineering During Const. (EDC)		149,700	15,000	164,700	
30 01 4 Project Management		182,000	18,000	200,000	
TOTAL Old Cahokia, 2A-1-(0)-X		2,327,700	232,000	2,559,700	
30 02 Judy's/Burdick, 3A-4-(0)					
30 02 1 Engineering Design Report (EDR)		768,000	77,000	845,000	
30 02 2 Plans and Specs		1,345,000	135,000	1,480,000	
30 02 3 Engineering During Const. (EDC)		286,000	29,000	315,000	
30 02 4 Project Management		182,000	18,000	200,000	
TOTAL Judy's/Burdick, 3A-4-(0)		2,581,000	259,000	2,840,000	
30 03 Brushy Lake, 4A-3-(0)					
30 03 1 Engineering Design Report (EDR)		777,000	78,000	855,000	
30 03 2 Plans and Specs		1,409,000	141,000	1,550,000	
30 03 3 Engineering During Const. (EDC)		194,000	19,300	213,300	
30 03 4 Project Management		182,000	18,000	200,000	
TOTAL Brushy Lake, 4A-3-(0)		2,562,000	256,300	2,818,300	
30 04 Spring Lake, 1B-3-X					
30 04 1 Engineering Design Report (EDR)		2,141,000	214,000	2,355,000	
30 04 2 Plans and Specs		4,113,000	412,000	4,525,000	
30 04 3 Engineering During Const. (EDC)		1,349,000	135,000	1,484,000	
30 04 4 Project Management		409,000	41,000	450,000	
TOTAL Spring Lake, 1B-3-X		8,012,000	802,000	8,814,000	
30 06 Mullens Slough, 7A-2					
30 06 1 Engineering Design Report (EDR)		1,068,000	107,000	1,175,000	
30 06 2 Plans and Specs		1,559,000	156,000	1,715,000	
30 06 3 Engineering During Const. (EDC)		189,000	18,900	207,900	
30 06 4 Project Management		182,000	18,000	200,000	
TOTAL Mullens Slough, 7A-2		2,998,000	299,900	3,297,900	

** PROJECT OWNER SUMMARY - Level 4 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
30 07 Dobrey Slough, 5A-Y					
30 07 1 Engineering Design Report (EDR)		445,000	45,000	490,000	
30 07 2 Plans and Specs		356,000	34,000	390,000	
30 07 3 Engineering During Const. (EDC)		26,300	2,600	28,900	
30 07 4 Project Management		182,000	18,000	200,000	
TOTAL Dobrey Slough, 5A-Y		1,009,300	99,600	1,108,900	
30 08 Elm Slough, 6A-2					
30 08 1 Engineering Design Report (EDR)		491,000	49,000	540,000	
30 08 2 Plans and Specs		323,000	32,000	355,000	
30 08 3 Engineering During Const. (EDC)		85,000	8,500	93,500	
30 08 4 Project Management		105,000	10,000	115,000	
TOTAL Elm Slough, 6A-2		1,004,000	99,500	1,103,500	
30 09 Cahokia Mounds, 8-1-H					
30 09 1 Engineering Design Report (EDR)		164,000	16,000	180,000	
30 09 2 Plans and Specs		168,000	17,000	185,000	
30 09 3 Engineering During Const. (EDC)		28,300	2,800	31,100	
30 09 4 Project Management		91,000	9,000	100,000	
TOTAL Cahokia Mounds, 8-1-H		451,300	44,800	496,100	
30 10 Project Close-Out					
30 10 1 Audit		136,000	14,000	150,000	
30 10 2 Finalize EDD		227,000	23,000	250,000	
30 10 3 Project Management		227,000	23,000	250,000	
TOTAL Project Close-Out		590,000	60,000	650,000	
TOTAL Planning, Engineering, & Design		22,363,300	2,235,100	24,598,400	
31 Construction Management					
31 01 Old Cahokia, 2A-1-(0)-X					
31 01 1 Construction Management		659,000	66,000	725,000	
31 01 4 Project Management		91,000	9,000	100,000	
TOTAL Old Cahokia, 2A-1-(0)-X		750,000	75,000	825,000	

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
31 02 Judy's/Burdick, 3A-4-(0)					
31 02 1 Construction Management		1,261,000	126,000	1,387,000	
31 02 4 Project Management		91,000	9,000	100,000	
TOTAL Judy's/Burdick, 3A-4-(0)		1,352,000	135,000	1,487,000	
31 03 Brushy Lake, 4A-3-(0)					
31 03 1 Construction Management		853,000	85,000	938,000	
31 03 4 Project Management		91,000	9,000	100,000	
TOTAL Brushy Lake, 4A-3-(0)		944,000	94,000	1,038,000	
31 04 Spring Lake, 1B-3-X					
31 04 1 Construction Management		5,936,000	593,000	6,529,000	
31 04 4 Project Management		182,000	18,000	200,000	
TOTAL Spring Lake, 1B-3-X		6,118,000	611,000	6,729,000	
31 06 Mullens Slough, 7A-2					
31 06 1 Construction Management		834,000	83,000	917,000	
31 06 4 Project Management		91,000	9,000	100,000	
TOTAL Mullens Slough, 7A-2		925,000	92,000	1,017,000	
31 07 Dobrey Slough, 5A-Y					
31 07 1 Construction Management		116,000	12,000	128,000	
31 07 4 Project Management		91,000	9,000	100,000	
TOTAL Dobrey Slough, 5A-Y		207,000	21,000	228,000	
31 08 Elm Slough, 6A-2					
31 08 1 Construction Management		374,000	37,000	411,000	
31 08 4 Project Management		136,000	14,000	150,000	
TOTAL Elm Slough, 6A-2		510,000	51,000	561,000	
31 09 Cahokia Mounds, 8-1-H					
31 09 1 Construction Management		125,000	12,000	137,000	

** PROJECT OWNER SUMMARY - Level 4 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
31 09 4 Project Management		45,500	4,500	50,000	
TOTAL Cahokia Mounds, 8-1-H		170,500	16,500	187,000	
TOTAL Construction Management		10,976,500	1,095,500	12,072,000	
TOTAL EAST ST. LOUIS and VICINITY, IL		157,893,700	31372400	189,266,100	

** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 Lands and Damages					
01 01 Old Cahokia, 2A-1-(0)-X					
01 01 1 Land Value		1,078,000	269,500	1,347,500	
01 01 2 Severance Damages		107,800	27,000	134,800	
01 01 3 Aquisition Costs		448,000	0	448,000	
01 01 4 Relocation Assistance		28,000	0	28,000	
TOTAL Old Cahokia, 2A-1-(0)-X		1,661,800	296,500	1,958,300	
01 02 Judy's/Burdick, 3A-4-(0)					
01 02 1 Land Value		2,553,200	638,300	3,191,500	
01 02 2 Severance Damages		255,300	63,800	319,100	
01 02 3 Aquisition Costs		808,000	0	808,000	
01 02 4 Relocation Assistance		50,500	0	50,500	
TOTAL Judy's/Burdick, 3A-4-(0)		3,667,000	702,100	4,369,100	
01 03 Brushy Lake, 4A-3-(0)					
01 03 1 Land Value		3,078,800	769,700	3,848,500	
01 03 2 Severance Damages		307,900	77,000	384,900	
01 03 3 Aquisition Costs		440,000	0	440,000	
01 03 4 Relocation Assistance		27,500	0	27,500	
TOTAL Brushy Lake, 4A-3-(0)		3,854,200	846,700	4,700,900	
01 04 Spring Lake, 1B-3-X					
01 04 1 Land Value		4,140,600	1,035,200	5,175,800	
01 04 2 Severance Damages		414,100	103,500	517,600	
01 04 3 Aquisition Costs		2,248,000	0	2,248,000	
01 04 4 Relocation Assistance		365,500	0	365,500	
TOTAL Spring Lake, 1B-3-X		7,168,200	1,138,700	8,306,900	
01 06 Mullens Slough, 7A-2					
01 06 1 Land Value		795,000	198,800	993,800	
01 06 2 Severance Damages		79,500	19,900	99,400	
01 06 3 Aquisition Costs		680,000	0	680,000	
01 06 4 Relocation Assistance		42,500	0	42,500	
TOTAL Mullens Slough, 7A-2		1,597,000	218,600	1,815,600	

** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 07 Dobrey Slough, 5A-Y					
01 07 1 Land Value		591,700	147,900	739,600	
01 07 2 Severance Damages		59,200	14,800	74,000	
01 07 3 Aquisition Costs		232,000	0	232,000	
01 07 4 Relocation Assistance		14,500	0	14,500	
TOTAL Dobrey Slough, 5A-Y		897,400	162,700	1,060,100	
01 08 Elm Slough, 6A-2					
01 08 1 Land Value		2,085,000	521,300	2,606,300	
01 08 2 Severance Damages		208,500	52,100	260,600	
01 08 3 Aquisition Costs		376,000	0	376,000	
01 08 4 Relocation Assistance		23,500	0	23,500	
TOTAL Elm Slough, 6A-2		2,693,000	573,400	3,266,400	
01 09 Cahokia Mounds, 8-1-H					
01 09 1 Land Value		1,837,500	459,400	2,296,900	
01 09 2 Damages to the Remainder		183,800	46,000	229,800	
01 09 3 Aquisition Costs		8,000	0	8,000	
01 09 4 Relocation Assistance		500	0	500	
TOTAL Cahokia Mounds, 8-1-H		2,029,800	505,300	2,535,100	
TOTAL Lands and Damages		23,568,400	4,444,000	28,012,400	
02 Relocations					
02 04 Spring Lake, 1B-3-X					
02 04 1 Mobilization and Demobilization		215,600	53,900	269,500	
TOTAL Mobilization and Demobilization		215,600	53,900	269,500	
02 04 2 Bridge Replacement					
02 04 2 1 Highway 157	3800.00 SF	568,800	142,200	711,100	187.12
02 04 2 2 CSX Railroad	3000.00 SF	449,100	112,300	561,400	187.12
02 04 2 3 Black Lane	8900.00 SF	1,247,000	311,800	1,558,800	175.14
TOTAL Bridge Replacement		2,265,000	566,200	2,831,200	
02 04 3 New Bridges					

** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
02 04 3 1 Forest Blvd.	2200.00	SF	308,300	77,100	385,300	175.14
02 04 3 2 Maryland Ave	2200.00	SF	308,300	77,100	385,300	175.14
02 04 3 3 Highway 111	2200.00	SF	329,300	82,300	411,700	187.12
02 04 3 4 North 51st Street	2200.00	SF	308,300	77,100	385,300	175.14
02 04 3 5 Collinsville Road	2200.00	SF	308,300	77,100	385,300	175.14
02 04 3 6 Penn. Central Railroad	2100.00	SF	314,400	78,600	393,000	187.12
TOTAL New Bridges			1,876,700	469,200	2,345,900	
TOTAL Spring Lake, 1B-3-X			4,357,200	1,089,300	5,446,600	
02 10 Misc. Utility Relocations						
02 10 1 Utility Relocations/Alterations	20.00	EA	598,800	149,700	748,500	37424
TOTAL Misc. Utility Relocations			598,800	149,700	748,500	
TOTAL Relocations			4,956,000	1,239,000	6,195,000	
06 Fish and Wildlife Facilities						
06 01 Stream Restoration						
06 01 04 Dams						
06 01 04 01 Old Cahokia, 2A-1-(0)-X						
06 01 04 01 1 Tributary Stream Sediment Basins			1,895,800	460,400	2,356,200	
TOTAL Old Cahokia, 2A-1-(0)-X			1,895,800	460,400	2,356,200	
06 01 04 02 Judy's/Burdick, 3A-4-(0)						
06 01 04 02 1 Tributary Stream Sediment Basins			6,699,500	1,618,900	8,318,300	
TOTAL Judy's/Burdick, 3A-4-(0)			6,699,500	1,618,900	8,318,300	
06 01 04 03 Brushy Lake, 4A-3-(0)						
06 01 04 03 1 Tributary Stream Sediment Basins			3,709,300	897,700	4,607,000	
TOTAL Brushy Lake, 4A-3-(0)			3,709,300	897,700	4,607,000	
06 01 04 04 Spring Lake, 1B-3-X						

** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
06 01 04 04 1 Tributary Stream Sediment Basins		14,033,700	3,398,700	17,432,500	
TOTAL Spring Lake, 1B-3-X		14,033,700	3,398,700	17,432,500	
06 01 04 06 Mullens Slough, 7A-2					
06 01 04 06 1 Tributary Stream Sediment Basins		4,566,900	1,107,400	5,674,300	
TOTAL Mullens Slough, 7A-2		4,566,900	1,107,400	5,674,300	
TOTAL Dams		30,905,100	7,483,100	38,388,200	
06 01 16 Bank Stabilization					
06 01 16 01 Old Cahokia, 2A-1-(0)-X					
06 01 16 01 1 Riffle & Pool Complexes		845,300	211,300	1,056,700	
TOTAL Old Cahokia, 2A-1-(0)-X		845,300	211,300	1,056,700	
06 01 16 02 Judy's/Burdick, 3A-4-(0)					
06 01 16 02 1 Riffle & Pool Complexes		2,650,500	662,600	3,313,200	
TOTAL Judy's/Burdick, 3A-4-(0)		2,650,500	662,600	3,313,200	
06 01 16 03 Brushy Lake, 4A-3-(0)					
06 01 16 03 1 Riffle & Pool Complexes		1,511,500	377,900	1,889,400	
TOTAL Brushy Lake, 4A-3-(0)		1,511,500	377,900	1,889,400	
06 01 16 04 Spring Lake, 1B-3-X					
06 01 16 04 1 Riffle & Pool Complexes		5,559,100	1,389,800	6,948,900	
TOTAL Spring Lake, 1B-3-X		5,559,100	1,389,800	6,948,900	
06 01 16 06 Mullens Slough, 7A-2					
06 01 16 06 1 Riffle & Pool Complexes		1,897,000	474,300	2,371,300	
TOTAL Mullens Slough, 7A-2		1,897,000	474,300	2,371,300	

** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
TOTAL Bank Stabilization			12,463,500	3,115,900	15,579,400	
TOTAL Stream Restoration			43,368,700	10599000	53,967,700	
06 02 Habitat Facilities						
06 02 09 Channels and Canals						
06 02 09 01 Old Cahokia, 2A-1-(0)-X						
06 02 09 01 1 Mobilization and Demobilization			170,100	42,500	212,600	
06 02 09 01 2 Excavation w/Off-Site Disposal	336000	CY	1,588,500	317,700	1,906,200	5.67
06 02 09 01 3 West Side Berm			480,700	120,200	600,800	
06 02 09 01 4 Concrete Box Culverts (2ea)	1.40	CLF	13,400	3,400	16,800	11999
06 02 09 01 5 CMP's			13,200	3,300	16,500	
06 02 09 01 6 Trapezoidal Concrete Channel	19.00	CLF	1,039,500	259,900	1,299,400	68387
06 02 09 01 7 Clearing and Grubbing	29.00	ACR	71,700	14,300	86,000	2965.51
06 02 09 01 8 Riparian Forest Tree Stand	12.00	ACR	9,600	2,400	12,100	1004.91
06 02 09 01 9 Plant New Forest w/BRS's	169.00	ACR	284,600	71,100	355,700	2104.80
06 02 09 01 10 Establishment of Turf	13.00	ACR	14,200	2,100	16,300	1255.19
06 02 09 01 11 Wood Duck Boxes(1-pole w/2boxes)	85.00	EA	10,800	2,200	13,000	152.[redacted]
TOTAL Old Cahokia, 2A-1-(0)-X			3,696,300	839,100	4,535,400	
06 02 09 02 Judy's Burdick, 3A-4-(0)						
06 02 09 02 1 Mobilization and Demobilization			150,900	37,700	188,600	
06 02 09 02 2 Excavation w/Off-Site Disposal	118300	CY	559,300	111,900	671,200	5.67
06 02 09 02 3 Berms			925,400	231,300	1,156,700	
06 02 09 02 4 Concrete Box Culverts (2ea)	2.30	CLF	138,000	34,500	172,500	74986
06 02 09 02 5 Creek/Ditch Restoration			234,000	58,500	292,500	
06 02 09 02 6 Clearing and Grubbing	22.00	ACR	54,400	10,900	65,200	2965.51
06 02 09 02 7 Prairie Planting	389.00	ACR	992,000	248,000	1,240,000	3187.74
06 02 09 02 8 Riparian Forest Tree Stand	76.00	ACR	61,100	15,300	76,400	1004.91
06 02 09 02 9 Plant New Forest w/BRS's	71.00	ACR	119,600	29,900	149,400	2104.80
06 02 09 02 10 Shore Cover (25' strip)	4.00	ACR	11,000	2,800	13,800	3444.11
06 02 09 02 11 Seasonal Mowing (2-times)	778.00	ACR	50,600	10,100	60,700	78.02
TOTAL Judy's Burdick, 3A-4-(0)			3,296,100	790,800	4,087,000	
06 02 09 03 Brushy Lake, 4A-3-(0)						
06 02 09 03 1 Mobilization and Demobilization			155,700	38,900	194,600	
06 02 09 03 2 Excavation w/Off-Site Disposal	436000	CY	2,061,300	412,300	2,473,600	5.67
06 02 09 03 3 Rectangular Concrete Channel	3.00	CLF	419,900	105,000	524,900	174967
06 02 09 03 4 Trapezoidal Grass Channel	63.00	CLF	201,600	50,400	252,000	3999[redacted]
06 02 09 03 5 Trapezoidal Concrete Channel	0.24	CLF	18,900	4,700	23,700	98[redacted]
06 02 09 03 6 Clearing and Grubbing	26.00	ACR	64,300	12,900	77,100	2965.51

** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

			QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
06 02 09 03	7	Plant New Forest w/RPM's	336.00	ACR	434,900	108,700	543,600	1617.98
06 02 09 03	8	Wood Duck Boxes(1-pole w/2boxes)	64.00	EA	8,100	1,600	9,800	152.45
06 02 09 03	9	Riparian Forest Tree Stand	23.00	ACR	18,500	4,600	23,100	1004.91
		TOTAL Brushy Lake, 4A-3-(0)			3,383,200	739,100	4,122,300	
06 02 09 04		Spring lake, 1B-3-X						
06 02 09 04	1	Mobilization and Demobilization			994,000	198,800	1,192,800	
06 02 09 04	2	Excavation w/Off-Site Disposal	3501000	CY	16,551,900	3,310,400	19,862,300	5.67
06 02 09 04	3	Berms			1,218,000	304,500	1,522,500	
06 02 09 04	4	Concrete Culverts			308,700	77,200	385,800	
06 02 09 04	5	Tunnel Under Railroad Embankment	300.00	LF	250,000	62,500	312,600	1041.85
06 02 09 04	6	Rectangular Concrete Channel	40.00	CLF	7,678,500	1,919,600	9,598,200	239955
06 02 09 04	7	Trapezoidal Grass Channels			4,275,500	1,068,900	5,344,400	
06 02 09 04	9	Channel Improv. for Bridge Repl			102,100	25,500	127,600	
06 02 09 04	11	Channel Improv. for New Bridges			271,600	67,900	339,500	
06 02 09 04	12	Channel Improvement Only			668,900	167,200	836,100	
06 02 09 04	13	Clearing and Grubbing	70.00	ACR	173,000	34,600	207,600	2965.51
06 02 09 04	14	Sediment Cleanout (exist. creek)	62700	CY	288,000	57,600	345,600	5.51
06 02 09 04	15	Excavate New Creek Channel	39900	CY	196,400	39,300	235,700	5.91
06 02 09 04	16	Plant New Forest w/RPM's	142.00	ACR	183,800	46,000	229,800	1617.98
06 02 09 04	17	Plant New Forest w/BRS's	18.00	ACR	30,300	7,600	37,900	2104.80
06 02 09 04	18	Plant High Quality Marsh	272.00	ACR	489,100	97,800	586,900	2157.72
06 02 09 04	19	Shoreline Plantings	9.00	ACR	10,100	2,500	12,700	1409.32
06 02 09 04	20	Wood Duck Boxes(1-pole w/2boxes)	304.00	EA	38,600	7,700	46,300	152.45
06 02 09 04	21	Riparian Forest Tree Stand	216.00	ACR	173,600	43,400	217,100	1004.91
06 02 09 04	22	Establishment of Turf	11.00	ACR	12,000	1,800	13,800	1255.19
06 02 09 04	23	Mowing	172.00	ACR	11,200	2,200	13,400	78.02
		TOTAL Spring lake, 1B-3-X			33,925,500	7,543,100	41,468,500	
06 02 09 06		Mullens Slough, 7A-2						
06 02 09 06	1	Mobilization and Demobilization			88,600	22,200	110,800	
06 02 09 06	2	New Trapezoidal Grass Channel	10.00	CLF	116,800	29,200	146,000	14597
06 02 09 06	3	Overflow Weir Structure			210,500	42,100	252,600	
06 02 09 06	4	Stoplog Structure (canal 1)			10,200	2,600	12,800	
06 02 09 06	5	Clearing and Grubbing	8.00	ACR	19,800	4,000	23,700	2965.51
06 02 09 06	6	Prairie Planting	6.00	ACR	15,300	3,800	19,100	3187.74
06 02 09 06	7	Exist. Forest Tree Stand Improv.	35.00	ACR	28,100	7,000	35,200	1004.91
06 02 09 06	8	Create Over-wintering Holes			1,415,600	283,100	1,698,700	
06 02 09 06	9	Fish cover (woody debris piles)	15.00	EA	2,300	600	2,900	190.52
06 02 09 06	10	Shoreline Plantings	7.00	ACR	7,900	2,000	9,900	1409.32
06 02 09 06	11	Wood Duck Boxes(1-pole w/2boxes)	3.00	EA	400	100	500	152.45
		TOTAL Mullens Slough, 7A-2			1,915,500	396,600	2,312,000	

** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

			QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
06 02 09 07		Dobrey Slough, 5A-Y					
06 02 09 07	1	Mobilization and Demobilization		55,100	13,800	68,900	
06 02 09 07	2	Excavation w/Off-Site Disposal	205100 CY	969,700	193,900	1,163,600	5.67
06 02 09 07	3	Berm for Overflow Protection(2')	12.50 CLF	20,000	5,000	25,000	1999.95
06 02 09 07	4	Concrete Box Culverts (2ea)	0.50 CLF	22,000	5,500	27,500	54990
06 02 09 07	5	42" Dia. RCP	28.00 LF	3,300	800	4,100	146.05
06 02 09 07	6	Plant High Quality Marsh	34.00 ACR	61,100	12,200	73,400	2157.72
06 02 09 07	7	Shore Cover (25' strip)	2.00 ACR	5,500	1,400	6,900	3444.11
06 02 09 07	8	Plant New Forest w/BRS's	29.00 ACR	48,800	12,200	61,000	2104.80
06 02 09 07	9	Wood Duck Boxes(1-pole w/2boxes)	4.00 EA	500	100	600	152.45
		TOTAL Dobrey Slough, 5A-Y		1,186,000	244,900	1,430,900	
06 02 09 08		Elm Slough, 6A-2					
06 02 09 08	1	Mobilization and Demobilization		146,700	29,300	176,000	
06 02 09 08	2	Excavation w/Off-Site Disposal	400500 CY	1,893,500	378,700	2,272,200	5.67
06 02 09 08	3	Berms		365,300	91,300	456,600	
06 02 09 08	4	Concrete Box Culverts		568,800	142,200	711,000	
06 02 09 08	5	Ditch Between Culverts		18,900	3,800	22,700	
06 02 09 08	6	Prairie Planting	46.00 ACR	117,300	29,300	146,600	3187.74
06 02 09 08	7	Exist. Forest Tree Stand Improv.	135.00 ACR	108,500	27,100	135,700	1004.91
06 02 09 08	8	Plant New Forest w/BRS's	316.00 ACR	532,100	133,000	665,100	2104.80
06 02 09 08	9	Plant New Forest w/RMP's	16.00 ACR	20,700	5,200	25,900	1617.98
06 02 09 08	10	Plant Field	12.00 ACR	1,600	400	2,000	162.90
06 02 09 08	11	Establishment of Turf	7.00 ACR	7,600	1,100	8,800	1255.19
06 02 09 08	12	Seasonal Mowing of Prairie (2ea)	92.00 ACR	6,000	1,200	7,200	78.02
06 02 09 08	13	Wood Duck Boxes(1-pole w/2boxes)	138.00 EA	17,500	3,500	21,000	152.45
		TOTAL Elm Slough, 6A-2		3,804,500	846,200	4,650,700	
06 02 09 09		Cahokia, Mounds, 8-1-H					
06 02 09 09	1	Mobilization and Demobilization		57,500	14,400	71,900	
06 02 09 09	2	Initial Mowing (light density)	193.00 ACR	20,100	5,000	25,100	130.03
06 02 09 09	3	Initial Burn	525.00 ACR	28,200	7,000	35,200	67.05
06 02 09 09	4	Apply Herbicide & Chemical Mix.	525.00 ACR	50,800	12,700	63,400	120.84
06 02 09 09	5	Planting	525.00 ACR	1,022,600	255,600	1,278,200	2434.74
06 02 09 09	6	Seasonal Mowing (2ea)	1050.00 ACR	68,300	13,700	81,900	78.02
		TOTAL Cahokia, Mounds, 8-1-H		1,247,300	308,400	1,555,800	
		TOTAL Channels and Canals		52,454,400	11708200	64,162,700	
		TOTAL Habitat Facilities		52,454,400	11708200	64,162,700	
		TOTAL Fish and Wildlife Facilities		95,823,100	22307200	118,130,300	

** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
14 Recreation Facilities						
14 01 Old Cahokia, 2A-1-(0)-X						
14 01 1 Bike Trail						
14 01 1 1 Mobilization and Demobilization			18,000	4,500	22,500	
14 01 1 2 Geotextile	20800	SY	30,600	7,600	38,200	1.84
14 01 1 3 CA-6 Base Course	18000	SY	114,000	28,500	142,500	7.92
14 01 1 4 Prime Coat	18000	SY	7,100	1,800	8,900	0.49
14 01 1 5 Bituminous Surface Treatment	18000	SY	31,000	7,800	38,800	2.15
14 01 1 6 Striping	16200	LF	3,700	900	4,600	0.29
14 01 1 7 Misc. Signs			2,000	500	2,500	
TOTAL Bike Trail			206,400	51,600	258,000	
TOTAL Old Cahokia, 2A-1-(0)-X			206,400	51,600	258,000	
TOTAL Recreation Facilities			206,400	51,600	258,000	
30 Planning, Engineering, & Design						
30 00 Engineering Analysis						
30 00 1 Flow Model			182,000	18,000	200,000	
30 00 2 Sediment Analysis			145,500	14,500	160,000	
30 00 3 Stream Stabilization			45,500	4,500	50,000	
30 00 4 Geotechnical Analysis			91,000	9,000	100,000	
30 00 5 ED Report			45,500	4,500	50,000	
30 00 6 Mapping			273,000	27,000	300,000	
30 00 7 Project Management			45,500	4,500	50,000	
TOTAL Engineering Analysis			828,000	82,000	910,000	
30 01 Old Cahokia, 2A-1-(0)-X						
30 01 1 Engineering Design Report (EDR)			696,000	69,000	765,000	
30 01 2 Plans and Specs			1,300,000	130,000	1,430,000	
30 01 3 Engineering During Const. (EDC)			149,700	15,000	164,700	
30 01 4 Project Management			182,000	18,000	200,000	
TOTAL Old Cahokia, 2A-1-(0)-X			2,327,700	232,000	2,559,700	
30 02 Judy's/Burdick, 3A-4-(0)						
30 02 1 Engineering Design Report (EDR)			768,000	77,000	845,000	
30 02 2 Plans and Specs			1,345,000	135,000	1,480,000	
30 02 3 Engineering During Const. (EDC)			286,000	29,000	315,000	

** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
30 02 4 Project Management		182,000	18,000	200,000	
TOTAL Judy's/Burdick, 3A-4-(0)		2,581,000	259,000	2,840,000	
30 03 Brushy Lake, 4A-3-(0)					
30 03 1 Engineering Design Report (EDR)		777,000	78,000	855,000	
30 03 2 Plans and Specs		1,409,000	141,000	1,550,000	
30 03 3 Engineering During Const. (EDC)		194,000	19,300	213,300	
30 03 4 Project Management		182,000	18,000	200,000	
TOTAL Brushy Lake, 4A-3-(0)		2,562,000	256,300	2,818,300	
30 04 Spring Lake, 1B-3-X					
30 04 1 Engineering Design Report (EDR)		2,141,000	214,000	2,355,000	
30 04 2 Plans and Specs		4,113,000	412,000	4,525,000	
30 04 3 Engineering During Const. (EDC)		1,349,000	135,000	1,484,000	
30 04 4 Project Management		409,000	41,000	450,000	
TOTAL Spring Lake, 1B-3-X		8,012,000	802,000	8,814,000	
30 06 Mullens Slough, 7A-2					
30 06 1 Engineering Design Report (EDR)		1,068,000	107,000	1,175,000	
30 06 2 Plans and Specs		1,559,000	156,000	1,715,000	
30 06 3 Engineering During Const. (EDC)		189,000	18,900	207,900	
30 06 4 Project Management		182,000	18,000	200,000	
TOTAL Mullens Slough, 7A-2		2,998,000	299,900	3,297,900	
30 07 Dobrey Slough, 5A-Y					
30 07 1 Engineering Design Report (EDR)		445,000	45,000	490,000	
30 07 2 Plans and Specs		356,000	34,000	390,000	
30 07 3 Engineering During Const. (EDC)		26,300	2,600	28,900	
30 07 4 Project Management		182,000	18,000	200,000	
TOTAL Dobrey Slough, 5A-Y		1,009,300	99,600	1,108,900	
30 08 Elm Slough, 6A-2					
30 08 1 Engineering Design Report (EDR)		491,000	49,000	540,000	
30 08 2 Plans and Specs		323,000	32,000	355,000	
30 08 3 Engineering During Const. (EDC)		85,000	8,500	93,500	

** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
30 08 4 Project Management			105,000	10,000	115,000	
TOTAL Elm Slough, 6A-2			1,004,000	99,500	1,103,500	
30 09 Cahokia Mounds, 8-1-H						
30 09 1 Engineering Design Report (EDR)			164,000	16,000	180,000	
30 09 2 Plans and Specs			168,000	17,000	185,000	
30 09 3 Engineering During Const. (EDC)			28,300	2,800	31,100	
30 09 4 Project Management			91,000	9,000	100,000	
TOTAL Cahokia Mounds, 8-1-H			451,300	44,800	496,100	
30 10 Project Close-Out						
30 10 1 Audit			136,000	14,000	150,000	
30 10 2 Finalize EDD			227,000	23,000	250,000	
30 10 3 Project Management			227,000	23,000	250,000	
TOTAL Project Close-Out			590,000	60,000	650,000	
TOTAL Planning, Engineering, & Design			22,363,300	2,235,100	24,598,400	
31 Construction Management						
31 01 Old Cahokia, 2A-1-(0)-X						
31 01 1 Construction Management			659,000	66,000	725,000	
31 01 4 Project Management			91,000	9,000	100,000	
TOTAL Old Cahokia, 2A-1-(0)-X			750,000	75,000	825,000	
31 02 Judy's/Burdick, 3A-4-(0)						
31 02 1 Construction Management			1,261,000	126,000	1,387,000	
31 02 4 Project Management			91,000	9,000	100,000	
TOTAL Judy's/Burdick, 3A-4-(0)			1,352,000	135,000	1,487,000	
31 03 Brushy Lake, 4A-3-(0)						
31 03 1 Construction Management			853,000	85,000	938,000	
31 03 4 Project Management			91,000	9,000	100,000	
TOTAL Brushy Lake, 4A-3-(0)			944,000	94,000	1,038,000	

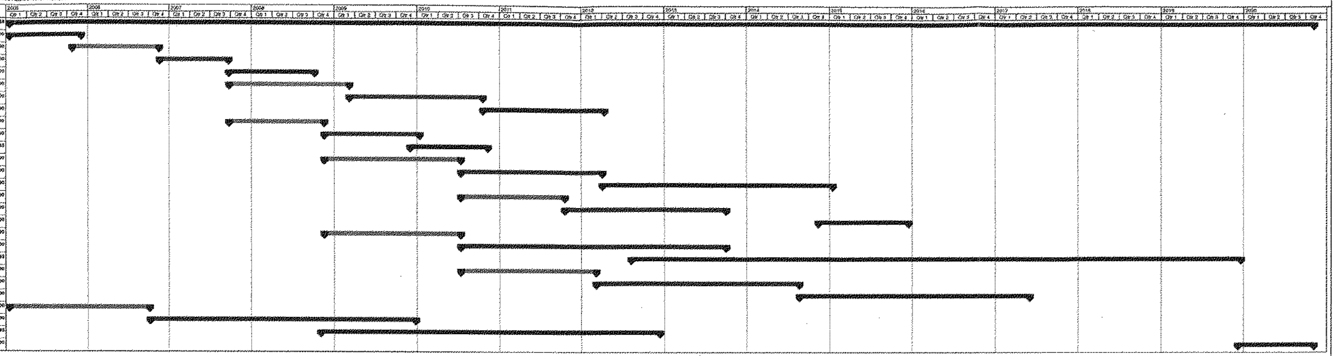
** PROJECT OWNER SUMMARY - Level 5 (Rounded to 100's) **

East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
31 04 Spring Lake, 1B-3-X					
31 04 1 Construction Management		5,936,000	593,000	6,529,000	
31 04 4 Project Management		182,000	18,000	200,000	
TOTAL Spring Lake, 1B-3-X		6,118,000	611,000	6,729,000	
31 06 Mullens Slough, 7A-2					
31 06 1 Construction Management		834,000	83,000	917,000	
31 06 4 Project Management		91,000	9,000	100,000	
TOTAL Mullens Slough, 7A-2		925,000	92,000	1,017,000	
31 07 Dobrey Slough, 5A-Y					
31 07 1 Construction Management		116,000	12,000	128,000	
31 07 4 Project Management		91,000	9,000	100,000	
TOTAL Dobrey Slough, 5A-Y		207,000	21,000	228,000	
31 08 Elm Slough, 6A-2					
31 08 1 Construction Management		374,000	37,000	411,000	
31 08 4 Project Management		136,000	14,000	150,000	
TOTAL Elm Slough, 6A-2		510,000	51,000	561,000	
31 09 Cahokia Mounds, 8-1-H					
31 09 1 Construction Management		125,000	12,000	137,000	
31 09 4 Project Management		45,500	4,500	50,000	
TOTAL Cahokia Mounds, 8-1-H		170,500	16,500	187,000	
TOTAL Construction Management		10,976,500	1,095,500	12,072,000	
TOTAL EAST ST. LOUIS and VICINITY, IL		157,893,700	31372400	189,266,100	

EAST ST LOUIS ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT

ID		Task Name	Cost
1		EAST ST LOUIS & VICINITY, IL	$151,151,892.48
2		ENGINEERING ANALYSIS	$922,500.00
10		EDR - ELM SLOUGH	$580,000.00
22		ELM SLOUGH P&S	$430,200.00
30		ELM SLOUGH CONSTRU	$3,282,700.00
40		EDR - OLD CAHOKIA CRE	$665,000.00
52		OLD CAHOKIA CREEK P	$1,530,000.00
68		OLD CAHOKIA CREEK C	$9,160,800.00
82		EDR - DOBREY SLOUGH	$690,400.00
94		DOBREY SLOUGH P&S	$490,000.00
102		DOBREY SLOUGH CONS	$1,696,799.85
113		EDR - JUDY'S/BURDICK	$946,000.00
124		JUDY'S/BURDICK P&S	$1,520,000.00
138		JUDY'S/BURDICK CONST	$17,832,220.00
154		EDR - CAHOKIA MOUNDS	$230,000.00
166		CAHOKIA MOUNDS P&S	$236,000.00
174		CAHOKIA MOUNDS CON	$1,770,033.00
184		EDR - SPRING LAKE	$1,630,000.00
196		SPRING LAKE P&S	$2,760,000.00
210		SPRING LAKE CONSTRU	$73,209,599.83
232		EDR - BRUSHY LAKE	$955,000.00
244		BRUSHY LAKE P&S	$1,850,000.00
258		BRUSHY LAKE CONSTRU	$11,440,430.00
274		EDR - MULLENS SLOUGH	$1,236,000.00
286		MULLENS SLOUGH P&S	$1,816,000.00
300		MULLENS SLOUGH CON	$11,598,219.93
318		PROJECT CLOSE OUT	$650,000.00



Project: East St Louis and Vicinity, Illin | Task | Split | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Split | Rolled Up Milestone | Rolled Up Progress | External Tasks | Project Summary

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RECREATION BENEFIT ANALYSIS

EAST ST. LOUIS AND VICINTITY, ILLINOIS
ECOSYSTEM RESTORATION AND FLOOD DAMAGE REDUCTION PROJECT

RECREATION FACILITIES AND ACTIVITIES

Support Facilities. The major cost-shared recreation facility proposed is the addition of one primary trailhead at the Old Cahokia Creek action area. The location of the trail is shown on Fig R-1. The trail would be used for hiking, jogging, bicycling, nature observation, environmental interpretation, photography, and sightseeing.

RECREATION USE WITH AND WITHOUT TRAIL FACILITIES

Project Recreation Without Trail. Without the cost-shared trail, recreation in the project area is non-existent.

Project Recreation With Trail. If the proposed amenities are constructed, the number of visitors as well as the quality of the visitor's experience would be expected to as a minimum mirror the usage of the SIUE trail, which this project trail would extend. Based on the additional use of the recommended trail as a nature observation and environmental interpretation area the use of this trail segment is likely to increase over time. Data for recreation benefit analyses were coordinated with Confluence Greenway. Visitation was estimated using the facility capacity method with still-current recreation criteria originally published in the 1978 Iowa State Comprehensive Outdoor Recreation Plan (SCORP) and the St. Paul Riverfront Plan.

Bicycling Visitation. It was calculated that the trail could accommodate 3,750 bicyclists, walkers, nature observers and joggers per year using the following recreation criteria for bicycling:

10 bicyclists per mile of trail;
a turnover rate of 5 per peak day (weekends and holidays);
9 peak days per peak month;
60 percent of peak month bicycling occurring on peak days; and
20 percent of annual bicycling days occurring during the peak month.

Bicycling, walking and jogging visitation was projected to reach capacity by the end of the fifth year after the trail amenities were developed. Annual visitation was projected at 20 percent of capacity the first year and 20 percent growth each additional year until the fifth year.

Walking Visitation. It was calculated that the cost-shared trail could accommodate 2,600 hikers per year using the following recreation criteria for hiking:

15 walkers/joggers/nature observers per mile of trail;
a turnover rate of 2 per peak day;
26 peak days in a year; and
60 percent of annual hiking visitation occurring on peak days.

Walking and jogging visitation was projected to reach capacity by the end of the second year after the trail was developed. Annual visitation was projected at 20 percent of capacity the first year and 20 percent growth each additional year until the fifth year.

RECREATION BENEFITS

Daily Recreation Benefits. The Unit Day Value (UDV) method was used to determine daily recreation benefits. Calculations were based on ER 1105-2-100, dated 22 April 2000; and Economic Guidance Memorandum (EGM) 02-04, Unit Day Values for Recreation, Fiscal Year 2002, dated 1 March 2002, which was the latest EGM available at the time this report was prepared. The value of a day of general recreation for the project was calculated to be $0.00for hiking and picnicking without trail development and $4.19 for users of the cost-shared walking, jogging, and bicycling trail amenities.

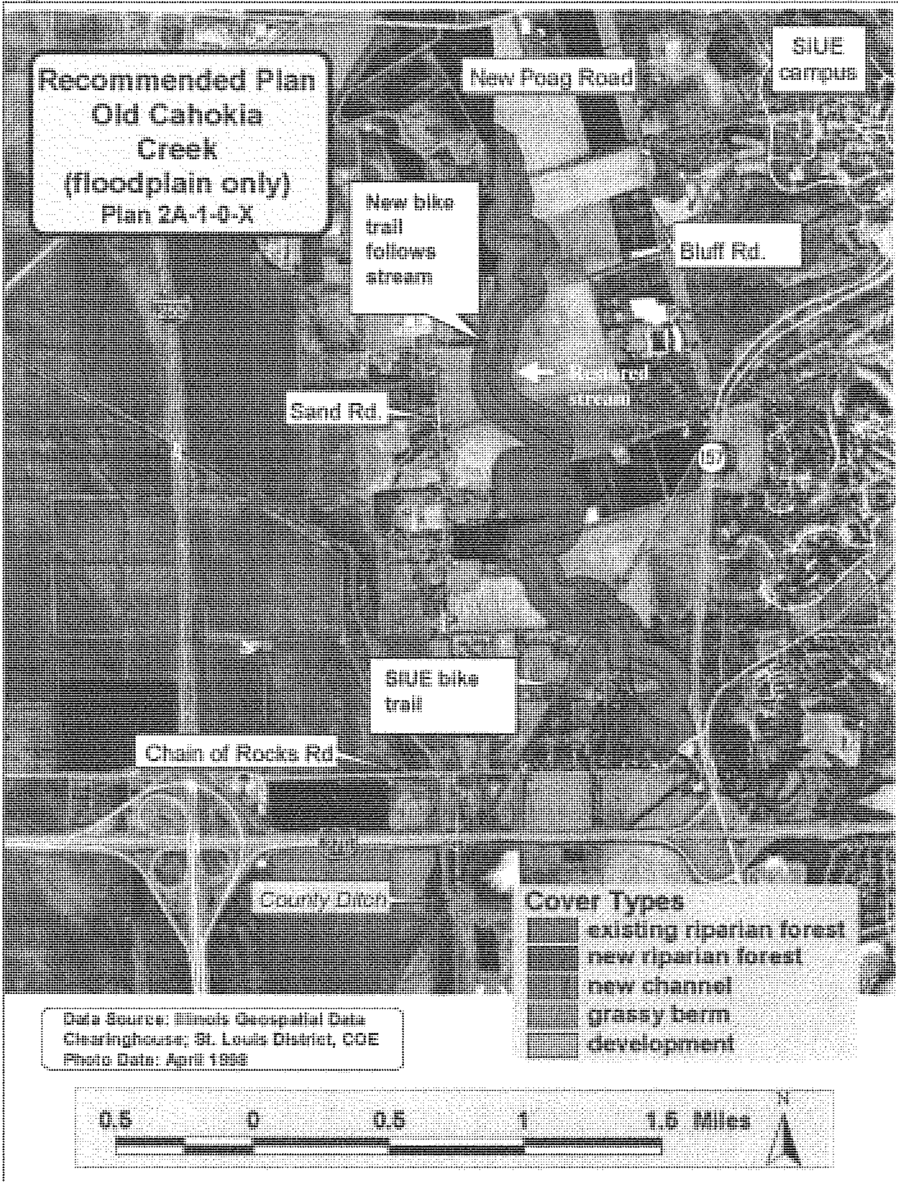
Annual Recreation Benefits. Annual recreation benefits were calculated assuming a 50-year project life and a 5.875 percent interest rate. Trail visitation was projected to reach capacity in the first year after the trail was constructed. Benefit calculations are shown in table below. Annual recreation benefits were calculated to be $ 0 without trail development and $ 26,000 with them. Therefore, the annual recreation benefits of the proposed trail, or the difference between the annual recreation benefits with-trail and without-trail, are $6,000. The benefit to cost ratio being 1.3 to 1.

