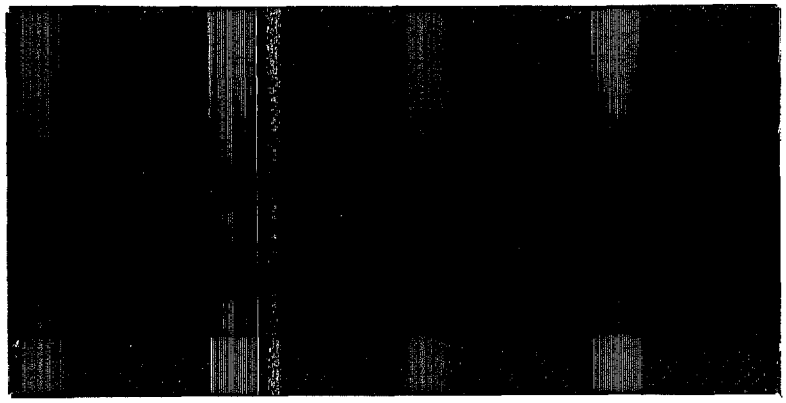
New Hampshire CZM W.P.

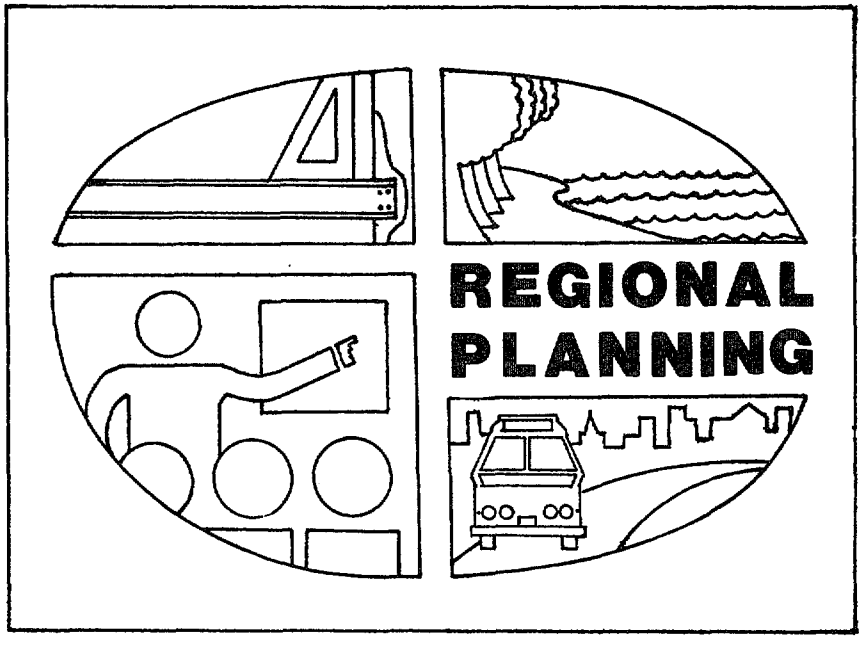
Rockingham Planning Commission

New Hampshire Coastal Zone Management Program



COASTAL ZONE

INFORMATION CENTER



EROSION & SEDIMENT CONTROL

ROCKINGHAM PLANNING COMMISSION
121 Water Street
Exeter, New Hampshire 03833

March 1986

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EROSION AND SEDIMENT CONTROL

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INTRODUCTION

Erosion due to highway construction, residential and commercial development is approximately ten times greater than on agricultural land, 200 times greater than on pasture land, and 2,000 times greater than on forest land.[1] Construction site erosion kills fish, and accelerates the filling of lakes, wetlands, streams and coastal estuaries. Carefully applied erosion control measures, on the other hand, can reduce soil loss by 90%, at costs of one half to one thirtieth of the cost of cleaning up sediment caused by poor protection during construction.[2]

This report and model regulation (Appendix A) is intended to assist local planning boards and property owners in avoiding the adverse consequences of unnecessary erosion during construction.

Help is available from the New Hampshire Coastal Program Office, the Soil Conservation Service, the N.H. Association of Conservation Commissions and the Rockingham Planning Commission (Appendix C).

[1] U.S. Environmental Protection Agency, Comparative Costs of Erosion and Sediment Control: Construction Activities (Washington, 1973).

[2] ibid.

VEGETATION

Vegetation shields the soil surface from falling rain, slows the velocity of run-off, filters sediment, and tends to hold soil particles in place. Erosion and sedimentation are generally not problems in well vegetated areas.

SLOPE

The size and steepness of slopes have a direct effect on the velocity, and thus the power of surface runoff. The speed and distance water travels influences the amount of erosion that takes place.

