APPENDIX A

SUGGESTED SOURCES OF INFORMATION FOR COMPLETING THE NEW HAMPSHIRE DATA SHEETS

APPENDIX A

SUGGESTED SOURCES OF INFORMATION FOR COMPLETING THE NEW HAMPSHIRE METHOD DATA SHEETS

DES	Department of Environmental Services
WSPCD	Water Supply and Pollution Control Division of DES
WRD	Water Resources Division of DES
DRED	Department of Resources and Economic Development
NHF&GD	NH Fish and Game Department
OSP	Office of State Planning
USGS	US Geological Survey
ASCS	Agricultural Stabilization and Conservation Service

Information	Available From
Aerial Photographs, Low Altitude 1981 & 1974	County ASCS Offices DRED, Design, Development & Engr
Anadromous Fish Run Information	NHF&GD, Fisheries Division
Archaeolgical Information	NH Division of Historical Resources
Drainage Basin Maps	DES, WRD, Water Management Bureau
Endangered and Threatened Wildlife Listing	NHF&GD, Non-Game and Endangered Wildlife Program
Endangered and Threatened Plants Listing	DRED, NH Natural Heritage Inventory
Endangered and Threatened Species by town	DRED, NH Natural Heritage Inventory
Fish Stocking Information	NHF&GD, Fisheries Division
Flood Insurance Rate Maps	Office of Emergency Management Municipal Offices
Flood Hazard Maps	Office of Emergency Management Municipal Offices
State Geologist	DES, Geology Bureau (UNH Durham)
Surficial Geology Maps	DES, Geology Bureau (UNH Durham) DES, Public Information and Permitting Unit
GRANIT Geographic Information System	Regional Planning Commissions Office of State Planning
Groundwater Availability Maps (Reconnaissance) (Dated 1974-1977, Scale 1:125,000. Out of print. Available for viewing only)	Regional Planning Commissions DES, WRD, Water Management Bureau Some Municipal Offices
Stratified Drift Aquifer Reports (Ongoing Detailed mapping program, maps may not yet be available for some areas)	DES, WRD, Water Management Bureau USGS, Water Resources Division Office of State Planning

Historic Preservation Office	NH Division of Historical Resources
Inventory of Groundwater and Surface Water Potential	DES, WSPCD, Water Quality and Permit Compliance Bureau – Non-point Source Program
Lakes & Ponds of NH Inventory	DES, Biology Bureau
Lake Water Quality Information	UNH, Cooperative Extension Service, Lakes Lay Monitoring Program
Official List of Public Waters in NH (1990)	DES, Public Information and Permitting Unit
Municipal Assessor's/Tax Maps	Municipal Offices
Municipal Zoning Maps	Municipal Offices
National Wetlands Inventory Maps	NH Office of State Planning, or Order by calling 1-800-USAMAPS
National Register of Historic Landmarks	NH Division of Historical Resources
NH Natural Heritage Inventory	DRED
NH Water Quality Report to Congress 305(b)	State Library, or DES, Public Information and Permitting Unit
Priority Wetlands of New England (by state)	Environmental Protection Agency, Region 1
Public Water Systems Information	DES, WSPCD, Water Supply Engineering Bureau
Rare Natural Communities Listing	DRED, NH Natural Heritage Inventory
NRCS Soil Survey Maps (by County)	County NRCS Offices County Conservation District Offices
USGS Topographic Maps	Local bookstores and sporting goods stores, or National Survey, Chester, VT (802) 875-2121, or Order by Calling 1-800-USAMAPS

NOTE: A number of printed regulations and documents/reports and some maps are available for purchase through DES Public Information and Permitting Unit (PIP). (Address given on following page.)

Not all of the Information listed above is immediately available for purchase. E.g., Aerial photos are available for viewing only at most offices; however, purchasing information can also be obtained from these offices.

CONTACT ADDRESSES

GENERAL

NH Division of Historical Resources
PO Box 2043
19 Pillsbury Street
Concord, NH 03302
271-3483

Office of State Planning (OSP)
2 ½ Beacon Street
Concord, NH 03301
271-2155

Dept of Resources & Economic Development (DRED)
PO Box 1856
172 Pembroke Road
Concord, NH 03302

NH Natural Heritage Inventory	271-3623
Design, Development & Engineering	271-2606

Environmental Protection Agency
Region 1
JFK Federal Building
Boston, MA 02203
(617) 565-3187

Office of Emergency Management
107 Pleasant Street
State Office Park South
Concord, NH 03301-3809
271-2231

US Geological Survey (USGS)
525 Clinton Street
Bow, NH 03304
225-4681

NH Fish & Game Department (NHF&GD)
2 Hazen Drive
Concord, NH 03301

General Inquiries	271-3421
Fisheries Division	271-2502
Non-Game Program	271-2462
Game Division	271-2461

National Survey Center
School Street
Chester, VT 05143
(802) 875-2121

DEPARTMENT OF ENVIRONMENTAL SERVICES (DES)

Geological Bureau
University of New Hampshire
117 James Hall
Durham, NH 03824
862-3160

Water Supply & Pollution Control Division
6 Hazen Drive
PO Box 95
Concord, NH 03302

General Inquiries	271-3503
Water Supply Engineering Bureau	271-2513
Biology Bureau	271-3503
Water Quality & Permit Compliance Bureau	271-2458
Groundwater Protection Bureau	271-3644

Public Information and Permitting Unit
PO Box 95
6 Hazen Drive
Concord, NH 03302
271-2975

Water Resources Division
64 North Main Street
PO Box 2008
Concord, NH 03302-2008

General Inquiries	271-3406
Water Management Bureau	271-3406
Wetlands Bureau	271-2147

CONTACT ADDRESS

GENERAL

NH Division of Historical Resources
PO Box 2043
19 Pillsbury Street
Concord, NH 03302
271-3483