Recreation Activity or Facility	UDV Points	FY 2003 Gen. Rec. Benefit/Day	Visitors per Year			Annual Benefits
Walking/Bicycle/Jogging Trail No Amenities, 2 miles, Bicycling/Walking/Jogging	26	$4.19	6,350	$426,797	$0	$26,606
Annual Benefits Added by Amenities to Riverfront Trail						$26,606

Trail	Qty	Unit Cost	Total
Connector Trail	1	$206,400.00	206,400
Includes Contingency @			$206,400
Contingency @ 25 %			$258,000
Annualized Cost Trail Amenities			$16,084

B/C = 1.7

Figure K-1 Old Cahokia Creek Trail



APPENDIX L – ENVIRONMENTAL JUSTICE ANALYSIS

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ENVIRONMENTAL JUSTICE ANALYSIS

L.1 SUMMARY OF ANALYSIS

The Environmental Impact Statement (EIS) for The East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project, conforms to the U.S. governments policy of insuring that federal projects do not disproportionately impact a community's right to a safe and clean environment. The project poses no significant risks to the health of nearby residents or the surrounding environment. Rather, the project is expected to improve long-term environmental conditions in the American Bottoms area by improved flood protection, restoration of pre-settlement hydrology, improving water quality, reduce sediment load, increasing biodiversity, and preserving open space.

L.2 EXECUTIVE DIRECTIVE AND AGENCY GUIDANCE

This Appendix of the EIS analyzes environmental justice issues related to the East St. Louis and Vicinity Interior Flood Control and Ecosystem Restoration proposal.

In general, environmental justice refers to fair treatment of all races, cultures and income levels with respect to development, implementation and enforcement of environmental laws, policies and actions.

At the federal level, the obligation of government agencies to take environmental justice into account is outlined in Executive Order 12898. The Order, signed by President Clinton February 11, 1994, calls for federal agencies to incorporate environmental justice considerations in decision-making activities. Significantly, Section 1-101 of the Order states:

"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 environmental 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."

In a memorandum accompanying Executive Order 12898, President Clinton also directed agencies to analyze "the environmental effects, including human health, economic and social effects, of federal actions, including effects on minority communities and low-income communities, when such analysis is required by the National Environmental Policy Act of 1969." To carry out this objective, in July 1999, EPA issued "Final Guidance for Consideration of Environmental Justice in Clean Air Act Section 309 Reviews." This document lists factors and conditions that may be considered in preparing environmental justice evaluations in environmental impact statements.

This appendix analyses the applicability of environmental equity issues in terms of area demographics, ecological, environmental and health impacts, and the proposed sites logistical impacts on nearby residents as specified in Executive Order 12898. To provide context, a number of subjects addressed at length elsewhere in this EIS are briefly summarized.

L.3 PROJECT DESCRIPTION

L.3.1 Background. In 1993 and 1996, the East St. Louis area suffered severe interior flooding. Millions of dollars were spent by several Federal agencies for providing emergency disaster relief, clean existing drainage ditches, and buy-out frequently flooded areas. Historical records indicate that similar interior flooding events have occurred in August 1946, May 1961, June 1957 which are referenced as significant events. In 1997, Congress funded the United States Army Corps of Engineers (USACE) to re-evaluate the flooding problem in the area. Subsequently, USACE decided that an ecosystem approach could potentially solve the flooding problem, and at the same time could be of great environmental benefit to the area.

The East St. Louis and Vicinity, Illinois Ecosystem Restoration and Flood Damage Reduction Project is an authorized Federal project located in the flood plain of the Mississippi River in Madison and St. Clair Counties, Illinois. Over the past 40 years, various federal agencies, including the USACE, have attempted to implement a series of plans and some construction activities to contain interior flooding from the surrounding bluffs. Streams which flow from the bluffs area enter the old agricultural ditches on the flood plain, locally called the American Bottoms. The area is protected from over bank flooding from the river by a 500 year flood event levee system rated to provide protection to the area from the Mississippi River.

The project has two main components: 1) Bottomlands, and 2) Uplands. Within the bottomlands, measures will be investigated to divert and temporarily store stormwater from the interior drainage system for enhancement of existing wetlands and restoration of historic wetlands. Bottomland sediment detention basins will also be investigated to capture sediment from upland runoff and minimize its deposition within the interior drainage system and existing and as well as proposed wetlands for temporary storage of stormwater. Upland sediment control measures in the form of nearly 180 dry detention basins will also be constructed to reduce erosion at the source by removing sediment from the water system in the bluffs while providing a stabilizing feature from stream banks.

L.4 SITE DESCRIPTION

The proposed East St. Louis and Vicinity Ecosystem Restoration and Flood Damage Reduction Project area is in southwestern Illinois in Madison and St. Clair counties, and lies within the Metro East St. Louis area along the east bank of the Mississippi River (Figure 1). The proposed project area consists of 106,000 acres. This acreage is divided into approximately 55,000 acres of bottomland, and uplands of 51,000 acres.

American Bottoms is the second largest concentration of residential, commercial, and industrial land use on the Mississippi River flood plain. The flood plain is comprised of ox-bow lakes and marshes that are remnants of former meanders of the Mississippi River. A levee protects the bottoms from Mississippi River flooding. Runoff from storm events from the upland or hill areas reaches the bottoms through drainage ways which consist of streams, ditches and canals.

As part of the EJ study, a search of hazardous waste sites in the area of the proposed project were identified. Two sites were identified as National Priority List (NPL) sites, National Lead and Kerr-McGee, respectively. In addition, several CERCLA sites were identified as follows: Swift Adhesives/SCA Service Chain of rocks, GMI Bliss, Union Electric Company Venice, SCA Milam Landfill, Sauget Monsanto Landfill, Bliss Waste Oil, Dead Creek, Ethyl Corporation, and Old American Zinc.

Figure L-1 Area Map

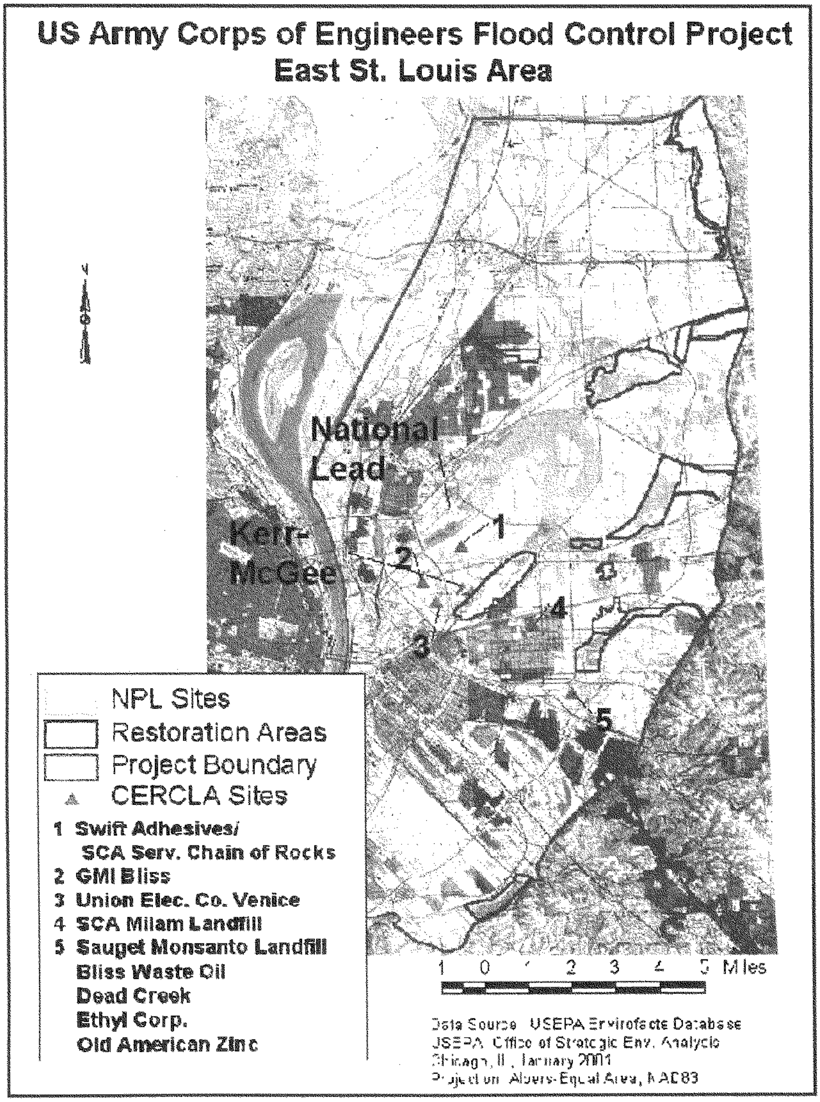
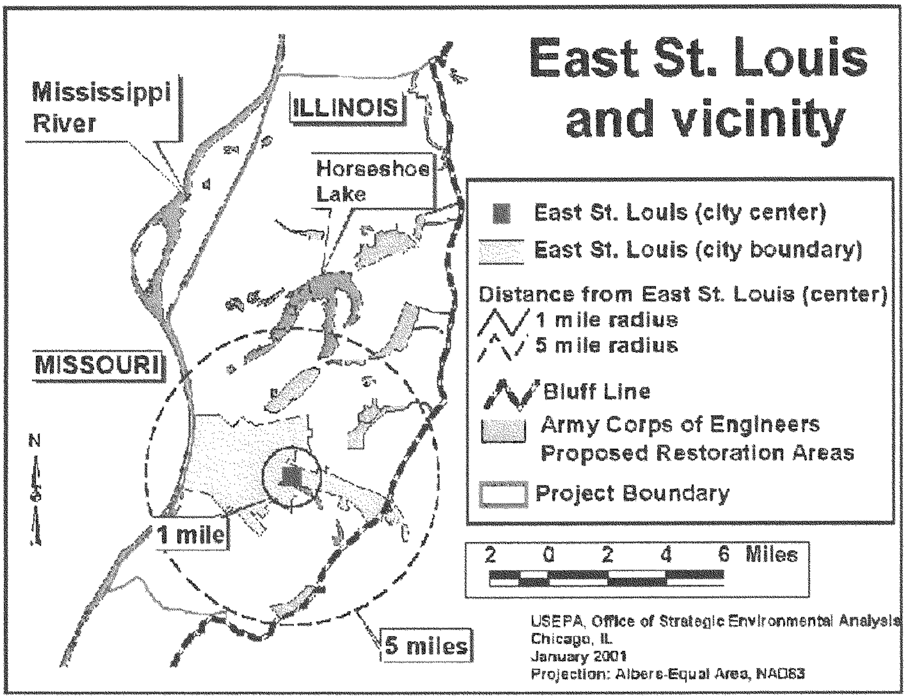


Figure L-2 East St. Louis and Vicinity



L.5 DEMOGRAPHIC FACTORS

Demographic data from 1990 indicates that East St. Louis is a predominantly low income and minority population area. East St. Louis's population is 41,000, according to 1990 Census Data.

NOTE: Some numbers have been rounded or exclude very small population segments. Totals may not add up to 100%.

East St. Louis's population consists of 98.52% African-American, 1.38% White and other minorities, and 0.78% Hispanic. African-Americans 97.4% of all households, and Caucasians and other minorities 2.2%, and Hispanics occupy 0.4%.

A comparison of demographic data between the counties of Madison and St. Clair reveals the following: The American Bottoms community area, which lies within the counties of Madison and St. Clair, consists of the following household race breakdown according to the 1990 census data: In Madison County, which consists predominantly bluff area communities, the total number of households is 94,857, with 93.4% of the population as White, 5.66% as Black, 0.39% as Asian or Pacific Islander, 0.26% as American Indian/Eskimo or Aleut, and 0.24% as Other. In St. Clair County, which consists of predominantly American Bottoms communities, the total number of households is 95,333, with 75.5% of the population as White, 23.4% as Black, 0.43% as Asian or Pacific Islander, 0.23% as American Indian/Eskimo or Aleut, and 0.33% as Other.

A comparison of poverty levels based on 1990 census data between communities in American Bottoms versus the Bluff area reveals the followings: The American Bottoms area consists of nearly 25 communities with 21% of citizens live below the poverty level. Where as the Bluff area consists of nearly 7 communities 7.7% of citizens live below the poverty level. On the basis of low income, nearly 43% of citizens residing in the American Bottoms communities are categorized as low income, where as nearly 21% of citizens residing in the Bluff area communities are categorized as the same. Since the American Bottoms communities are predominantly low income minority, an environmental justice analysis is an appropriate component of this EIS.