CLIMATE

Erosion and sedimentation are also a function of the frequency, intensity, and duration of rainfall. When calculating runoff, most southern New Hampshire planning boards assume a "25 Year Storm", that is the expected rainfall in a 24 hour period during the worst storm in 25 years. Some require designs to accommodate a 50 year storm. Others plan only for a 10 year storm. Appendices D, E, and F provides approximate anticipated rainfall for each of these storms.

SAMPLE EROSION CONTROL MEASURES

Just as there are a number of factors influencing the amount of erosion which can take place in a given situation, so are there a number of different ways it can be controlled.

— Diversion Dike to intercept surface runoff at the top of a slope, before erosion can begin.

FACTORS WHICH INFLUENCE EROSION

Erosion is influenced by a number of factors or soil characteristics, vegetation, slope and climate. Each affects erosion in a different way.

SOIL CHARACTERISTICS

The permeability of a particular soil greatly influences surface runoff. The Soil Conservation Service maintains data on the permeability of all New Hampshire soil types (Appendix H). Published soil surveys which include applicable soil data sheets are available for Rye, North Hampton, Hampton and Hampton Falls. Soils maps and soil data sheets (not bound or collated) are available for Seabrook, New Castle and Portsmouth (See Appendix G for sample).

Soils that contain high proportions of silt and fine sand are highly erodible. Clay, on the other hand, tends to bind particles together, thereby limiting erodibility. Soils higher in organic matter contain many air pockets which tend to absorb water and also limit erodibility. Soils least susceptible to erosion are those consisting of well drained gravel or gravel/sand mixtures. The Soil Conservation Service rates the erodibility of various soil types with numerical co-efficients known as K-values. A quick determination of a soil's propensity for erosion may be reached by obtaining relevant K-values from the Soil Conservation Service soil data sheets:

A K-Value of	.23 and lower ... means.....	low erodibility
	.24 to .26	moderate erodibility
	.27 and higher.....	high erodibility

Help in making further detailed analyses of soils can be obtained by contacting a qualified soil scientist (Appendix I) or the Soil Conservation Service.

REQUIRED PERMITS

As indicated in Section 5 of the model regulations, (Appendix A) a particular project may require state permit(s). Dredge or fill projects involving wetlands require a permit from the New Hampshire Wetlands Board (telephone 271-2147) pursuant to RSA 483-A. Another statute, RSA 149:8-a, requires a permit from the New Hampshire Water Supply and Pollution Control Commission (telephone 271-3503) for " . . . any person proposing to significantly alter the characteristic of the terrain, in such a manner as to impede natural runoff or create an unnatural runoff . . " Commission regulations require this permit for any project involving more than 100,000 contiguous square feet of land area.

Dredge/fill projects which impact salt marshes or navigable waters of the United States also require a permit from the U.S. Army Corps. of Engineers. Specific requirements may be obtained from the Army Corps. at 1-800-343-4789.

-- Vegetative Buffer Strip to reduce water velocity and to filter sediment.

-- Seeding and Mulching to slow runoff and trap sediment.

-- Hay Bales to effectively trap sediment for short periods of time.

-- Snow Fencing to minimize the area of disturbance and prevent construction equipment from pushing debris onto other areas.

-- Sod Strips to provide instant vegetative cover.

-- Sediment Traps to intercept sediment-laden runoff and retain the sediment. Sediment traps are small temporary holding basins.

FLOODPLAINS

Floodwaters play an obvious role in soil erosion and the subsequent deposit of sediment. Floodprone areas have been mapped by the Federal Emergency Management Agency (FEMA). Copies of these Flood Insurance Rate Maps are on file at town halls and at the Rockingham Planning Commission. When reviewing proposed subdivisions and site plans, town officials should be aware of the 100 year flood zone, that is, the anticipated extent of the worst flood in a one hundred year period, as indicated on these maps.

PROJECT SIZE

The model erosion regulation (Appendix A) does not specify a minimum project size that would require an erosion control plan. That decision is left to the discretion of local planning boards. The state of New Hampshire reviews projects whose area exceeds 100,000 square feet; the state of Connecticut reviews projects greater than 20,000 square feet. Local planning boards should consider a minimum project size within this range.

ADOPTION AND ENFORCEMENT

The Model Erosion and Sediment Control Regulations may be incorporated into local subdivision or site plan regulations by following the procedures specified in RSA 675:6. Specifically, adoption entails a Public Hearing, approval by a Planning Board majority, and filing of the regulations with the Town Clerk.

The provisions of the model regulation are enforced like any other subdivision or site plan regulation. The bond provisions in Section 4 of the model regulations will insure compliance with planned erosion and sediment control measures.