Office of State Planning (OSP)
2 ½ Beacon Street
Concord, NH 03301
271-2155

Dept of Resources & Economic Development
PO Box 1856
172 Pembroke Road
Concord, NH 03302

NH Natural Heritage Inventory	271-3623
Design, Development & Engr Dept	271-2606

Environmental Protection Agency
Region 1
JFK Federal Building
Boston, MA 02203
(617) 565-3187

Office of Emergency Management
107 Pleasant Street
State Office Park South
Concord, NH 03301-3809
271-2231

US Geological Survey (USGS)
361 Commerce Way
Pembroke, NH 03275
226-7800

NH Fish & Game Department (NHF&GD)
2 Hazen Drive
Concord, NH 03301

General Inquiries	271-3421
Fisheries Division	271-2502
Non-game Program	271-2462
Game Division	271-2461

1

National Survey Center
75 School Street
Chester, VT 05143
(802) 875-2121

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University of New Hampshire
117 James Hall
Durham, NH 03824
862-3160

Water Supply & Pollution Control Division
6 Hazen Drive
PO Box 95
Concord, NH 03302

General Inquiries	271-3503
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Biology Bureau	271-3503
Water Quality & Permit Compliance	271-2458
Groundwater Protection Bureau	271-3644

Public Information and Permitting Unit
6 Hazen Drive
PO Box 95
Concord, NH 03302
271-2975

Water Resources Division
64 North Main Street
PO Box 2008
Concord, NH 03302-2008

General Inquiries	271-3406
Water Management Bureau	271-3406
Wetlands Bureau	271-2147

USDA NATURAL RESOURCES CONSERVATION SERVICE AND COUNTY CONSERVATION DISTRICT OFFICES

Natural Resources Conservation Service (RC&D) and
Belknap County Conservation District
719 Main Street, Room 203
Laconia, NH 03246-2772
Phone: 527-5880

Natural Resources Conservation Service and
Carroll County Conservation District
44 Main Street (P.O. Box 533)
Conway, NH 03818-0533
Phone: 447-2771

Natural Resources Conservation Service and
Cheshire County Conservation District
11 Industrial Park Drive
Walpole, NH 03608-9744
Phone: 756-2988

Natural Resources Conservation Service and
Coos County Conservation District
4 Mayberry Lane
Lancaster, NH 03584-9612
Phone: 788-4651

Natural Resources Conservation Service and
Grafton County Conservation District
250 Swiftwater Road, Room 6
Woodsville, NH 03785-0229
Phone: 747-2001

Natural Resources Conservation Service and
Hillsborough County Conservation District
Chappell Professional Center
#468, Route 13, South
Milford, NH 03055-3442
Phone: 673-2409

Natural Resources Conservation Service and
Merrimack County Conservation District
The Concord Center
10 Ferry Street, Box 312
Concord, NH 03301-5081
Phone: 223-6023

Rockingham County Conservation District
110 North Road
Brentwood, NH 03833-6614
Phone: 679-2790

Strafford County Conservation District
259 County Farm Road, Unit #3
Dover, NH 03820-6015
Phone: 749-3037

Natural Resources Conservation Service
Telly's Plaza
243 Calef Highway
Epping, NH 03042
Phone: 679-1587

Sullivan County Conservation District
24 Main Street
Newport, NH 03773-1500
Phone: 863-4297

North Country RC&D Area Council
719 North Main Street, Room 220
Laconia, NH 03246-2772
Phone: 527-2093

Southern NH RC&D Area Council
The Concord Center
10 Ferry Street, Rm. 422, Box 4
Concord, NH 03301-5081
Phone 223-0083

Natural Resources Conservation Service
Federal Building, 2 Madbury Road
Durham, NH 03824-1499
Phone: 868-7581

UNH COOPERATIVE EXTENSION

Belknap County
36 County Drive
Laconia, NH 03246-2900
527-5475

Carroll County
75 Main Street, Box 860
Center Ossipee, NH 03814
539-3331

Cheshire County
800 Park Avenue
Keene, NH 03431-1513
352-4550

Coos County
629A Main Street
Lancaster, NH 03584-9612
788-4961

Grafton County
3785 Dartmouth College Highway
No. Haverhill, NH 03785
787-6944

Hillsborough County
Chappell Professional Center
468 Route 13S
Milford, NH 03055
673-2150

Merrimack County
315 Daniel Webster Highway
Boscawen, NH 03303
796-2151

Rockingham County
113 North Road
Brentwood, NH 03833
679-5616

Strafford County
County Farm Road, Unit 5
Dover, NH 03820-6015
749-4445

Sullivan County
24 Main Street
Newport, NH 03773
863-9200

State Office (Water Resources)
Nesmith Hall
131 Main Street
Durham, NH 03824-3597
862-1067

NH REGIONAL PLANNING COMMISSIONS

North Country Council
107 Glessner Road
Bethlehem, NH 03574
4444-6303

Lakes Region Planning
103 Main Street, Suite 3
Meredith, NH 03253-9287
279-8171

Upper Valley – Lake Sunapee
77 Bank Street
Lebanon, NH 03766
448-1680

Southwest Regional Planning
20 Central Square, 2nd Floor
Keene, NH 03431
357-0557

Central NH Regional Planning
28 Commercial Street
Concord, NH 03301
226-6020

Southern NH Planning
438 Dubuque Street
Manchester, NH 03102-3546
669-4664

Nashua Regional Planning
PO Box 847
Nashua, NH 03061
883-0366

Rockingham Regional Planning
156 Water Street
Exeter, NH 03833
778-0885

Strafford Regional Planning
2 Ridge Street, Suite 4
Dover, NH 03820-2505
742-2523

APPENDIX B

DATA SHEETS REQUIRED FOR THE NEW HAMPSHIRE METHOD

SUMMARY SHEET FOR THE NEW HAMPSHIRE METHOD

Wetland name or code____________________________ Total area of wetland___________________