Figure L-3 Population Density

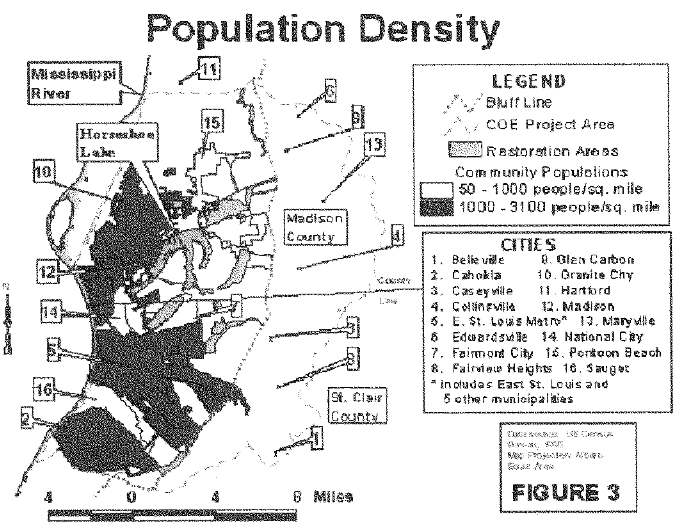


Figure L-4 Minority Population

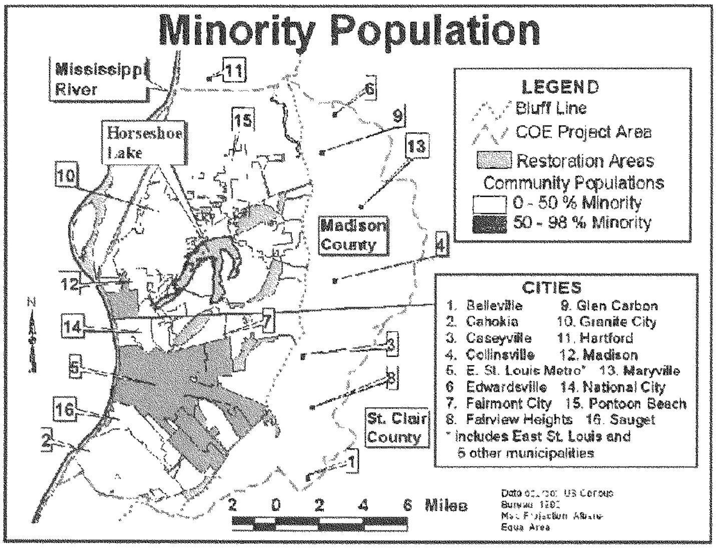
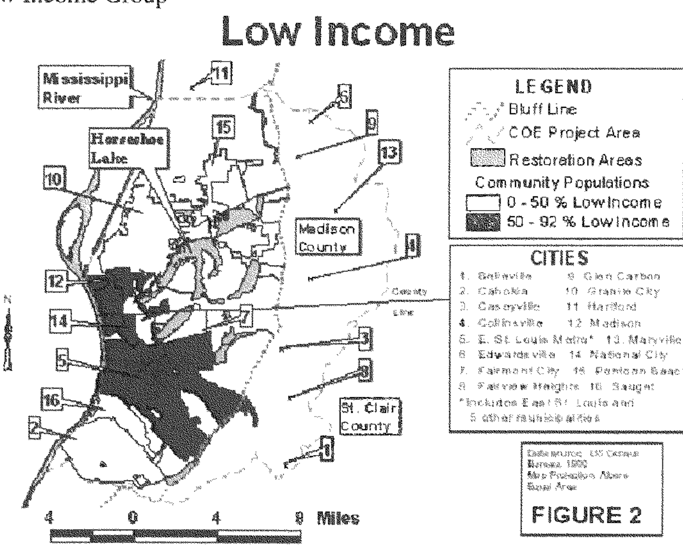


Figure L-5 Low Income Group



L.6 IMPACTS ON COMMUNITY.

L.6.1 Logistics and Social Impacts. Construction activities associated with the proposed project will have a temporary impact on the immediate area. As with any project, vehicle and equipment traffic will be ongoing, especially during the construction stage of the project. During cleaning operations of ditches and canals, traffic within the area will also increase. At present, there is little pedestrian traffic through the project area. No significant impact on community activities or cohesiveness appears imminent.

Social impacts on the community will not be significant. The proposed project will not require displacement of businesses or private residences. Nor will access to critical local institutions such as churches, community centers or government offices, be impacted.

L.6.2 Local Ecosystem. The Southwest Ecologically Rich Area of Illinois comprises an interacting matrix of major rivers, flood plains, bluffs, caves and alluvial deposits. The geology of the area is controlled by two major factors, the Mississippi River and the limestone bedrock that the river has carved through for centuries. This natural excavation has resulted in a region called the American Bottoms, named because it is the widest flood plain area along the whole length of the Mississippi River. The western edge of the flood plain is distinguished by a sharp bluff, rising to 150' to 250' in height, which lead out east to a plateau of fertile farmland. The area has an excellent source of ground water. The ecosystems within the Southwest Ecologically Rich Area perform various important functions including flood abatement, reduction of sediments and nutrients in runoff, groundwater recharge and habitat for wildlife.

The American Bottoms is the home to a significant cultural resource, the East St. Louis Mound Group, a major prehistoric ceremonial and habitation site of the Middle Mississippian people, was recognized as a UNESCO World Heritage Site in 1982. There still exist some remnants of the pre-settlement natural landscape, however they are fragmented and stressed by chemical and developmental pressures. Wetlands continue to be lost due to infilling by stormwater runoff from the adjacent bluffs and as the bluffs erode, upland riparian habitat is lost. Today the area supports diverse land uses - agricultural, urban, industrial, and suburban development. The soil is rich in potash, a chemical nutrient on which horseradish thrives and about 85% of the world's supply of horseradish is processed in this area.

Bottomlands slow flood waters and disperse the force of floods. The massive, shallow roots of the trees prevent floods from washing away the forest's floor. Bottomland hardwoods often buffer adjacent streams from upland forests, protecting both natural resources on land and the stream bank, and the people who live in these uplands.

The bottomlands are valuable to many forms of wildlife that seek its refuge, diversity of habitat, abundant water. Seasonal flooding produces shallow areas where many kinds of aquatic life feed on decomposed matter and hide from predators. Fish and crayfish provide food for people and animals, such as otters, minks and racoons. The forests are also nesting and feeding sites for herons, owls and egrets. Animals depend on bottomland hardwoods for shelter that cannot be found in other ecosystems. This area contains habitat for six federally threatened or endangered species.

The uplands contain loess hill prairies, savannas and forests. All are home to abundant wildlife and diversity of vegetation. The loess hill prairies are the among the most endangered of the ecosystems primarily due to habitat alteration. These natural communities are responsible for the generation and maintenance of the fertile topsoil which has made the Midwest the agricultural center that it is.

L.6.3 Public Health Factors. The project will not significantly increase environmental health risks faced by local residents. During the course of the project, levels of dust caused by construction activities and volatile organic carbon (VOC) emitted by construction vehicles and equipment may cause a temporary increase. However, these increased levels represent a small increase in current levels in the area and will not significantly increase background levels.

L.6.4 Additional Exposures. Noise, water quality, air quality issues may affect the area due to construction activities. Concerns with noise and air quality impacts stem from the influx of construction and material handling equipment at the restoration sites. A scientific analysis of noise and air quality impacts on nearby communities has not been conducted. However, due to the distances from residential areas and the use of conventional construction equipment, the restoration activities are not likely to result in significant noise impacts. These effects are short term and temporary in nature and therefore will not have an adverse impact on the local communities.

L.6.5 Economic Impacts. The proposed flood control project and ecosystem restoration is designed to reduce the risk of flooding and enhance the natural environment, and therefore, may be beneficial to local communities by attracting and encouraging further agriculture and industrial development.

L.6.6 Public Outreach. The public outreach effort undertaken by the USACE has consisted of an PEIS announcement in the January 22, 1999, Federal Register, and two subsequent public workshops to discuss the proposed project. Additional outreach efforts in the form of public hearings will be conducted in the near future when the draft EIS becomes available for public comment.

As the interior flood control/ecosystem restoration project moves forward, public information activities will be conducted. Details have yet to be determined, but may include regular newsletters, community forums and tours. Where appropriate, documents and forums will utilize a bilingual format.

L.7 CONCLUSIONS

Taking all of the above factors into consideration, the EIS for the proposed East St. Louis Ecosystem Restoration and Flood Damage Reduction project does not conflict with the federal governments policy on environmental justice.

Overall, the proposed ecosystem restoration project appears unlikely to pose increased environmental risk factors. In fact, the proposed project should improve environmental conditions in the area, and at the same time, opportunities for economic activity will be enhanced. Residential areas area situated far enough away from recognized short term environmental impacts and will not be adversely affected.

Therefore, it is USACE/USEPA view that the inhabitants of East St. Louis and surrounding municipalities encompassing a wide spectrum of income levels and socioeconomic backgrounds will realize cumulative environmental and economic benefits from the proposed project.

L.8 BIBLIOGRAPHY

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APPENDIX N – INDEPENDENT TECHNICAL REVIEW

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Study Review Comments	Type: Preliminary: Final: X Other:	Page 1 of 1 Date: March 2003
Project: East St. Louis Ecosystem Restoration and Flood Damage Reduction	**Reviewer:** Name: Organization:	

Comment Number	Drawing/ Number	Page/ Space	COMMENT	ACTION
			PM-F Comments	
1		3-7	Section 3.1 last sentence. Specify which study was done in 1984.	Noted – Report title will be added
2		3-36	"Chutes and Bar Deposits". Is SP a certain kind of sand like SM is silty sand? Or is it just sand, as stated?	None – correct as cited
3		3-37	Section 3.6.3.2. Could we make some general statements in this section and move these tables to an appendix?	None- Tables to be left as is
4		3-40	Second to last paragraph. Do temperatures exceed 100 degrees every other year in general or do they get over 100 on average 50% of the years? There's a difference.	None – every other year in general – this is a general characterization of the area weather
5		3-41	End of 1st paragraph. What is PM10?	Noted – Reference to Appendix F will be made here for additional information
6		3-46	Section 3.10.1.1.12. Why are we talking about Schoenberger in the middle of Harding?	None – Like Little Canteen Creek it is a tributary creek and floodplain ditch to the Harding Ditch
7		3-51	Second paragraph. The St. Clair county ordinance that is mentioned, is this the one that was defeated?	None- It is still in active status of attempting to get passes it has been defeated several times but the County is still pursuing
8		3-74	Mullens Slough. The use of "apparently" and "evidently" in back-to-back sentences makes us seem less than knowledgeable on the subject. Next paragraph – where is McDonnough Lake mentioned "above"?	None – We could walk across McDonnough Lake Mullen's didn't allow this level of investigation

Study Review Comments				**Type:** Preliminary: Final: X Other:	**Page** 2 **of** 2 **Date:** March 2003
Project: East St. Louis Ecosystem Restoration and Flood Damage Reduction				**Reviewer:** Name: Organization:	
Comment Number	Drawing/ Number	Page/ Space	**COMMENT**		**ACTION**

9		6-6	Second to last sentence. So, was the HGM model used in some areas and not others? If so, which ones?	Noted – Sentence will be added to indicate two HGM models were applied at 3 of the 9 "major" action areas (Dobrey Slough, Elm Slough, Brushy Lake).
10		6-9	When you chose the short name for Objective 3, you chose "maintain" over "enhance", and yet all the measures listed appear to be more like enhancements….	None – terminology considered adequate
11		6-9	In Objective 4, all the objectives seem like erosion control. How is this objective different from #5?	None - Objective 4 addresses the quality of water which is adversely impacted by sediment but the measures relate directly to the improvement of water quality not merely sediment control. Objective 5 relates directly to sediment control to prevent its deposition on the floodplain irrespective of water quality. Although measures overlap for these two objectives, their focus differs.
12		6-49	First row, right column. Why is the word "high" in this cell?	Noted – word will be removed
13		6-52	Lansdown ditch. The description is very negative then we say it can be combined with other measures and carry it forward. Can't we beef up our justification a bit?	Noted - Description will be expanded to clarify difference between lower and upper portion of the ditch.

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14		6-60	What's the difference between "carried forward" and "considered further"?	None – terminology used is designed to show that for this combination of sites a number of complex combination plans were considered before the site was carried forward as Spring Lake.
15		6-61	Harding Ditch… The description doesn't seem very positive and yet it's "considered further". Consider clarifying the justification.	Noted – Description will be expanded to clarify that Harding Ditch is and existing water conveyance system that can be used to support environmental restoration actions.
16		6-63	In the table, several rationale descriptions say that "all planning objectives" are met. And then we say it has the ability to meet social objectives. Isn't this redundant? And in the last two rows on page 6-64, we mention PED. I think this is the first occurrence of this acronym? If so, we need to say what it stands for.	Noted – Description is designed to distinguish between objectives formulated on and those that occur incidentally. All other references to social objectives will be eliminated.
17		6-73	Last paragraph, fifth sentence. Consider listing the three kinds of forest before going into descriptions.	Noted – sentence will be added
18		6-75	Second to last para. What does the IHPA own in the action area?	Comment noted. The sentence will be modified to describe the small portion of the action area owned by IHPA.
19		6-87	Second para, last sentence. Do we say "historical" because it's been filled so we don't know?	Noted– existing elevations will be included to clarify

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20		6-89	Second to last para. What are the land treatment measures that NRCS analyses eliminated?	Noted– These are described in Appendix E and a reference will be made here.
21		6-89	Third para, 5th sentence. This sentence is confusing and needs to be clarified. Perhaps "a full array of ecosystem alternatives and ways to measure social affects" or something…	Noted – Sentence will be clarified.
22		6-90	I don't understand the third sentence.	Noted – will be clarified to indicate cost curves were used to compare the costs of measures that were providing similar benefits in order to reduce the number of alternative plans
23		6-90	In section 6.10, consider explaining the difference between "common" and "variable" measures in the following sections.	Noted – terms will be added to Section 14 Glossary of Terms
24		6-	Also in this section's tables, the use of shorthand (i.e. NEWFCORR) needs to be eliminated or explained. Also, explain what the upper right corner information means.	Noted – terms will be added to Section 14 Glossary of Terms. None – Upper right hand corner information is shorthand for further information contained in Appendix A
25		6-92	Last para. We don't know what kind of "earthen hydraulic feature" we're considering? Why are we being vague?	Noted – term should be earthen berm
26		6-94	Second to last para. Second sentence, delete 6th word. Isn't the "no action" a third level of management.	Noted – paragraph will be clarified
27		6-106	Second para. Why was "no action" not acceptable? Also, in first table, what is CEA?	Noted – Rationale will be included. CEA is included in Section 14 Acronyms

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28		6-107	Last para. Is the same measure listed as both the ICA and HEP winner? Isn't this incorrect?	Noted – error will be corrected 2B-1-(0)-X is the ICA and 2A-1-(0)-x is the HEP as shown in related table on the same page.
29	Tabl	6-113	For 8a, we should specify that the 1.3 million are annual damages.	Noted – annual damages will be added to the table description
30		6-115	Second para. Third sentence. This sentence is confusing and needs to be clarified. It is unclear how the "design flood event" was arrived at.	Noted – an expanded explanation of the relationship between the 1844 flood event and its association with the action areas will be added using information displayed in Table 6.5 and information contained in Appendix C.
31		6-119	Is the description of Objective 5 identical to that of Objective 4? Shouldn't we try to at least vary it slightly? Again, I'm unclear of the difference between these two measures. Also, Objective 6 is also eerily similar to both 4 and 5.	None – These objectives are related and might have been able to be combined but throughout the process it was important to keep these separate as they are understood by the general public in different ways. Their redundancy does not change the formulation process but rather helps convey two concepts that are often generally misunderstood.