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APPENDIX A

MODEL EROSION AND SEDIMENT CONTROL REGULATIONS

1. General

For the purpose of controlling soil erosion and sedimentation in surface waters resulting from site construction and development, no subdivision or site plan shall be approved without plans for erosion and sediment control, unless otherwise exempted by the Planning Board as provided below.

2. Where Required

The developer shall submit a soil erosion and sediment control plan for the entire tract of land unless there is a determination by the Planning Board that such a plan is unnecessary due to the size or character of the development, or to the natural conditions of the site. In no case shall a proposed development which involves the construction of a street or road, or results in the disturbance (stripping of vegetation) of more than _____ square feet of contiguous area, or will create a subdivision of more than _____ residential building lots, be approved without such plan. (See page 5 of accompanying guidelines for suggested project size)

3. Definitions

Runoff - The portion of rainfall, melted snow or irrigation water that flows across the ground surface and eventually is returned to streams.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice, and has come to rest on the earth's surface either above or below sea level.

Sloughing - A slip or downward movement of a extended layer of soil frequently resulting from the undermining action of water (waves) or the earth disturbing activity of man.

Surface Water - Water at or above the earth's surface.

4. General Requirements

A. The plan shall consist of a drawings, prepared at the same scale as that of the subdivision or site plan, approved by the Rockingham County Conservation District (RCCD), which identifies the various measures proposed for the erosion and sedimentation and their relative locations.

B. The design specifications for each such erosion control measure shall be submitted with the plan.

C. All erosion and sediment control measures planned shall meet the design standards and specifications set forth in the "Erosion and Sediment Control Design Handbook" as adopted by the RCCD.

D. The following standards shall be applied in planning for erosion and sediment control:

(1) Whenever practical, natural vegetation shall be retained, protected or supplemented. The stripping of vegetation will be done in a manner that minimizes soil erosion and shall be consistent with guidelines set forth in the "Erosion and Sediment Control Design Handbook".

(2) The Area of Disturbance shall be kept to a minimum and shall be protected from erosion during the winter months.

(3) Measures shall be taken to control sediment and retain it within the project area. To the extent possible, sediment in runoff water shall be trapped and retained within the project area.

(4) Final vegetation and permanent erosion control structures shall be installed as soon as possible following disturbances of the site, but no later than six months after commencement of site work.

(5) Off-site surface water shall either be diverted around, or conducted safely through, the project area.

5. Plan Requirements

A. LOCUS MAP

(1) North arrow, scale, date

(2) Property lines of the project

(3) Critical natural or man-made features within 3,000 feet of the project

B. SITE PLAN OF EXISTING CONDITIONS (Scale of 1" = 100' or larger)

(1) North arrow, scale, date

(2) Accurate property lines

(3) Easements

(4) Structures, utilities, roads and other paved areas

(5) Topographic contours at two foot intervals, keyed to USGS benchmark

(6) Slopes in critical areas

(7) Steepness of the grade expressed as a percentage

(8) Waterways, bodies of water, drainage patterns and watershed boundaries

(9) Calculations showing volume and velocity of present surface run-off

(10) Extent of floodplain (100 year flood)

(11) Existing vegetation: tree lines, grassy areas, and unique vegetation

(12) Soils information including soil names, soil type boundaries as determined by qualified Soil Scientist, Soil Conservation Service mapping numbers, erodibility co-efficients (K-values), permeability, depth, texture and structure.

(13) Areas with potentially serious erosion problems

C. EROSION AND SEDIMENTATION CONTROL SITE PLAN

(1) North arrow, scale, date, elevation datum

(2) Existing and proposed property lines

(3) Proposed structures, roads, utlities, topsoil stockpiles, equipment storage and stump disposal

(4) Existing and proposed topographic contours at two foot intervals

(5) Description of the basic strategies of the erosion control plan

(6) Proposed easements

(7) Limits of proposed soil disturbance

(8) Limits of cut and fill areas, indicating volumes of material in cubic yards

(9) Area in square feet of wetlands, including that portion disturbed or filled

(10) Construction schedule

(11) Earth movement schedule

(12) Soil exposure time of each area

(13) Description of the seeding and mulching plan, including:

(a) location of areas to be seeded

(b) lime and fertilizer application rates

(c) seed mix(es)

(d) seeding application rates

(e) seeding dates

(f) types of mulch materials

(g) mulch application rates

(h) mulch anchoring methods

(i) mulching dates

(14) Size, number and location of proposed trees and shrubs

(15) Description of all structural erosion and sedimentation control measures, with locations and detailed drawings of each

(16) Design calculations for all temporary and permanent structural control measures

(17) Calculations of construction and post-construction surface runoff, showing volume and velocity

(18) Name and phone number of the person on the construction site directly responsible for the application, inspection and maintenance of the erosion control plan

(19) Bond or other surety to insure implementation of proposed landscaping and structural erosion control measures

(20) Future inspection and maintenance schedule for all control measures

(21) Name, address, and phone number of the person or parties responsible for future maintenance and inspection

6. Responsibility For Installation/Construction

The applicant shall bear final responsibility for the installation and construction of all erosion and sediment control measures required by the provisions of this Section. Where erosion and sediment control plans call for the construction of permanent erosion or sediment control measures, the Planning Board may require a bond or other security in an amount and with surety conditions satisfactory, to the Board, providing for the actual construction and installation of such improvements within a period specified by the Planning Board and expressed in the bond or other surety.