County ___________________ Town_________________________ Date _______________________

Investigator(s) ____

A **Functional Value**	**B** **FVI from Data Sheets**	**C** **Size of Evaluation Area (Acres)**	**D** **Wetland Value Units B x C**
1. Ecological Integrity			
2. Wildlife Habitat			
3. Finfish Habitat: Part A – Rivers and Streams __________ Part B – Ponds and Lakes __________			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12, Urban Quality of Life B: Wildlife Habitat __________ C: Education Opportunity __________ D: Visual/Aesthetic Quality __________ E: Water Based Recreation __________			
13. Historical Site Potential			
14. Noteworthiness			

APPENDIX C

THE COWARDIN (1979) SYSTEM OF WETLAND CLASSIFICATION

APPENDIX C

THE COWARDIN (1979) SYSTEM OF WETLAND CLASSIFICATION

In 1979, the U.S. Fish & Wildlife Service (USFWS) published a classification of wetlands and deepwater habitats (Cowardin et. Al., 1979). In this classification system, wetlands are defined by plants (hydrophytes), soils (hydric soils), and frequency of flooding.

The structure of the classification scheme is hierarchical, with systems forming the highest level of the classification hierarchy (Figure C-1). Of the five major wetland systems, three are of interest in inland watersheds:

1. **Riverine System** – All fresh water rivers and their tributaries are included in this system.

2. **Lacustrine System** – Includes areas of open water greater than 20 acres or more that 6.6 feet in depth.

3. **Palustrine System** – All nontidal wetlands dominated by trees, shrubs, and persistent emergent herbaceous plants.

Within these three systems, wetlands are further divided into a number of classes. The classes which are important to the NH Method are as follows:

a) **Open Water** – Areas of water where there are no beds of emergent, submergent, of floating vegetation.

b) **Aquatic Bed** – Water areas dominated by plants that grow principally on or below the surface of the water for most of the growing season, e.g. Pondweeds, Waterlilies, Water Milfoil.

c) **Emergent Wetland** – Characterized by rooted herbaceous and grasslike plants which stand erect above the water or ground surface, e.g. Cattails, Pickerel Weed.

d) **Scrub-shrub Wetland –** Wetlands dominated by shrubs and tree saplings less than 20 feet in height, e.g. Buttonbush, Alders, Red Maple saplings.

e) **Forested Wetland –** Wetlands dominated by trees taller than 20 feet in height, e.g. Red Maple, American Elm, Ashes, Spruce.

For a complete explanation of this classification system, the reader should refer to the original publication (Cowardin et al. 1979 – see section VI for the full reference). Users of the NH Method may be able to obtain copies of this report from the US Fish & Wildlife Service depending on availability. Reprints of the publication may be purchased from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161, (703) 487-4780.

APPENDIX D

HYDRIC SOILS CLASSES FOR WETLAND SOILS

D-1 Hydric Soil Classes from the National Cooperative Soil Survey

D-2 Hydric Soil Classes from a High Intensity Survey (HIS)

D-3 Explanation of High Intensity Soils (HIS) Maps

TABLE D-1: Hydric Soils from the National Cooperative Soils Survey

BELKNAP COUNTY (1968) Published

Map Symbol	Soil Name	Hydric Soil Class
Mh	Marsh	A
Mi	Mixed Alluvial Land	A
Mp	Muck and Peat	A
RbA	Ridgebury	B
RbB	Ridgebury	B
RdA	Ridgebury	B
RdB	Ridgebury	B
*RhA	Ridgebury	B
	Whitman	A
*RhB	Ridgebury	B
	Whitman	A
Ru	Rumney	B
Sc	Scarboro	A
W	Water < 49 acres	A
WATER	Water > 40 acres	A
Wa	Whitman	A

* This map unit contains more than one soil. Use hydric soil class B for this soil type.

BELKNAP COUNTY UPDATE (Subject to change)

5	Rippowam	B
6	Saco	A
15	Searsport	A
97	Greenwood	A
97	Ossipee	A
115	Scarboro	A
125	Scarboro	A
295	Greenwood	A
333B	Roundabout	B
347A	Lyme	B
347A	Moosilauke	B
347B	Lyme	B
347B	Moosilauke	B
395	Chocorua	A
495	Ossipee	A
533	Raynham	B
538A	Squamscott	B
547A	Walpole	B
547B	Walpole	B
549	Peacham	A
647A	Pillsbury	B
647B	Pillsbury	B
657A	Ridgebury	B
657B	Ridgebury	B

TABLE D-1 continued…

CARROLL COUNTY

Map Symbol	Soil Name	Hydric Soil Class
AW	Alluvial Land	A
CM	Chocorua	A
FA	Fresh Water Marsh	A
GW	Greenwood	A
LDB	Leicester	B
LDB	Ridgebury	B
LfA	Leicester	B
LfA	Walpole	B
LfB	Leicester	B
LfB	Walpole	B
Lk	Limerick	B
Lm	Limerick Variant	B
MU	Muck and Peat	A
OT	Ossipee	A
Ra	Raynham Variant	B
RgB	Ridgebury	B
RlA	Ridgebury	B
RlB	Ridgebury	B
W	Water < 40 acres	A
Water	Water > 40 acres	A
Wc	Whitman	A

TABLE D-1 continued…

CHESHIRE COUNTY

Map Symbol	Soil Name	Hydric Soil Class
5	Rippowam	B
6	Saco	A
15	Searsport	A
107	Rippowam	B
107	Saco	A
109	Limerick	B
197	Bobohemists (ponded)	A
214	Naumberg	B
218	Raynham	B
218	Wareham	B
295	Greenwood	A
340B	Stissing	B
341B	Stissing	B
347B	Lyme	B
347B	Moosilauke	B
395	Chocorua	A
414	Moosilauke	B
495	Ossipee	A
533	Raynham	B
646B	Pillsbury	B
647B	Pillsbury	B