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32		6-120	In paras 2 and 3, consider specifying the target (4 mi, 3 mi) in the first clause of the first sentence.	Noted – target will be clarified at beginning of discussion
33		6-120	Last para. Is this the right place to discuss this?	None – yes this discussion provides in one place the formulation process for this restoration objective.
34	Table 6-8	6-122	What are RVIs?	None – Section 14 Glossary of Terms and Acronyms identifies RVI as Relative Value Index and page 14-9 provides an explanation of the term which is covered more extensively in Appendix A.
35		6-124	We need to explicitly state what the NER plan is.	Noted - In summary reference to recommended plan will be eliminated and Section 7 will clarify that selected plan is the NER plan.
36		7-8	Section 7.2.1.2. Aren't some of the privately owned acres non-suitable for farming, like maybe jurisdictional wetlands or something?	None – this evaluation is directly related to the established procedures for assessing conversions to nonagricultural use in Illinois that do not consider the presence of any jurisdictional wetlands.

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37		7-9	What is the paragraph telling me? Lots of facts but no logical progression. Is the table trying to tell me that we have #### acres of potential cropland but only %%% of it is suitable for farming?	Comment noted. The paragraph will be modified to emphasize that soils in the affected action areas can be classified by their potential to produce crops, and that most affected soils do not have a high potential. The table is attempting to display this same message, but with additional detail pertaining to landform. The table does not describe what proportion of potential cropland is suitable for farming
38		7-11	Last two paras. So there is horseradish grown on non-horseradish soils? 5000 vs 1537.	None – discussion regards soil types and their expected productivity
39		7-20	Last para. Knowing the area, does the $10k number seem high?	No – this information was supported by current and previous economic investigations of the area.

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40	Table 7-10	7-33	What is "TY"? What's going on with the negatives in the cultural row? We may want to consider explaining this.	None – Section 14 Glossary of Terms and Acronyms identify TY as Target Year and page 14-11 provides an explanation of the term which is further explained in Appendix A. cultural communities here is a biological term that refers to developed land not cultural resources
41	Table 7-11	7-34	Again, consider explaining the negatives in the New Forested Wetland row.	Comment noted. An explanation will be provided.
42		7-35	Second to last para. Is this the first time we mention that the upland detention might not work? If so, it seems a little late and understated.	None- The possibility that these detention basins might not work is mentioned during the selection process, discussed here and further in Sections 8 (8.7.1, 8.11.3) and 9 (9.2.5, 9.2.6, 9.2.7, 9.11). As well as Appendix E
43	Figure 7-6	7-46	In para on this page, need to explain the lack of data in the southern part of the project area in figure 7-6.	Noted – A sentence will be added to indicate that the available 1903 mapping did not cover the entire project area.

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44		7-48	5th para. Explain why flood surface data has not been developed.	None – As described in Section 7 and throughout the rest of the report the Borrow Pit and Stockyards areas are described as incidental future opportunities that will be explored as warranted. No indepth investigation has occurred at either site.
45	Table 7-18	7-49	What's going on with the mink? Consider explaining it in para on Wildlife Habitat of Wetlands. And is the reference to table 7-13 in that para correct? Or is it 7-18?	Comment noted. The reference to the table will be corrected. The change in habitat suitability for the mink will be explained.
46		7-50	Third papa. First sentence. Can we please list what these functions are before we start talking about performance?	Noted – Information provided in Appendix A will be included here directly or by reference.
47		7-63	Second para. Since we are obviously hoping the sediment traps will work (in fact, they're in the recommended plan), shouldn't we say something about some possible ways to address the fish problem?	At this time there do not appear to be any feasible solutions to making dams passable upstream by fishes.

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48		8-5	Third para. Insert "and" before "upland" and semicolons in many places – see me about this. Also, delete common at end of sentence. In addition, the stockyard is listed as an action area in preceding para but then separated out in this third para. Is it an action area with a recommended plan or what? If so, add the acres in to the summary acres. If not, remove it from the list of action areas.	Stockyards and Borrow Pit are incidental future opportunities described here but not included in recommended plan acres as habitat units were not projected for these areas. Costs for taking action at these two sites would be small and handled within existing project contingencies. The feasibility of these two sites will be evaluated under PED.
49		8-	General. Did we do a recreation evaluation? These recommended plans include recreation but how are we justifying that? How did we decide what kind and where?	Noted - Evaluation of the recommended bike path connection was conducted and was justified based on use of the existing trail system and the added connectivity provided by this added trail. As discussed in Section 8.13 while additional recreation features appear promising but they will need to be further evaluated.

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50		8-37	No alternatives at all? Not even whether to do forest or prairie? How do we get away with this?	None- these are only incidentally identified potential opportunities no effort to formulate on them has been made at this time.
51		8-40	Ditto comment for page 8-37. At least refer the reader to an earlier discussion about why we didn't look at alternatives.	None- these are only incidentally identified potential opportunities no effort to formulate on them has been made at this time.
52		8-64	Second para. And what happens if the sediment basins done work?	None – As identified in Section 6 alternative plans, flood plain dry detention basins would be implemented in accordance with the ICA (least cost) plan identified during formulation and discussed during plan selection. This would not change information contained in 8-64 as upland areas of concern would not be impacted under such a plan.
53	Table 8-14	8-66	This table doesn't really list recreation features. These are restoration features.	Noted – Table will be retitled as Potential Recreation Areas
54		8-67	First para. Are we trying to design for a desired level of flood damage reduction? Or just trying to quantify it?	Noted – Sentence will be clarified concept is to verify what has been predicted.

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55		8-69	8.13.2. Last sentence. Doesn't at least one of the restoration areas include a bike trail in the recommended plan? Do we need to address the economic benefit of this recreation feature?	Noted - information regarding justification will be added
56		8-70	8.14.1. Do we really reimburse under our regular ecosystem restoration authority. I thought this was unique to CAP.	None – Yes
57		9-3	Last para. The para says each was incrementally justified on its own merits – where do we show each cost per habitat unit?	None – Section 6 and Appendix A provides this information in detail.
			ED-DCC Comments	
1		3-19	In **Table 13-3**, Agricultural Use, for the row labeled "Ave. size of farms (acres)", for both Madison and St. Clair counties, the average sizes of the farms are increasing, not decreasing as shown in the table. Please eliminate the negative sign "-" in front of –21.6 and –24.8 since both of these numbers should be positive.	Noted - Correction will be made
2		8-20	In **Para. 8.2.5 Brushy Lake**, the second para. entitled "Floodplain." In the third sentence, fifth line, beginning with "Within the habitat area, about **x** miles of Cahokia Creek", replace the letter **x** and insert the correct number.	Noted - Correction will be made
3		I-2	In Appendix I, Page I-2, the last sentence at the bottom of the paragraph, there is a blank reference to the Local Sponsors taxing authority that needs to be filled in.	Noted - Information will be added
4		N/A	Overall Comment: The report is well written, comprehensive and logically organized. This made it much easier to review than some documents I have reviewed in the past.	None
			ED-DAC Comments	
1			20% overall contingency seems low considering the level of design	Contingencies range from 15 – 25% on individual items based on the accessed risk for the item considered.

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2			Ref: 04 02 1 06 Roller Compacted Concrete, Is $60/cy material price high enough: For regular concrete, I have been using $75 to $90 per cubic yard.	Based on large volume competitive pricing at the time the estimate was prepared
3			Ref: 09 01 8 Establishment of Turf, Will seeding be affected by the Bare Root Seedlings? Should production be adjusted down to account for the necessary caution around them?	No
4			Ref: 09 02 5 2 Stone for Rock Riffles, Price per ton of Riprap seems low.	Disagree, based on current pricing
5			Ref: 09 06 4 Stoplog Structure (canal 1), Where are the stoplogs for this structure priced?	All inclusive based on historical data from Chain of Rocks Design All inclusive based on historical data from Chain of Rocks Design
			ED-H Comments	
1		C-9	C.3.2, Is the 409.4 NGVD Flow line used in reference to the 2700 CFS maximum capacity for Cahokia canal or are they separate?	None – Information provided establishes planning parameters effecting potential actions.
2		C10	Why is there no mention or consideration for the Metrolink tracks that run directly adjacent to the Harding Ditch? Or does the railroad track mention constitute this?	None – Metrolink tracks are not impacted and do not effect planning at this location.

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3		X	I know this is far along in the study, but is FEMA a partner?	None – IEMA nominated this project for the Flood Plain Management Award in 2001 they have been involved in the process and are supportive of the project. The project does not remove any areas from the Flood Insurance Program.
4		1-12	Assumption made from the drawing on this page that O'fallon is not a major player in this study or the construction phase of the project	None – this is a correct assumption O'fallon's interest would only be in the proposed dry detention basins falling within their jurisdiction.
5		1-13	What is the arrow pointing to the E. St. Louis region place to show?	None – there is no arrow the boundary in this location gives the appearance of being an arrow
6			Noticed that MLA source documentation style is being used, this is good	None
			PM-EAE Comments	

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9		5-18	Section 5.4.2.2, 1st para; "because flooding of long duration (on the order of weeks and months) can kill submerged vegetation, introduced flood events, especially those of greatest depth, would need to recede in a shorter amount of time than what the Mississippi River once did, in order to maintain the integrity of plant communities occurring in existing wetland resources that are relatively scarce today.." – Do we not think that we could establish a seed source that could come back after a long duration flood? If we mimic natural processes, shouldn't the areas dry out eventually in some years as well, resulting in vegetation mortality? I am not so sure that having a devastating event is bad. Are you saying it is too risky? If devastation was allowed to occur on rare occasions, wouldn't it be beneficial to boltonia? Also, was the driver for habitat here the Mississippi flood pulse, or upland flood pulse. If upland, I understand the reasoning behind less duration, but I would think velocities would have been greater than a flood from the MS.	Local seed sources most likely would be established that could regenerate plant communities in project area wetlands, but maintaining a viable seed source would be much more problematic for woody rather than herbaceous vegetation, especially mast tree species that are to be reintroduced. At the other extreme, there should be periods of "dry" years that may result in the loss of some of the wetter plant species. Rare flood events of great duration would not be considered to be devastating or risky if it were not for the scarceness of today's remaining wetlands, especially forested ones. Flood pulses, especially longer ones, should benefit Boltonia. The historic "driver" of floodplain wetland hydrology varied depending on stage of the Mississippi River; when it was low, flow from upland watersheds was dominant, and when it was high, upland tributaries constituted

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10		II-1	Shouldn't section four in the table of contents have a star by it indicating it is required under NEPA?		No, section 1502.10 of the CEQ guidelines does not indicate that future-without project conditions are part of the "standard format" for preparing EISs.
13		2-40	Section 2.5.2, last sentence; Wildlife habitat is not a function. Perhaps change "affected other functions, such as wildlife habitat" to "performed other functions, such as serving as wildlife habitat" or something of that nature.		No, "provision of wildlife habitat" is a function of wetlands, following the HGM method for assessing wetland functions.
14		3-67	Section 3.12.2; Habitat tables – Shouldn't the range be from the lower extremity of numbers to highest extremities of numbers calculated for each site rather than starting at zero for each? Also, how can you have a range of HSI for prairie if you only had 1 site?		Yes. A value of zero for the lower end of the range indicates that at least one evaluated site had no habitat value. The evaluated prairie site consisted of several sample points that were averaged.
15		3-78	Section 3.12.2.6.4, 1st para; It is unclear that SHAP and AIBI are IEPA programs or methodologies. Cite reference.		Comment noted. This section will be modified to clarify that these methods were employed by the IEPA.
16		3-84	Section 3.12.4.2., Aquatic Biota; I suggest citing reference for MBI. It is not clear who this was developed by (IEPA?)		Comment noted. This section will be modified to indicate who developed the MBI method.

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18		3-86	Section 3.12.4.2., Mosquitos; It would be nice if you could update the west nile virus discussion with updated information presented by Richard Lampin of INHS at the last UMRCC. He had some good information.	Comment noted. This section may be updated in the final report provided the INHS has new information available. Otherwise, updated information on West Nile virus can be included in NEPA documents to follow the programmatic EIS.
20		4-5	Section 4.4; I would suggest some wording detailing the lack of data available to the team for making good quantitative estimates of future development in the project (lack of really good future without picture).	Comment noted. More detail will be added to the beginning of Section 4.4 to discuss the lack of specific data.

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21		4-1	General question; It is clear that the assumptions on loss of habitat types was based mainly on development, thus those sites on private lands exhibit anticipated losses, and those on public lands do not. What about the rate of loss due to aquatic to terrestrial areas? Conversion of marsh to bottomland hardwood could result in overall gain in bottomland forest if the rate of marsh loss was greater than the rate of bottomland forest (net gain for bottomland). The study does recognize sedimentation as a major problem. This was recognized for lakes and ponds, but I didn't see this for wetlands so much. Do wetlands just not get as much direct input as lakes?	To establish trends for the HEP analysis, the biology team made forecasts about the rate of loss of habitats in the study area due to future development, but "losses" due to conversion from one habitat type to another as a result of sedimentation, for example, were not addressed at this scale. However, at the scale of individual project areas, these "losses" (conversions) were accounted for in the HEP analyses. With regard to rates of sedimentation in aquatic areas versus wetlands, wetlands generally do not get as much direct input as lakes because of the way in which the study area's interior flood control system is designed. Flood plain wetlands have been engineered out of the system, but Horseshoe Lake, the largest lake in the study area, is used as a temporary storm water detention area, and as a result receives much sediment.