7. Maintenance

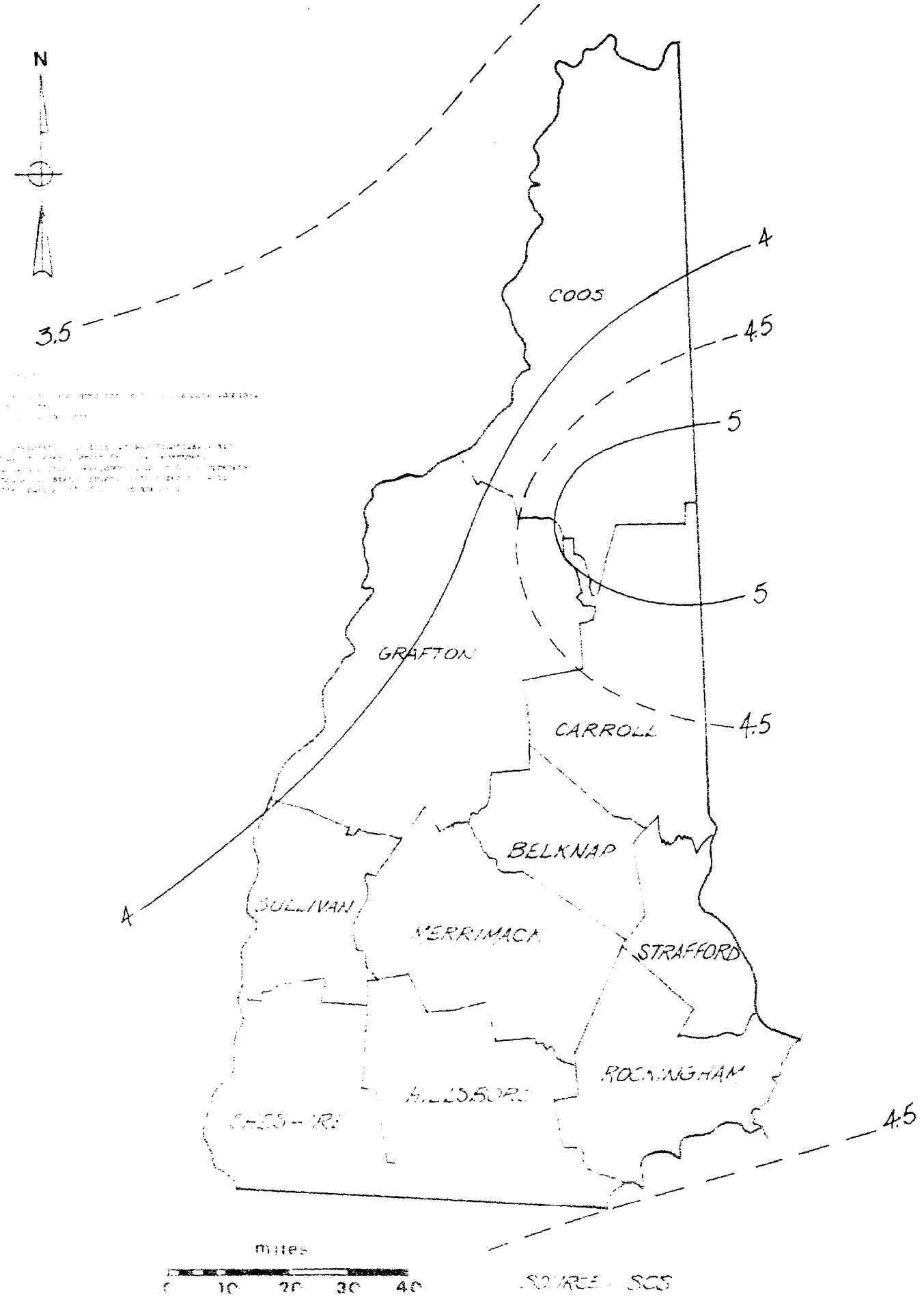
Individuals or developers carrying out soil erosion and sediment control measures under these articles, and all subsequent owners of property on which such measures have been installed, shall adequately maintain all permanent erosion control measures, devices and plantings in effective working condition.