COOS COUNTY

Map Symbol	Soil Name	Hydric Soil Class
15A	Searsport	A
105A	Rumney	B
195A	Sphagnofibrists	A
209A	Charles	B
246A	Lyme	B
246B	Lyme	B
247A	Lyme	B
247B	Lyme	B
247C	Lyme	B
295A	Greenwood	A
395A	Chocorua	A
406A	Medomak	A
414A	Moosilauke	B
414B	Moosilauke	B
415A	Moosilauke	B
415B	Moosilauke	B
415C	Moosilauke	B
433A	Grange	B
495A	Ossipee	A
505A	Cohas	B
549A	Peacham	A
569A	Monarda	B
569B	Monarda	B
569C	Monarda	B
570A	Monarda	B
570B	Monarda	B
570C	Monarda	B
633A	Pemi	B
646A	Pillsbury	B
646B	Pillsbury	B
646C	Pillsbury	B
647A	Pillsbury	B
647B	Pillsbury	B
647C	Pillsbury	B
*697A	Peacham	A
	Greenwood	A
	Rumney	B
737B	Monarda Varient	B
764B	Monarda	B
765B	Monarda	B
767A	Peacham	A
767A	Ossipee	A

* This map unit contains more than one soil. Use Hydric Soil Class A for this soil type.

COOS COUNTY

Map Symbol	Soil Name	Hydric Soil Class
767A	Monarda	B
817A	Moosilauke	B
823B	Pillsbury	B
825B	Pillsbury	B
825B	Peacham	A
831A	Peacham	A
831A	Ossipee	A
831A	Pillsbury	B
865B	Monarda Variant	B
869B	Moosilauke	B
W	Water	A

GRAFTON COUNTY

Map Symbol	Soil Name	Hydric Soil Class
5	Rippowam	B
15	Searsport	A
105	Rumney	B
109	Limerick	B
114A	Walpole	B
114A	Binghamville	B
295	Greenwood	A
341A	Stissing	B
341B	Stissing	B
347A	Lyme	B
347A	Moosilauke	B
347B	Lyme	B
347B	Moosilauke	B
395	Chocorua	A
406	Medomak	A
534	Binghamville	B
614A	Kinsman	B
633	Pemi	B
647A	Pillsbury	B
647B	Pillsbury	B
717	Lyme	B
717	Peacham	A
723B	Pillsbury	B
729B	Lyme	B
731	Peacham	A
731	Ossipee	A
W	Water	A

HILLSBOROUGH COUNTY EAST

Map Symbol	Soil Name	Hydric Soil Class
Bg	Binghamville	B
BoA	Borochemists	A
BpA	Borochemists	A
Cu	Chocorua	A
Gw	Greenwood	A
LeA	Leicester Variant	B
LsA	Leicester Variant	B
LtA	Leicester	B
LtA	Walpole	B
LtB	Leicester	B
LtB	Walpole	B
LvA-	Leicester	B
LvA	Walpole	B
LvB	Leicester	B
LvB	Walpole	B
RbA	Ridgebury	B
ReA	Ridgebury	B
ReB	Ridgebury	B
Rp	Rippowam	B
Sm	Saco Varient	A
Sn	Saugatuck	B
So	Scarboro	A
Sr	Scarboro	A
W	Water < 40 acres	A
Water	Water > 40 acres	A

HILLSBOROUGH COUNTY WEST

15	Searsport	A
105	Rumney	B
246B	Lyme	B
247B	Lyme	B
295	Greenwood	A
395	Chocorua	A
495	Ossipee	A
549	Peacham	A
646B	Pillsbury	B
647B	Pillsbury	B
W	Water < 40 acres	A
Water	Water > 40 acres	A

MERRIMACK COUNTY (1961)

Map Symbol	Soil Name	Hydric Soil Class
Lm	Limerick	B
Mh	Marsh	A
Mp	Muck and Peat	A
RbA	Ridgebury	B
RbB	Ridgebury	B
*RdA	Ridgebury	B
	Whitman	A
RdB	Ridgebury	B
RdB	Whitman	A
Ru	Rumney	B
Sa	Saco	A
Sc	Scarboro	A
W	Water < 40 acres	A
Water	Water > 40 acres	A

* This map unit contains more than one soil. Use hydric soil class B for this analysis.

MERRIMACK COUNTY UPDATE (Subject to change)

5	Rippowam	B
6	Saco	A
15	Searsport	A
97	Greenwood	A
97	Ossipe	A
115	Scarboro	A
125	Scarboro	A
295	Greenwood	A
333B	Roundabout	B
347A	Lyme	B
347A	Moosilauke	B
347B	Lyme	B
347B	Moosilauke	B
395	Chocorua	A
495	Ossipee	A
533	Raynham	B
538A	Squamscott	B
547A	Walpole	B
547B	Walpole	B
549	Peacham	A
647A	Pillsbury	B
647B	Pillsbury	B
657A	Ridgebury	B
657B	Ridgebury	B
W	Water	A

ROCKINGHAM COUNTY

Map Symbol	Soil Name	Hydric Soil Class
33A	Scio	B
97	Greenwood	A
97	Ossipee	A
115	Scarboro	A
125	Scarboro	A
134	Maybid	A
295	Greenwood	A
305	Limerick	B
395	Chocorua	A
397	Ipswich	A
495	Ossipee	A
497	Pawcatuck	A
533	Raynham	B
538A	Squamscott	B
546A	Walpoe	B
547A	Walpole	B
548B	Walpole	B
597	Westbrook	A
656A	Ridgebury	B
657A	Ridgebury	B
657B	Ridgebury	B
997	Ipswich	A
W	Water	A