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22			Section 4.4.2.1, Plants; Second to last sentence. When you say loss of diversity, you should probably say "diversity of native species", because of the non-natives that may increase in the area.	Comment noted. This section will be modified to clarify that the referenced loss of diversity pertains to native species.
23		6-24	Section 6.4, 1st para; In the TY0 and TY50 without project, the total number of HEP sites is 185 sites among all habitats, but here you mention that there were 160 sites. Also, here you mention 112 sites evaluated using HGM, and n the TY0 and TY50 without project you mentioned only 3 were evaluated (Dobrey Slough, Elm Slough, Brushy Lake). I don't follow. The ES shows these numbers, but the text of the report (other than here) do not.	The draft report consistently mentions that there were 160 sites evaluated using HEP. These sites and the 112 HGM sites were used to establish baseline (habitat and wetland function) conditions in the study area. HEP was used to assess project-related effects at all nine "major" action areas. HGM was applied at only three of the nine because not all HGM models were completed.

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24		6-1	Chapter 6; General Comment - Good Env. Planning methodology and seems well thought out. I can follow how you identify potential sites within watersheds, figure potential measures for each, identify meaningful combinations of sites that would best contribute to the goals of the project, then determine their effectiveness as stand alone or units, put together a characterization of each site (I would call it a fact sheet), crunch out feasible alternatives, and run ICA. Thanks for sparing the reader the pain of looking at endless combinations of specific measures within each individual site and doing an analysis of each combination of possible measures.	Comment noted.
25		Overall	Pre and Post Project Habitat Sections; General Comment – It seems like there is a lot of detail in characterizing habitat for a "programmatic" type of document, and that much of this could have been left to the individual site planning during implementation. Effort to develop an HGM approach was a good idea to help in further individual project development, however the detail of habitat analysis seems extensive. Level of detail of a programmatic document is to justify authorization of the East Side Project, but not necessarily to justify the individual projects, as this document appears to come very close to doing.	The level of detail used to describe pre- and post-project habitat conditions was considered necessary because the outcome of formulation is a series of individual projects, and not a concept-level plan. Presentation of this level of detail in future decision documents rather than in the current report would not provide a strong basis of support for justification of these individual projects.

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26		7-41	Section 7.11.1.2.3; Might there have been a better species to use in showing benefits of a prairie restoration, such as grasshopper sparrow or other prairie dependent bird. I think the meadowlark is somewhat of a generalist compared to other bird species that could have been used (p.s. I am a fish biologist).	In addition to the eastern meadowlark, the biology team considered the field sparrow and marsh wren for evaluation of prairie habitat. The meadowlark was chosen after a respected ornithologist within the District recommended it over the other two.
27		7-44	Section 7.11.1.3.4; Isn't it difficult to mimic timing of MS river flooding based on flashy upland flooding versus seasonality of flooding of MS river.	No, not in terms of seasonal timing. As noted in Table 3-24, average monthly rainfall data for St. Louis indicate wet periods during spring-early summer and again in fall. This annual "timing" is very similar to that of typical Mississippi River flooding (April-June, Sept.-Nov.). "Flashy" storms in historic upland watersheds probably resulted in shallow but prolonged flooding in the bottoms.

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28		7-45	Section 7.11.1.3.4; General comment – Could you have suggested, or was it though of, to stock fingerling "MS river species" into the project areas during spring, to mimic the recruitment of YOY that overland flooding would have provided to the river?	Stocking of fish such as young-of-the-year into project areas was not considered. Of the recommended action areas, the one most amenable to stocking would be Mullens Slough. Stocking could be considered at this or other areas in future planning.
29		7-45	Section 7.11.1.3.4; Table 7-17 – I see surface elevation, duration, acres, volume, inundated area, habitat type, but no mention of timing. This gets back to the comment I made in 27 above.	Unlike the other parameters, timing of a storm water flood pulse cannot be manipulated or altered, and because of this it was not included in the table. If it were included, it could only reflect rainfall patterns derived from historic precipitation data, and would not differ from one proposed action area to another.

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Comment Number	Drawing/ Number	Page/ Space	**COMMENT**	**ACTION**
31		All	Comment on habitat analysis; We talk about (and it appears this is the main criteria) increasing overwintering habitat, however, it is not obvious that overwintering is limiting in the project area. Is there a rate of loss of existing overwintering areas due to sedimentation? What is the extent of overwintering acres pre and post? I paged through the habitat appendix and didn't find much on this.	Although extent of overwintering habitat for fish in the study area was not specifically described in the main report or Appendix A for existing or future conditions, forecasts of change in surface area and depth of lake and pond habitat were made. The report will be modified to address overwintering habitat.
33		A-7	Last Para, line 5; It states that "as a second rule, there must always be a TY = 1...". That is a rule? It doesn't make sense to measure target year 1 if benefits or negatives are not expected directly after construction of the project. I understand using a TY1 if you do something that provides instantaneous benefits (e.g. dredge out critical overwintering areas). I think target years are picked based on capturing benefits.	Comments noted. The sentence should be changed to indicate that the first target year after the baseline year is TYX1, and the ending target year is TYX2. Nevertheless, the biology team selected TY1 as the first target year to be evaluated after the baseline year in order to capture benefits.
34		A-36	Existing cover types list; I am curious if palustrine emergent is covered under marsh habitat, and if not, where is that habitat type covered?	Yes, palustrine emergent is considered to be marsh habitat.
35		All	General Comment – Was there any effort to outline a monitoring plan that would be suitable to track success/failure of the project?	Comment noted. Section 8 will be modified to outline such a monitoring program.

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36		A-72	1st para, line 3-4; "...if the percent of ground cover in the PFO PWAA's at Site X was 50 percent on average, the value "20" was entered into the..." Twenty should be changed to "50".	Comment noted. The sentence will be corrected.
37		A-72	Last para, line 3-4; Each answer, referred to as the PWAA FCI or PWAA FCI,... – I don't understand, PWAA FCI or PWAA FCI (or is between two acronyms that are the same, shouldn't they be different if you have an or statement?).	Comment noted. The sentence will be corrected.
			ED-G Comments	
1		8-50	Par. 8.3.4.2, The use of 8 inch concrete for channel protection appears inappropriate for protecting the channel. The presences of erodiable materials will most likely result in undermining the concrete slabs and result in a maintenance responsibility that certainly is not intended. Vegetative matting in concert with graded stone protection will produce the same protection and be environmental friendly as well. Suggest that an examination of Cape Girardeau, Walker Branch be made to observe the application of the various geotextiles and graded stone that was applied there to protect against erosion as well as maintain the project features. The weep holes that are to be placed in the concrete will clog up and vegetation will follow. This will be a maintenance issue requiring the sponsors to spend more time than it is worth to keep operational and free from vegetation	Concur with concern. The design of the high efficiency channel design will be reevaluated during the preparation of the P&S.
2		8-51	Section. 8.3.5, Par. 4, fourth sentence, The covering of the riprap with two feet of clay cover appears in appropriate. If the riprap is to protect against scouring then what will the two feet of clay accomplish? If the is sacrificial cover then it appears this may be counter productive in that the clay sediment will be eroded and transported into the ecosystem with possible adverse effects elsewhere. Since this riprap is located upstream of a detention structure this feature may not be necessary since the bottom velocities should be low enough for vegetation assisted with a geofabric to survive. This should be looked into further with the hydraulic data and soil data	None- The riprap is needed for scour protection of the mat founded roller compacted concrete structure. The 2-foot of soil was to reestablish vegetation and habitat as a mitigating environmental feature.
3		8-55	Section. 8.3.9, Par. 1, The use of flap gates has been the conventional control mechanism for culvert pipes. It is suggested that "Tideflex" valves be used instead. Metropolitan Sewer District, St. Louis is using these extensively and there is little maintenance associated with this valve	Concur. The "Tideflex" type of valve will be designed in the preparation of P&S.

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4			General Comment. The use of corrugated metal pipe (CMP) should be eliminated and concrete pipe used instead. The issues with aging CMP's in the St. Louis District levee systems are well known. The use of this type of pipe initiates the beginning of replacement at a future date. This should be eliminated if at all possible		Concur. Concrete pipe will be designed in the preparation of P&S.
5		8-63	Section. 8.5, Par. 1, Will the periodic inspections mentioned be performed by the sponsor, the Corps or both parties? If performed by the Corps, has cost for this activity been included in the O&M cost for the project?		Since the project is for environmental restoration and not flood control, Corps inspection is not anticipated.

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Comment Number	Drawing/ Number	Page/ Space	COMMENT	ACTION
6		8-64	Section. 8.7.1, Par. 1, also page 8-67,Section 8.11.3, par. 1, What is the approximate completion date for the pilot study being conducted on Judy's Branch and what is the scope for the study	None - The Judy's Branch Pilot Study has been underway since FY2000 with stream gaging, bank rod monitoring and sediment transport modeling. During FY2003 a hydraulic model has been completed for the stream and a reconnaissance investigation is under way with sediment transport modeling and in-stream stability design to be completed in early FY 2004. Monitoring of this stream once measures are in place as currently planned will last approximately two years so that pre and post conditions can be measured and analyzed.
7			General. The use of roller compacted concrete is a good choice. It is recommended that the use of boulder-crete or grouted riprap be examined for application to these features both detention structures as well as channel protection. This method is being used in other Corps projects and appears to have a good application for project features within this study area.	Noted. The roller concrete mix design has not been determined. Boulder-crete and grouted riprap will be examined if near vertical placement can be achieved.
			RE Comments	

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Comment Number	Drawing/ Number	Page/ Space	COMMENT	ACTION
1	Appendix "H"		Exec summary say sponsor is MESD in 4 party agmt. REP project description depict Madison & St. Clair as sponsors with Illinois funding.	No Action-Section 3 of the Executive Summary identifies MESD as the Study Sponsor and Section 7 of the Executive Summary identifies Madison and St. Clair Counties as the Construction Sponsor.
2	H-2		Under permanent easement section "will require… will be req'd is redundant throughout report.	This was changed.
3			Show distinction between intro and summary throughout	The format has been changed to summarize each site and a final summary of the entire project area.
4			I. Old Cahokia Creek – is Judy's Branch a tributary??	None-Not a tributary
5			What's significance of 10 uplands - last sentence???	None-For each area with an upland component the number of upland sites were identified.
6	H-3		Is flowage easement necessary in a floodplain? Para "c"	None-Our project will induce additional flooding in some areas see Para 9.
7			Para "c" is it correct that 278 ac in floodplain comes from 7 parcels and 4 owners?? II. Judy's/Burdick	None-These areas are farms owned by a few landowners.
8	H-4		IV. Elm Slough encompasses 664 acres yet 670 fee acres req'd??	Noted-Will be corrected to 670 acres.
9			The repetition of why fee is req'd could be drafted into introduction paragraphs describing land acquisition strategy.	Noted-The format has been revised and this is worded differently.
10	H-5		Is 157 a highway?? 1st paragraph	Noted-157 will be identified as a route.

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11			VI. Cahokia Mounds – encompasses 519 ac, but 525 ac req'd??	Noted –Acres should be 525. Will be corrected.
12	H-6		Is Centerville a City??	Noted-Will be identified as the City of Centerville.
13			Summary statement shows inconsistent acreage totals	Noted-Has been corrected.
14	H-8		There 196 parcels held by 126 private landowners	Noted-Will clarify private landowners and parcels.
15	H-9		No data	None-Page missing from disk.
16	H-10		Para 3 – indicates MESD will not be involved in land acq. Need discussion in REP on who will acq and hold title.	None-Covered in H-1. MESD is a partner with the same status as State of IL
17	H-12		Para 15 - Will one-year acq schedule run concurrently for each area??	None-It will run 1 year for each area after Final ROW for that area is provided.
18			Para 16 – 2nd sentence REP prepared???	Noted-Will be corrected to Real Estate Plan
19			Para 18 – 3rd sentence what kind of development, if known.	Noted-Will be corrected to include housing and commercial development.
			PM-FE Comments	

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Comment Number	Drawing/ Number	Page/ Space	COMMENT	ACTION
1		7-19	May be questions regarding validity of using Monarch-Chesterfield curves in E. St. Louis	The Monarch-Chesterfield curves were developed by the St. Louis District for the St. Louis area. They were provided to the Vicksburg District for utilization in the flood damage evaluation of the East St. Louis project area. These curves were deemed indicative of the type of flooding and construction practices prominent in both the St. Louis area and the East St. Louis project area. The depth of flooding and the resulting damage to structures is based on a depth-damage factor. It does not change the value of site-specific structures. It estimates the loss based on a percent damage factor for each flood depth incurred by each structure. Thus, these curves were determined to be applicable to the East St. Louis project area.

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2		7-23	under Structure Value – How are error values for structure values related to mean values of structures and standard deviations around that mean	Since a detailed real estate appraisal cannot be done for each structure in the area, we assign an error value to account for uncertainties that may occur in estimating structure values. The actual structure value in this case is the expected mean. Standard deviation is a representation of an estimate of error, or deviation, around the mean. The standard deviation is the average deviation from the mean.