8. Relationship to State Regulations

Copies of any permit required under State regulations such as those promulgated under RSA 483:A; and 149:8-a shall be submitted to the Planning Board prior to approval under this regulation.

10 Year 24 Hour Rainfall (inches)

APPENDIX C



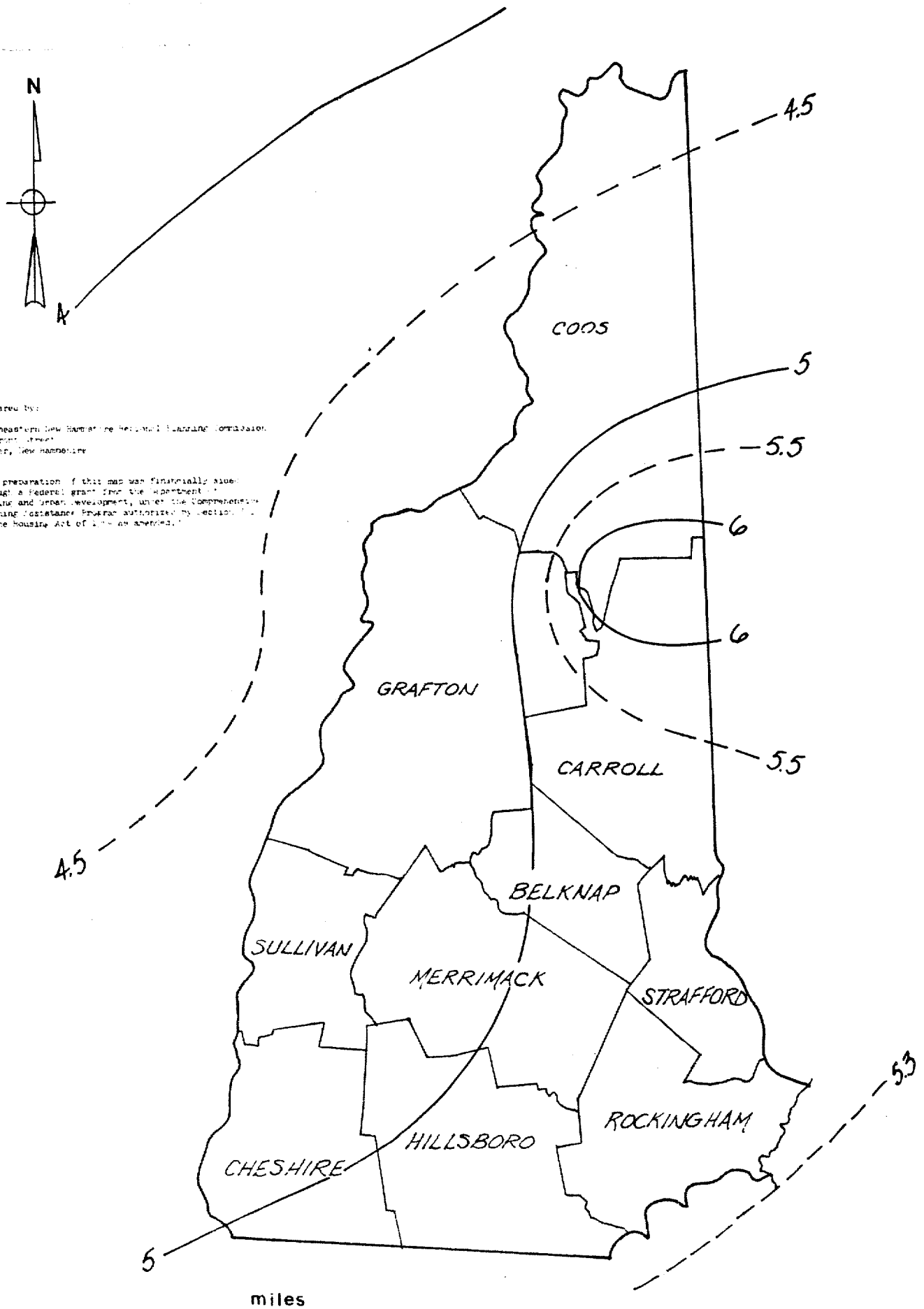
APPENDIX C

ASSISTANCE

New Hampshire Coastal Office 90 Fleet Street Portsmouth, NH 03801 431-9366	This office includes local representatives of the NH Wetlands Board and the NH Water Supply & Pollution Control Commission. Staff are particularly knowledgeable on wetlands and erosion control requirements relative to RSA 149:8-a.
Soil Conservation Service, USDA 32 Front Street Exeter, NH 03833 772-4385	This agency is clearly the best source for technical information on soils, erosion, and sedimentation.
Rockingham Planning Commission 121 Water Street Exeter, NH 03833 778-0885	Commission staff has a great deal of experience in the review and analysis of proposed developments in southeast New Hampshire.
NH Association of Conservation Commissions 54 Portsmouth Street Concord, NH 03301 224-7867	The Association may provide examples of the various types of assistance rendered by local Conservation Commissions in the review of subdivisions and site plans.