TABLE D-1 continued…

STRAFFORD COUNTY

Map Symbol	Soil Name	Hydric Soil Class
Re	Biddeford	A
LcB	Leicester	B
LeA	Leicester	B
LeB	Leicester	B
LrA	Leicester	B
LrA	Ridgebury	B
LrB	Leicester	B
LrB	Ridgebury	B
RgA	Ridgebury	B
RgB	Ridgebury	B
RlA	Ridgebury	B
RlB	Ridgebury	B
Ru	Rumney	B
Sb	Saugatuck	B
ScA	Scantic	B
ScB	Scantic	B
SwA	Swanton	B
SwB	Swanton	B
Wa	Whitman	A
W	Water	A

TABLE D-1 continued…

SULLIVAN COUNTY

Map Symbol	Soil Name	Hydric Soil Class
Bp	Borohemists	A
Ch	Chocorua	A
Gw	Greenwood	A
Lk	Limerick	B
LuA	Lyme	B
LuA	Moosilauke	B
LyA	Lyme	B
LyA	Moosilauke	B
LyB	Lyme	B
LyB	Moosilauke	B
Ot	Ossipee	A
PgA	Pillsbury	B
PiA	Pillsbury	B
PiB	Pillsbury	B
Ra	Raynham	B
Ru	Rumney	B
Sa	Saco	A
Sb	Saco Varient	A
SgA	Stissing	B
ShA	Stissing	B
ShB	Stissing	B
W	Water < 40 acres	A
Water	Water > 40 acres	A

TABLE D-2: Hydric Soils from a High Intensity Soil Survey

Soil Type	Hydric Class
511BH	B
511CH	B
511DH	B
512BH	B
512CH	B
513BH	B
513CH	B
514*H	B
51XBH	B
51XCH	B
521BH	B
521CH	B
521DH	B
522BH	B
522CH	B
522DH	B
523BH	B
523CH	B
524*H	B
52XBH	B
52XCH	B
52XDH	B
531BH	B
531CH	B
533BH	B
533CH	B
534*H	B
53XBH	B
53XCH	B
541BH	B
541CH	B
543BH	B
543CH	B
544*H	B
54XBH	B
54XCH	B
551BH	B
551CH	B
553BH	B
554*H	B
55XBH	B
55XCH	B
561BH	B
561CH	B

TABLE D-2 continued…

Soil Type	Hydric Class
563CH	B
564*H	B
566*H	B
56XBH	B
56XCH	B
611BH	A
612BH	A
613BH	A
614BH	A
615BH	A
616BH	A
61XBH	A
621BH	A
622BH	A
623BH	A
624BH	A
62XBH	A
631BH	A
632BH	A
633BH	A
634BH	A
63XBH	A
641BH	A
642BH	A
643BH	A
644BH	A
64XBH	A
651BH	A
652BH	A
653BH	A
654BH	A
65XBH	A
661BH	A
663BH	A
664BH	A
666BH	A
66XBH	A

EXPLANATION OF HIS SYMBOLS: KEY TO SOIL TYPES

This key is used in determining soil types that are utilized in high intensity soil surveys for administration of lot size by soil type and wetlands regulations. The soil types are defined as soils having the same soil characteristics of draining class, parent material, restrictive features, and slope, and are designated by a five part symbol, the parts being A, B, C, D, and E.

PART A: DRAINAGE CLASS

1 – excessively drained
2 – well drained
3 – moderately well drained
4 – somewhat poorly drained
5 – poorly drained
6 – very poorly drained
7 – not determinable (to be used only with Symbol B-6)

PART B: PARENT MATERIAL

1 – Glaciofluvial deposits (outwash/terraces)
2 – Glacial till materials, marine or glaciolacustrine deposits
3 – Very fine sand and silt deposits
4 – Loamy/sandy over silt/clay deposits
5 – Silt and clay deposits
6 – Excavated, regarded or filled (see Connotative Soil Legend)
7 – Alluvial deposits
8 – Organic materials – fresh water
9 – Organic materials – Tidal marsh

PART C: RESTRICTIVE FEATURE (if more than one applies, list the most restrictive).

1 – none
2 – bouldery, with more than 15% of the surface covered with boulders (larger than 24 inches in diameter).
3 – mineral restrictive layer(s) are present in the soil profile less than 40 inches below the soil surface – such as hard pan, platy structure, clayey texture. For examples of soil characteristics that quality for restrictive layer, see Soil Manual for Site Evaluations in New Hampshire, page 2-22, figure 2-8.
4 – bedrock present in the soil profile 0-40 inches below the soil surface (bedrock is either a lithic or paralithic contact – see Soil Taxonomy p. 48-49).
5 – subject to flooding.
6 – does not meet fill standards (see addendum – Standards for Fill material) (Only to be used with symbol B-6).

X – Areas where depth to bedrock is so variable that a single soil type cannot be applied will be mapped as a complex of soil types and will have a symbol X.

PART D: SLOPE CLASS

B – 0 to 8%
C – 8 to 15%
D – 15% to 25%
E – 25%

PART E: HIGH INTENSITY SOIL MAP IDENTIFIER – H (see addendum).

Example of the 5-part symbol: **Soil type = 511BH**

PART A: 5 = Poorly Drained
PART B: 1 = Glaciofluvial Deposits
PART C: 1 = No restrictive features
PART D: B = 0-8% slope
PART E: H = HIS map identifier

D.3 HIGH ITENSITY SOIL (HIS) MAPS

The purpose of high intensity soil maps is to provide information for areas that are undergoing intensive land use changes. Individuals involved in land planning in New Hampshire can use HIS maps to good advantage. These maps may be available for some areas in the study area. Contact the local planning board to determine the availability of HIS maps in your study area.

One example of HIS map use is for soil type/lot size calculations. Some towns and cities have adopted soil type/lot size data under subdivision regulations requiring setbacks from wetlands. A second use of HIS maps is to locate the 4,000 square foot area for a leaching field on a proposed building lot that will have a septic tank and leach field system. A third use is for areas where it is important to have accurate location of soil boundaries. An example of this use includes any NH DES and towns that have adopted regulations utilizing setback distances as part of wetland identification. A fourth use that can be anticipated is for identifying and delineating sensitive soil conditions near shorelines of surface waters.