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3		7-26	Is there a difference between expected banefits and those benefits which have a 50% probability of being exceeded as indicated in the tables?	There is a difference in expected annual benefits and benefits which have a 50% probability of being exceeded. The value shown in the table is considered to be the mean of the expected annual benefits. However it appears that the damage function that is produced in the HEC-FDA program is not normally distributed. In this program the damage-exceedance probability function is not analytic since it is derived from rating curves, stage-damage relationships, etc. that are not analytic. The table that presents the 75%, 50% and 25% probability values presents the results of the risk based analysis of the expected annual benefits
4		Appendix A	Each area is analyzed using CEA (cost effectiveness analysis) and an ICA (incremental analysis) which based upon the text will always produce the same results. This should be explained or clarified	Noted - Will be clarified
			PM-EAC Comments	

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Comment Number	Drawing/ Number	Page/ Space	COMMENT	ACTION
1			Although cultural resources are only an "incidental social objective" in this study, these are among the most important archaeological resources in the world. I had expected more coordination (documented and otherwise) with Illinois State Historic Preservation Officer (ISHPO) staff and Cahokia Mounds National Historic Landmark (CMNHL) site staff Because of the importance of the CMNHL and other archaeological sites within the general project area, I discussed some of my concerns with Tim George (Tim George) on 18 March 03. As I told Tim, previously I had discussed the project with relevant ISHPO staff, Joe Phillippe and Anne Haaker.	None -Numerous coordination meetings were held with the ISHPO on the project during formulation. Preliminary Agency Coordination occurred on 9 Jun 1999 where a variety of Spring Lake and Cahokia Mounds Alternatives were discussed in detail and again on 15 October 1999 were the final Spring Lake and Cahokia Mounds alternatives were approved by the ISHPO group for plan development. These are the plans that were displayed at the Feb 2000 Public Meeting. Section 6 identifies the numerous alternatives eliminated due to this coordination process. The Reviewers coordination outside of the Team with the ISHPO staff can not be addressed as the project team was not advised by Reviewer of these activities.

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Comment Number	Drawing/ Number	Page/ Space	COMMENT	ACTION
2			ISHPO was unclear whether Corps was considering this NHPA coordination, since this was not explicitly stated or if this was just intended to be only NEPA. If only NEPA, they were not inclined to comment. I have urged TG to e-mail Haaker, telling her that we did want NHPA review. We definitely need ISHPO comments at this point, and we need to see if they have any positive ideas which could be incorporated into plan.	None - The draft is out for review by all interested parties as stated in the public notice.
3			ISHPO staff said they and CMNHL had <u>not</u> seen the current proposals and had concerns. (Executive Summary, Section 3, p. iii, states there was close coordination with ISHPO during formulation and plan evaluation stages, this should include the recommended plan as well). TG said he was setting up meeting at CM,NHL possibly to include ISHPO staffers. Although it would have been better to coordinated with present CMNHL staff earlier (since there has been a staff change since earlier coordination was done) there is still time to do this before the report is finalized. Is it possible to partner with ISHP0 and CMNHL, similar to partnerships/cooperating agency relationship with other federal and state agencies?	None - the ISHPO staff has seen the current plan on several occasions. Study team was directed by the ISHPO office to coordinate details of the Cahokia Mounds plan with the site manager. This was accomplished and the current plan reflects site manager's desires. It is not assumed that change of site managers impacts program decisions. Current site manager was involved in all formulation coordination meetings on the project.
4			I found little documentation of coordination with ISHPO and CMNHL, there was no correspondence or e-mail. I assume this will be included in Appendix J final report, including anything generated during the review period.	None - assumption is correct
5			ISHPO expressed opposition to proposed Spring Lake Action Area, new Fairmont City (Indian Lake) ditch (Recommended Plan, Section 8.4.4, p. 494); they consider this an adverse impact. TG and I discussed problems (need to move houses) with using Landsdown ditch to carry water. Suggest discussing the adverse impact angle with ISHPO and Advisory Council on Historic Preservation (ACHP), perhaps we and they can find a way to mitigate impact through survey and site mitigation.	None - ISHPO specifically endorsed this plan on 15 October1999. Further coordination will occur as required.

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6			Tribal coordination had not been initiated when the review document was prepared. TG said ED-Z was contacted to initiate tribal coord. I assume documentation will appear in final document (Appendix J?).	None - Tribal coordination was initiated at the same time as public coordination. ED-Z furnished applicable tribal addresses for direct mailing of materials.
7			Appendix G, I would like to see discussion of NEPA and NHPA scoping for archaeological concerns, -- did you consider other entities (groups doing research in area, professional and public archaeological groups) besides ISHPO and CM and ITARP -- since this is such a rich archaeological area?	None - Scoping was open to all entities. Appendix G reflects this process.
8			I told TG my concern about prairie fires (vandalism, lightening) in vicinity of CMNHL if there are large areas of prairie (Recommended Plan, Section 8.2.6 (p. 459). TG said they will manage the prairies in thirds, have firebreak around perimeter. Does the town/local fire department have any thoughts on this?	None - No, burning is just one of the potential methods of maintenance that can be used. These will be further explored and detailed during follow-on project development.
9		D. 9	Appendix D, Geomorphology, Sections D.4.2.1 (p.D.9), Alluvial deposition , Fluvial geomorphology and D. 4.2.3 (p. D.15) colluvial deposits - Suggest you consider including results of Cahokia Canal and Canteen Creek rehabilitation project geomorphological study by Ed Hajic. This is much more specific to portions of the present study area, including depths of post settlement alluvial and colluvial deposits, than the boilerplate that is presented.	None - As Engineering Documentation Reports are developed for each site this information and other pertinent documentation of this nature will be further developed and explored.

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10		184	Section 3.14 (p.184) Existing conditions, cultural resources - at least give the rough number of reported prehistoric sites within the project area.	None - Does not seem prudent to guide the public in any way to the areas we identify by reporting numbers of sites. This information was considered confidential.
11		533	Section 11-4 (p. 533) Delete reference to "final disposal action" and "Fort Chaffee". IFC is not federal property. Suggest using NHPA laws section from Chesterfield Feasibility Study, which is more applicable to a federally assisted undertaking on non federal property and also is more inclusive.	Noted - Will review and evaluate referenced section for applicability.
			CO-F Comments	
			As stated the recommended plan would require authorization under Section 404 of the Clean Water Act, as well as Sections 401 and 402. During the design phase on-site jurisdictional delineations would be necessary to determine specific wetland acreages, wetland types and quantity of unavoidable impacts to same. The preferred method of compensation for unavoidable losses to wetlands and waters of the United States is acreage based, in-kind. The use of out-of-kind compensation must be shown to be practicable and environmentally equal or preferable to in-kind compensation. Decisions to allow out-of-kind mitigation are made on a case-by-case basis during the permit evaluation process.	None - this process is understood
			Other factors affecting mitigation ratios include temporal losses between the time of impact and the time the mitigation site achieves a fully functional level and the likelihood of mitigation success. The acquisition of land for mitigation, in the appropriate locations, may present a problem given the extended timeframe of this project and the fact that so much of the study area is under pressure for development. Development which could eliminate or severely reduce mitigation potential in appropriate locations.	None - this process is understood

			PM-F Comments	
1		6-	In general in section 6.2.1, consider formatting the measures so the wrapping lines up. It'll look less messy.	Noted – correction will be made
2		6-12	There needs to be a line inserted before the "Planning Objective 8"	Noted – correction will be made

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3		6-59	Judy's – far right column needs to words "Carried Forward As" added	Noted – correction will be made
4		6-62	HA-55… In description, second sentence… "However, these sites form…"	Noted – correction will be made
5		6-63	In this table, is the second column really necessary if it's the same for every row?	None - Included for emphasis because of long series of previous tables.
6		6-75	For some reason there last paragraph got broken in the wrong place.	Noted – correction will be made
7		6-78	Remove extra blank line in first para	Noted – correction will be made
8		6-83	Last sentence… "On such occasions..."	Noted – correction will be made
9		6-91 onward	Throughout section 6.10 consider replacing the words "will" with "would" and "are being evaluated" with "were evaluated".	Noted – correction will be made
10		6-	Section 6.11.4. In the table, are the colors for 1 and 2 reversed in the HEP column?	None – colors are correct
11		6-95	Table. Aren't we missing a "#1" label by "Prairie buffers"?	Noted – correction will be made
12		6-96	Second para. Second sentence. Is "moderate-extensive" supposed to be "moderate to extensive"?	Noted – correction will be made
13		6-99	Second para. Why is "area" footnoted and if that's right, where's the footnote?	Noted – footnote symbol will be removed
14		6-103	Table. Second row is cut off. Burn/mow note is unclear.	Noted - will be corrected
15		7-1	Remove period from middle of 7.3	Noted – correction will be made
16	Fig 7-1		It's very hard to see the action area boundaries. Consider thickening the lines.	Noted – correction will be made

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17		7-16	7.2.2.2.1. What appendix?	Noted – word appendix will be replaced with section.
18		7-41	Second sentence. Consider adding word "types" into first set of parentheses.	Noted – correction will be made
19		7-47	Second sentence. Re-write end to read: "to the north of the old railroad embankment, which is now a bike trail".	Noted – correction will be made
20		7-50	First para. Put parentheses around FCI	Noted – correction will be made
21		7-74	Section 7.18. First sentence. Forecloses?	Noted – forecloses will be replaced with eliminates
22		8-20	Second para, fourth sentence. Need to replace x with a number.	Noted – correction will be made
23		8-67	Last para. Katy trail is spelled wrong.	Noted – correction will be made
24		9-3	Second para. I think an EDR is an Engineering Documentation Report.	Noted - correction will be made
25		9-4	In 9.2.2, is the Madison and St. Clair County Park District the same or different from the Metro East Park (and Recreation?) District?	Yes
26		9-8	Para's 3 and 4 seem to disagree regarding where the schedule is located – appx K or I.	Noted – correction will be made
27		9-11	First sentence. Change proceed to preceed.	Noted – correction will be made
28		I-2	Don't forget to fill blank in last sentence.	Noted – correction will be made
			ED-DCC Comments	
1		13-2	In **Para. 13.1, CORPS OF ENGINEERS**, the 7th person from the top, change Catherine "**Fix**" to Catherine "**Fox**".	Noted – correction will be made
			ED-H Comments	
1		C-9	C.3.2, There is an extra space before the comma in the last sentence, "…stored and still stay , within…"	Noted – correction will be made

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Comment Number	Drawing/ Number	Page/ Space	COMMENT	ACTION
2		1.3.3.1	First sentence should be "1800's" not "1800,s"	Noted – correction will be made
3		1.3.3.4	First sentence, there is and extra, "..of the"	Noted – correction will be made
4		1.3.3.5	First sentence, there is an extra space before the 3 in 1,349	Noted – correction will be made
5		1-13	Boundary (frame) of the drawing needs to be "re-cropped" or expanded, there are areas outside this boundary.	None – designed to appear this way
6		1-15	Re-crop the boundary/frame or expand the boundary of the drawing	None – designed to appear this way
7		1.6.1	4th line has and extra space and the should be space after semicolon following levee	Noted – correction will be made
8		1.6.3	There should be two spaces following the period after "area" and before "Flooding", also "table" and "in"	Noted – correction will be made
9		1.6.3	Last sentence should read something like, "An additional $5 million dollars has been spent…," sentence begins with a number and subjective verbiage used instead of active	Noted – correction will be made
10		1.6.4	4th paragraph, first sentence, comma should be inside the quotes	Noted – correction will be made
11		2-17	Picture extends past the boundaries of the frame	None- Display is fine as is
12		2.3.4.1	4th sentence, place the period inside the end quote	Noted – correction will be made
			PM-EAE Comments	
1		vii	Table ES-2. Caption; Correct spelling of construction.	Noted – correction will be made
2		3-9	Section 3.1, 2nd para; Correct spelling of patterns	Noted – correction will be made
3		3-50	Section 1.10.2, 1st para; Change (ie:construction) to (i.e.: construction)	Noted – correction will be made

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Comment Number	Drawing/ Number	Page/ Space	COMMENT	ACTION
4		3-108	Section 3.16, 1st para; Correct spelling of smorgasboard	Noted – correction will be made
5		3-108	Section 3.16, 1st para; Correct spelling of Mississippi	Noted – correction will be made
6		3-77	Section 3.12.2.6.2, 1st para; Correct spelling of desiccation (misspelled twice in that paragraph)	Noted – correction will be made
7		3-88	Section 3.12.4.3, 5th para; Change unsTable to unstable	Noted – correction will be made
8		ii	1st 2 words on page; Change left bank to left descending bank	Noted – correction will be made
9		1-10	Section 1.3.3.1, 1st para; Change 1800,s to 1800's	Noted – correction will be made
10		5-9	Section 5.3.1.5, Figure 5-2; Change alcal to algal.	Noted – correction will be made
11		3-85	Section 3.12.4.2., Mosquitos; I assume question marks are an electronic boo-boo for marking the bulleted list. If not, I would use bullet marks other than question marks.	Noted – correction will be made
12		8-87	Section 3.12.4.3, para 4; Correct spelling of lake chiubsucker	Noted – correction will be made
13		All	Overall Comment; Correct spelling of over wintering to overwintering.	Noted – correction will be made
14		A-2	Para 3, line 5; Correct "ease of reaching" to "ease of reading"	Noted – correction will be made
15		A-77	1st para, 1st line; Change agenc ies to agencies	Noted – correction will be made
16		A-1	General comment – what is with all the question marks in the equations? I have never seen math equations with question marks.	Noted - correction will be made this happened as a function of converting the file to pdf. format
17		A-116	Was this page left blank intentionally?	None - Yes
			ED-G Comments	

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1		8-51	Section. 8.3.5, Par. 1, -second line, The word "rain" is in error	Noted- will be corrected to read rainfall
2		8-54	Section. 8.3.6, Par. 1, sentence 7, The size of the material for the bike path surface is missing. Same on page 8-49, Section 8.3.4.1. Section. 8.3.8, Par. 1, last sentence, There is a word(s) missing to complete the sentence	Noted – correction will be made
			RE Comments	
1			Table of Contents II-1 spelling "members"	Noted – correction will be made
2			Capitalize Canal No. 2nd paragraph, 3rd sentence	Noted – correction will be made
3			Page alignment distorted	
4	H-7		VIII. Wedgewood – 4th sentence, "…most of the 105 acres s/b 124 acres	Noted – correction will be made
5			IX. Spring Lake – 4th sentence Each of the three …	Noted - correction wil be made
6			Capitalize Lake in Indian Lake	Noted – correction will be made
7	H-11		Para 11 – relo asst … req'd for landowners…	Noted – correction will be made
8			Para 17 – EPA region 5	Noted – correction will be made
			PM-FE Comments	
1		6-90	use "project" rather than "current" in paragraph 6.90	Noted – correction will be made
2		7-19	should be "depth-damage curves" on line 6	Noted – correction will be made
			PM-EAC Comments	
1		6-83 & 321	"such" not "sucks"	Noted – correction will be made