APPENDIX D

25 Year 24 Hour Rainfall (inches)



Prepared by:

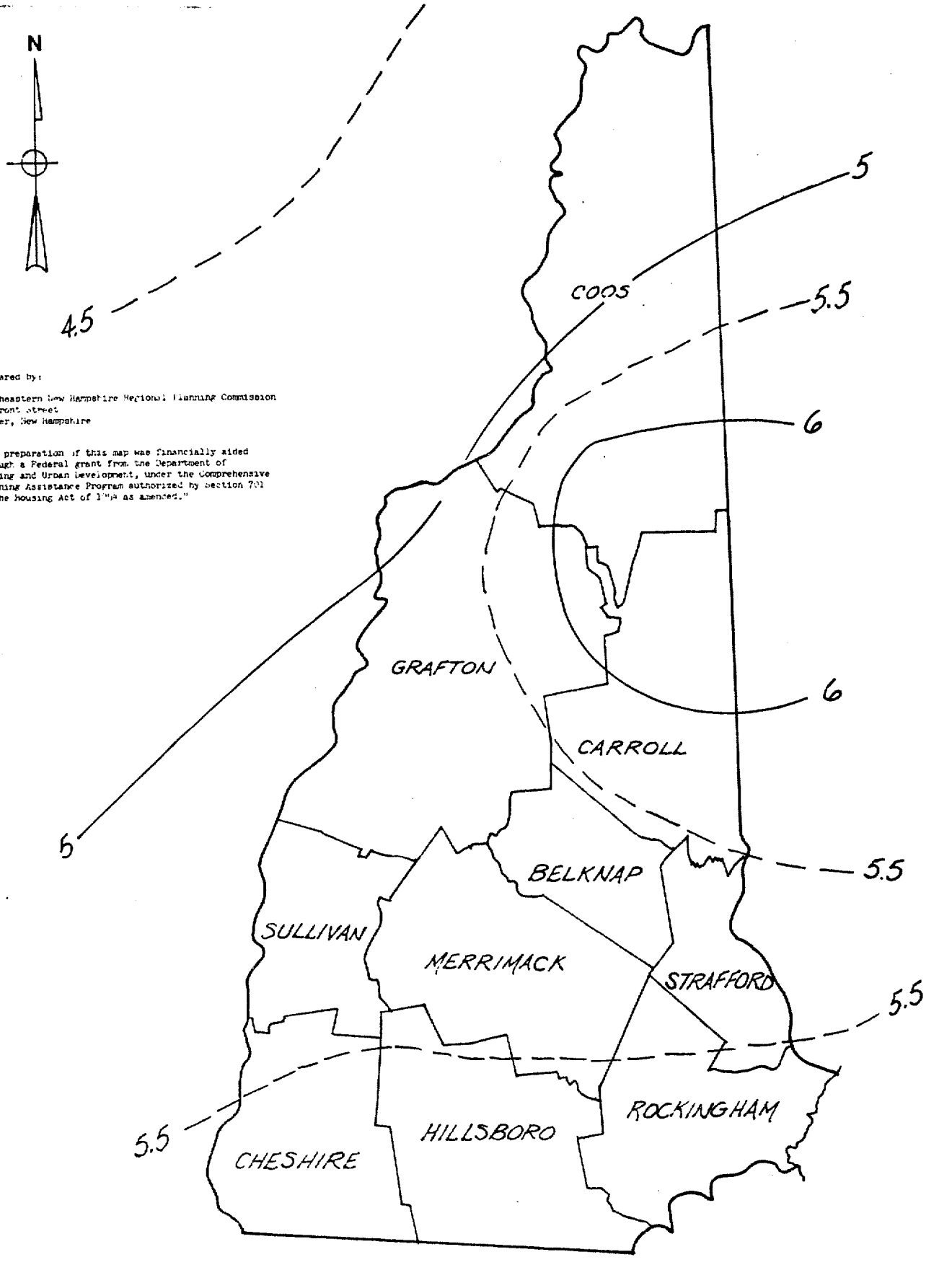
Southeastern New Hampshire Regional Planning Commission
[illegible] Front Street
Exeter, New Hampshire

"The preparation of this map was financially aided through a Federal grant from the Department of Housing and Urban Development, under the Comprehensive Planning Assistance Program authorized by Section [illegible] of the Housing Act of 1954 as amended."