High intensity soil maps prepared using the standards established for New Hampshire provide a suitable level of detail and accuracy for intensive land use planning. The base map commonly uses a scale of 1 inch = 40 or 50 feet. Topographic lines with contour intervals of 2 feet or less are required to quality for these standards. In addition, a perimeter survey by a licensed land surveyor is required. These standards provide an adequate base map so that soil boundary line placement can be measured in the field by use of pacing or hip chains. Ground control features are also shown on the base map. These become useful for future observations during site walks, etc.

Standards are also established for the soil legend, purity of units shown on the map, accuracy of soil boundary placement, an the smallest unit to be shown on the map. These standards are provided to maintain consistency in map preparation throughout the state. The State of New Hampshire has a licensing program for soil scientists.

Natural Drainage Classes as used by the Society of Soil Scientists of Northern New England (SSSNNE), which has the technical responsibility for the HIS standards, are more narrowly defined by the definitions of the classes used by he National Cooperative Soil Survey (NCSS). The current standards used in preparing HIS maps include the following drainage classes:

VERY POORLY DRAINED:

Soils that are saturated for long periods of time, and (1) have organic soil materials that extend from the surface to a depth of 16 inches or more; or (2) have a surface organic layer commonly 8 to 16 inches thick.

POORLY DRAINED:

Soils that are saturated for somewhat shorter periods of time than poorly drained soils but in which water is close to the soil surface during the early part of the growing season.

SOMEWHAT POORLY DRAINED:

Soils that have evidence of wetness and a depth less than 15 inches below the soil surface but saturation commonly does not occur to the soil surface for extended time periods during the growing season.

MODERATELY WELL DRAINED:

Soils that have evidence of wetness between a depth of 15 inches and 40 inches below the soil surface.

WELL DRAINED:

Soils that lack evidence of wetness within 40 inches of the soil surface.

EXCESSIVELY DRAINED:

Other soils that lack evidence of wetness within 40 inches but have sandy and/or gravelly textures throughout.

These nontechnical definitions are provided for general information purposes. The reader should refer to SSSNNE special publication No. 1 for more detailed technical definitions of these drainage classes.

These maps can provide information needed for land use planning and regulation, including information about wet soil (hydric) boundary lines, soils with shallow depth over bedrock, steep slopes, rapidly permeable soils and sub-surface hardpan layers. Line placement accuracy over and above that used in the HIS standards (i.e. 20 feet) will be needed for regulatory activities involving setback distances.

Although it is desirable to have HIS map information for an entire community, it is generally not practical economically. Communities that use HIS maps for areas undergoing development and NCSS maps for town wide planning activities generally will have the required soils information.

High Intensity Map Purity
The soil within an area enclosed by a soil boundary line (a map unit delineation) will have a minimum of 75 percent of the soil properties inferred by the soil map symbol derived from the Key to Soil Types and placed within that map unit delineation. The control section for determining soil properties is from the soil surface to a depth of 40 inches.

Minimum Size Delineation
The minimum size delineation will refer only to map units of poorly drained, very poorly drained, rock outcrop or slopes greater than 25 percent soil types. The minimum size delineation will be 2000 square feet. Smaller areas may be shown at the discretion of the soil scientist.

Soil Boundary Line Placement
Soil boundary line placement should be accurate within 20 feet. Streams and small water bodies are shown at the discretion of the Soil Scientist. If any soil boundary is to be used for setback requirements or other permitting requirements (i.e. hydric soils), it will be flagged in the field (accurate within 5 feet of true location), located and shown on the soil/plan map. Items in parentheses are provided for future clarification only.

STANDARDS FOR A HIGH INTENSITY SOIL MAP

Criteria for High Intensity Soil Maps

1. Use of a Base Map.
2. Use of a Connotative Soil Legend (see Key to Soil Types).
3. Required Map Unit Purity.
4. Minimum Size Delineation.
5. Required accuracy of soil boundary line placement.
6. Map prepared by a Certified Soil Scientist or by an apprentice working under direct supervision of the said soil scientist.

Base Map

1. A current perimeter survey by a Licensed Land Surveyor.
2. Map scale of 1”=100’ or larger, i.e., 1”=50’, or 1”=20’, etc.
3. Topography with 2 foot contour intervals or less, i.e., 1 foot contour intervals.
4. Ground control is required and shall be at the density specified by the Soil Scientist. The following guide lines are recommended:
   a) Four identified points or features per acre.
   b) Uniformly distributed throughout the parcel.
   c) Points or features will be shown on base map.

Connotative Soil Legend

Areas mapped with Symbol B-6 will be identified within the map unit legend as to what it is, i.e., fill, excavated or regarded.   All map unit symbols used will be derived from the Connotative Soil Legend, with only one soil type per map unit delineation.

APPENDIX E

INTERPRETATION OF TOPOGRAPHIC MAPS AND WATERSHED DELINEATION PROCEDURES

E-1 Interpretation of Topographic Maps

E-2 Delineation of Watershed Boundaries

E-3 Measuring Watershed Areas

APPENDIX E

INTERPRETATION OF TOPOGRAPHIC MAPS AND WATERSHED DELINEATION PROCEDURES

NEEDED FOR THIS CALCULATION:

*Topographic map.
*Ability to interpret topographic maps.
*Planimeter or Dot Grid

For the purpose of the NH Method, a watershed or drainage basin is defined as the geographic area which contributes surface water runoff to a watercourse and/or wetland. The NH Method requires that an evaluator delineate and measure the watershed area of the wetland being evaluated, unless this information is already available.

This appendix describes a method for delineating a watershed on a topographic map such as a USGS quad sheet. Once the watershed boundary is established, the area of the watershed can be measured using one of the methods described in Section E.3.