SOURCE : SCS

APPENDIX E

50 Year 24 Hour Rainfall (inches)



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MLRA(S): 143, 144B
REV. HRM, 1-83
AERIC HAPLAQUEPTS, SANDY, MIXED, FRIGID

APPENDIX F

SAMPLE SOIL DATA SHEET

THE WALPOLE SERIES CONSISTS OF DEEP, POORLY AND SOMEWHAT POORLY DRAINED SOILS FORMED IN GLACIAL OUTWASH OR DRIFT ON UPLANDS. TYPICALLY THESE SOILS HAVE A VERY DARK GRAYISH BROWN STONY LOAM SURFACE LAYER ABOUT 8 INCHES THICK. THE MOTTLED SUBSOIL LAYERS FROM 8 TO 20 INCHES ARE GRAY AND OLIVE GRAY SANDY LOAM. THE MOTTLED SUBSTRATUM FROM 20 TO 60 INCHES IS OLIVE, YELLOWISH BROWN, AND PALE OLIVE GRAVELLY SAND. SLOPES RANGE FROM 0 TO 8 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-8	ST-FSL, ST-SL, ST-L	SM	A-2, A-4	5-15	90-100	75-100	70-100	30-50	<25	NP-3
8-20	STV-FSL, STV-SL, STV-L	SM	A-2, A-4	10-20	90-100	75-100	70-100	30-50	<25	NP-3
8-20	LS, SL, GR-SL	SM	A-2, A-4	0-5	85-100	75-95	40-95	25-50	-	NP
20-60	LS, S, GR-S	SP-SM, SP, SM	A-1, A-2, A-3	0-15	55-100	50-95	25-90	0-25	-	NP

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CORROSIVITY CONCRETE
0-8	2-10	0.80-1.20	2.0-6.0	0.10-0.23	4.5-6.0	-	LOW	.24	3	-	-	LOW	HIGH
8-20	2-10	0.80-1.20	2.0-6.0	0.10-0.20	4.5-6.0	-	LOW	.20	3	-	-		
8-20	2-6	1.30-1.55	2.0-6.0	0.07-0.18	4.5-6.0	-	LOW	.24					
20-60	0-2	1.40-1.65	>6.0	0.01-0.13	4.5-6.0	-	LOW	.10					

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYDIC GRP	POTENTIAL FROST ACTION
NONE			0-1.5	APPARENT	NOV-MAY	-		>60		-	-	C	HIGH

SANITARY FACILITIES (B)

SEPTIC TANK ABSORPTION FIELDS	SEVERE-WETNESS, POOR FILTER
SEWAGE LAGOON AREAS	0-7%: SEVERE-SEEPAGE, WETNESS 7+%: SEVERE-SEEPAGE, SLOPE, WETNESS
SANITARY LANDFILL (TRENCH)	SEVERE-SEEPAGE, WETNESS, TOO SANDY
SANITARY LANDFILL (AREA)	SEVERE-SEEPAGE, WETNESS
DAILY COVER FOR LANDFILL	POOR-SEEPAGE, TOO SANDY, WETNESS

BUILDING SITE DEVELOPMENT (B)

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE, WETNESS
DWELLINGS WITHOUT BASEMENTS	SEVERE-WETNESS
DWELLINGS WITH BASEMENTS	SEVERE-WETNESS
SMALL COMMERCIAL BUILDINGS	SEVERE-WETNESS
LOCAL ROADS AND STREETS	SEVERE-WETNESS, FROST ACTION
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SEVERE-WETNESS

CONSTRUCTION MATERIAL (B)

ROADFILL	POOR-WETNESS
SAND	PROBABLE
GRAVEL	PROBABLE
TOPSOIL	POOR-TOO SANDY, WETNESS

WATER MANAGEMENT (B)

POND RESERVOIR AREA	SEVERE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SEVERE-SEEPAGE, PIPING, WETNESS
EXCAVATED PONDS AQUIFER FED	SEVERE-CUTBANKS CAVE
DRAINAGE	0-3%: FROST ACTION, CUTBANKS CAVE 3+%: FROST ACTION, SLOPE, CUTBANKS CAVE
IRRIGATION	0-3%: WETNESS 3+%: WETNESS, SLOPE
TERRACES AND DIVERSIONS	ST: WETNESS, TOO SANDY STV: LARGE STONES, WETNESS, TOO SANDY
GRASSED WATERWAYS	ST: WETNESS STV: LARGE STONES, WETNESS

REGIONAL INTERPRETATIONS

WALPOLE SERIES
STONY

NH0044

RECREATIONAL DEVELOPMENT (B)

CAMP AREAS	SEVERE-WETNESS	PLAYGROUNDS	0-6% ST: SEVERE-WETNESS 0-6% STV: SEVERE-LARGE STONES,WETNESS 6+% ST: SEVERE-SLOPE,WETNESS 6+% STV: SEVERE-LARGE STONES,SLOPE,WETNESS
PICNIC AREAS	SEVERE-WETNESS	PATHS AND TRAILS	SEVERE-WETNESS

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY															
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	7S		-		-		-		-		-		-		-	

WOODLAND SUITABILITY (C)

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDLING MORT'Y.	WINDTH. HAZARD	PLANT COMPE.	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	TREES TO PLANT
ALL	4W	SLIGHT	SEVERE	SEVERE	SEVERE		EASTERN WHITE PINE	70	EASTERN WHITE PINE
							RED MAPLE	78	WHITE SPRUCE
							RED SPRUCE	65	NORWAY SPRUCE
							YELLOW BIRCH	75	

WINDBREAKS

CLASS-DETERMING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY (D)

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	POTENTIAL AS HABITAT FOR: WETLAND WILDLF	RANGELD WILDLF
0-3%	V. POOR	POOR	FAIR	FAIR	FAIR	-	GOOD	GOOD	POOR	FAIR	GOOD	-
3-8%	V. POOR	POOR	FAIR	FAIR	FAIR	-	FAIR	V. POOR	POOR	FAIR	V. POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE
EASTERN WHITE PINE	PIST	
RED MAPLE	ACRU	
CINNAMON FERN	OSCI	
SENSITIVE FERN	ONSE	
GOLDTHREAD	COOC	
INDIAN JACK-IN-THE-PULPIT	ARTR	
ARROWWOOD	VIDE	
POTENTIAL PRODUCTION (LBS./AC. DRY WT):		
FAVORABLE YEARS		
NORMAL YEARS		
UNFAVORABLE YEARS		

FOOTNOTES

A ESTIMATES OF ENGINEERING PROPERTIES BASED ON DATA FROM SIMILAR SOILS.
B RATINGS BASED ON NSH. PART II. SECTION 403. MARCH 1978.
C RATINGS BASED ON NATIONAL FORESTRY MANUAL. SEPT. 1980.
D RATINGS BASED ON SOILS MEMO 74. JAN. 1972.

APPENDIX G

HYDROLOGIC SOIL GROUPS FOR DETERMINING RUNOFF IN NEW HAMPSHIRE

The hydrologic grouping of soils is based upon infiltration rates as they affect runoff. The four groups are described as follows:

Group A -- Soils having high infiltration rates even when thoroughly wetted. These consist chiefly of deep, well to excessively drained sands or gravel. These soils have a high rate of water transmission and would result in low runoff potential.

Adams	Gloucester	Jaffrey	Suncook
Carver	Hermon	Merrimac	Warwick
Colton	Hinckley	Quonset	Windsor

Group B -- Soils having moderate infiltration rates when thoroughly wetted. These consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

Acton	Canton	Groveton	Ninigret	Sudbury
Agawam	Charlton	Hadley	Ondawa	Sutton
Bangor	Chatfield	Hartland	Pennichuck	Unadilla
Belgrade	Croghan	Haven	Podunk	Waumbek
Berkshire	Deerfield	Langdon	Redstone	Winnecook
Binghamville	Duane	Madawaska	Salmon	Winooski
Brookfield	Duchess	Marsardis	Stetson	

Group C -- Soils having slow infiltration rates when thoroughly wetted. These consist chiefly of (1) soils with a layer that impedes the downward movement of water, or (2) soils with moderately fine to fine texture or (3) soils with moderately high water tables (poorly drained). These soils have a slow rate of water transmission.

AuGres	Dixmont	Marlow	Pipestone	Scantic
Becket	Elmwood	Melrose	Pittstown	Scituate
Bernardston	Glover	Millis	Plaisted	Shapleigh
Brayton	Hollis	Montauk	Pootatuck	Skerry
Brimfield	Howland	Naumburg	Raynham	Stissing
Buckland	Leicester	Nicholville	Ridgebury	Suffield
Buxton	Lempster	Occum	Ruippowam	Walpole
Calais	Limerick	Paxton	Rumney	Wareham
Canaan	Lyman	Peru	Saugatuck	Woodbridge
Cornish				

Group D -- Soils having very slow infiltration rates when thoroughly wetted. These consist chiefly of (1) clay soils with a high swelling potential, (2) soils with a permanent high water table (very poorly drained), (3) soils with a claypan or clay layer at or near the ground surface, and (4) shallow soils over nearly impervious materials. These soils have a very slow rate of water transmission.

Biddeford	Marshes	Peacham	Swanton
Cabot	Mixed Alluvial	Saco	Whatley
Chocurua	Muck & Peat	Scarboro	Whitman
Greenwood	Ossipee		

APPENDIX H

Qualified Soil Scientists

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QUALIFIED SOIL SCIENTISTS

December 17, 1985

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