E-1 INTERPRETATION OF A TOPOGRAPHIC MAP

In order to successfully delineate a watershed boundary, the evaluator will need to visualize the landscape as represented by a topographic map. This is not difficult once the following basic concepts of the topographic maps are understood.

Each contour line on a topographic map represents a ground elevation or vertical distance above a reference point such as sea level. A contour line is level with respect to the earth's surface just like the top of a building foundation. All points along any one contour line are at the same elevation.

The difference in elevation between two adjacent contours is called the contour interval. This is typically given in the map legend. It represents the vertical distance you would need to climb or descend from one contour elevation to the next.

The horizontal distance between contours, on the other hand, is determined by the steepness of the landscape and can vary greatly on a given map. On relatively flat ground, two 20 foot contours can be far apart horizontally. On a steep cliff face two 20 foot contours might be directly above and below each other. In each case the vertical distance between the contour lines would still be ten feet.

One of the easiest landscapes to visualize on the topographic map is an isolated hill. If this hill is more or less circular, the map will show it as a series of more or less concentric circles (Figure E-1). Imagine that a surveyor actually marks these contour lines onto the ground. If two people start walking in opposite directions on the same contour line, beginning at point A, they will eventually meet face to face.

If these same two people start out in opposite directions on different contours, beginning at points A and B respectively, they will pass each other somewhere on the hill and their vertical distance apart would remain 20 feet. Their horizontal distance apart could be great or small depending on the steepness of the hillside where they pass.

A rather more complicated situation is where two hills are connected by a saddle (Figure E-2). Here each hill is circled by contours but at some point toward the base of the hills, contours begin to circle both hills.

How do contours relate to water flow? A general rule of thumb is that water flow is perpendicular to contour lines. In the case of the isolated hill, water flows down on all sides of the hill. Water flows from the top of the saddle or ridge, down each side in the same way water flows don each side of a garden wall (See arrow on Figure E-2).

As the water continues downhill it flows into progressively larger watercourses and ultimately into the ocean. Any point on a watercourse can be used to define a watershed. That is, the entire drainage area of a major river like the Merrimack can be considered a watershed, but the drainage areas of each of its tributaries are also watersheds.

Each tributary in turn has tributaries, and each one of these tributaries has a watershed. This process of subdivision can continue until very small, local watersheds are defined which might only drain a few acres, and might not contain a defined watercourse.

Figure E-3 shows an idealized watershed of a small stream. Water always flows downhill perpendicular to the contour lines. As one proceeds upstream, successively higher and higher contour lines first parallel then cross the stream. This is because the floor of a river valley rises as you go upstream. Like-wise the valley slopes upward on each side of the stream. A general rule of thumb is that topographic lines always point upstream. With that in mind, it is not difficult to make out drainage patterns and the direction of flow on the landscape even when there is no stream depicted on the map. In Figure E-3, for example, the direction of streamflow is from point A to point B.

Ultimately, you must reach the highest point upstream. This is the head of the watershed, beyond which the land slopes away into another watershed. At each point on the stream the land slopes up on each side to some high point then down into another watershed. If you were to joint all of these high points around the stream, you would have the watershed boundary. (High points are generally hill tops, ridge lines, or saddles).

E-2 DELINEATION OF A WATERSHED

The following procedure and example will help you locate and connect all of the high points around a watershed on a topographic map shown in Figure F-4. Visualizing the landscape represented by the topographic map will make the process much easier than simply trying to follow a method by rote.

1. Draw a circle at the outlet or downstream point of the wetland in question (the wetland is the hatched area shown in Figure E-4).

2. Put small “X’s” at the high points along both sides of the watercourse, working your way upstream towards the headwaters of the watershed.

Figure E-4: Delineating a Watershed Boundary – Step 1

3. Starting at the circle that was made in step one, draw a line connecting the "X's" along one side of the water course (Figure E-5). This line should always cross the contours at right angles (i.e., it should be perpendicular to each contour line it crosses).

4. Continue the line until it passes around the head of the watershed and down the opposite side of the water course. Eventually it will connect with the circle from which you started. At this point you have delineated the watershed of the wetland being evaluated.

The delineation appears as a solid line around the watercourse. Generally, surface water runoff from rain falling anywhere in this area flows into and out of the wetland being evaluated. This means that the wetland has the potential to modify and attenuate sediment and nutrient loads from this watershed as well as store runoff which might otherwise result in downstream flooding.

Figure E-5: Delineating a Watershed Boundary – Step 2

E-3 MEASURING WATERSHED AREAS

There are two widely available methods for measuring the watershed: a) Dot Grid Method, and b) Planimeter. These methods can also be used to measure the area of the wetland itself as required by the NH Method.

a) The dot grid method is a simple technique which does not require any expensive equipment. In this method the user places a sheet of acetate or mylar, which has a series of dots about the size of the period at the end of this sentence printed on it, over the map area to be measured. The user counts the dots which fall within the area to be measured and multiplies by a factor to determine the area. A hand held, mechanical counting device is available to speed up this procedure.

b) The second of these methods involves using a planimeter, which is a small device having a hinged mechanical arm. One end of the arm is fixed to a weighted base while the other end has an attached magnifying lens with a cross hair or other pointer. The user spreads the map with the delineated area on a flat surface. After placing the base of the planimeter in a convenient location the user traces around the area to be measured with the pointer. A dial or other readout registers the area being measured.

Planimeters cost from several hundred dollars up to a thousand dollars or more depending on the degree of sophistication. For the purpose of the NH Method, a basic model would be sufficient. Dot counting grids are more affordable , and are in the 10 to 20 dollar range. Both Planimeters and dot grids are available from engineering and forestry supply companies. Users of either of these methods should refer to the instructions packaged with the equipment they purchase.

APPENDIX F

CALCULATION OF THE AVERAGE SLOPE OF A WATERSHED AND STREAM GRADIENT

F-1 Calculation of Average Slope

F-2 Calculation of Stream Gradient

APPENDIX F

CALCULATION OF THE AVERAGE SLOPE OF THE WATERSHED AND STREAM GRADIENT

NEEDED FOR THIS CALCULATION

* USGS topographic map or aerial photograph.
* Ruler or scale.
* Pocket calculator.

F-1 CALCULATION OF THE AVERAGE SLOPE OF THE WATERSHED

When the average watershed slope is difficult to estimate because of lack of sufficient local data or complex topography, the following method using a grid system on a topographic map may be used.[1]

The procedure is as follows:

1. Establish a grid on the contour map on which the watershed has been delineated. The grid is usually laid off on a north-south and east-west line, but this is not essential. At least 4 grid lines should cross the watershed in each direction (Figure F-1).

2. Measure the length of each grid line in each direction within the watershed boundary. Using the map scale, convert your measurement to feet. The total of these lengths is the denominator (L) in the equation below.

3. Count the number of contour line crossings and/or points of contact along each grid line. The total number of crossings is (N), the number in the equation.

4. The value (ΔZ) in the equation below is simply the contour interval of the topographic map being used. If you are using a 7.5 minute USGS topographic map, the contour interval is 20 feet, and thus, "Δ Z" is always 20 for these maps.

5. The constant "1.57" in the equation is a modifying factor that is related to the angle between the contours and the grid lines.

6. S simply refers to Slope.

The mathematical formula for determining the average watershed slope using the grid system is expressed as:

$$S = \frac{N \times \Delta Z \times 1.57}{L}$$

The example on the next page illustrates the procedure.

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[1] Applied Hydrology – Linsley, Kohler & Paulus, published by McGraw-Hill Engineering Hydraulics – Rouse, published by Wiley.

Problem: Determine the average watershed slope for the watershed already delineated.

Solution: Outline the watershed on a topographic map and lay out a grid system with at least four grid lines in each direction (Figure F-1).

Referring to the map, first, calculate the lengths of the grid lines within the watershed boundary, and then count the number of contour crossings or points of contact on the grid in both directions (also within the watershed boundary) as shown in the example (Figure F-1).

Figure F-1. Calculation of Average Slope of the Watershed

LENGTHS				CONTOUR CROSSINGS			
Line:	A = 3,000’	G = 4,500’		Line:	A = 9	G = 21	
	B = 5,000’	H = 6,250’			B = 27	H = 24	
	C = 5,500	I = 6,750’			C = 20	I = 30	
	D = 5,750’	J = 7,250’			D = 24	J = 38	
	E = 5,500’	K = 6,250’			E = 24	K = 39	
	F = 5,000’	L = 6,500’			F = 20	L = 29	
	29,750’	37,500’			124	181	
	29,750’				124		
	+37,500’				+181		
Total Length =	67,250’			Total Crossings =	305		

Using the equation: $$S = \frac{N \times \Delta Z \times 1.57}{L}$$

The average slope is: $$S = \frac{305 \times 20' \times 1.57}{67{,}250'} = \frac{9577}{67{,}250'} = 0.142$$ **=**

Expressed as percent = 14.2%, round off to 14%

F-2 CALCULATION OF STREAM GRADIENT

The topography or relief of a basin has an influence on the hydrological response of the drainage basin. The slope (or gradient) of a stream channel, which is determined by topography, affects the velocity (speed) of flow in the channel.

Commonly, only the main stream is considered when describing the stream gradient of a watershed. The longest stream is taken to be the main stream. To obtain the value for the gradient of the stream, it is necessary to measure the total fall in height of the stream from its most distant point in the watershed to the outlet (points A and B respectively in Figure F-2). The blue line marked on the USGS topographic map is used to measure stream length. The fall in height of the stream is found by considering the contour pattern of the topographic map, and is divided by the length of the stream channel (measured from A to B in Figure F-2) to give a value for a gradient. Gradient can either be expressed in feet per mile, or as a percentage (see example below).

The stream length can be measured either by using a map wheel, or by carefully measuring along each stream length with a length of string (a narrow link gold or silver chain works very well).

STEP 1: Establish the highest (point A) and the lowest (point B) contours along the main stream channel within the watershed boundary. Calculate the height difference in feet (A – B).

STEP 2: Measure the length of the main stream channel (L) in feet.

STEP 3: Divide the answer from Step 1 by the answer from Step 2: $\frac{A - B}{L} =$ Stream Gradient

In Figure F-2:

A = 1,000'
B = 880'
L = 6,000'

$$\frac{1{,}000 - 880'}{6{,}000} = \frac{120'}{6{,}000'} = 0.02$$

= 2% gradient,
or the stream drops 105 feet per mile,
or the stream drops 120 feet per 6,000 feet

APPENDIX G

EXAMPLES OF THE APPLICATION OF THE NEW HAMPSHIRE METHOD

G – 1 **Burnham Brook Wetland, Canterbury, New Hampshire**

G - 2 **Whitefield Airport Wetland, Whitefield, New Hampshire**

APPENDIX G

EXAMPLES OF THE APPLICATION OF THE NEW HAMPSHIRE METHOD

The NH Method was used to evaluate two wetlands: one in southern New Hampshire in the town of Canterbury, and one north of the White Mountains in the town of Whitefield.

These examples may be used as a guide for evaluating other wetlands in New Hampshire. The base map and overlays are presented in Figures G-1 to G-3 (Burnham Brook, Canterbury) and Figures G-4 to G-7 (Whitefield Airport, Whitefield). In each example, the overlays are followed by a completed set of evaluation data sheets and the summary evaluation.

G.1 BURNHAM BROOK WETLAND, Canterbury, New Hampshire

The Burnham Brook wetland is 66 acres in size and is located in Merrimack County in a dominantly rural residential area. Land use in the contributing watershed (which is 6,100 acres in size) is predominantly rural-residential, agricultural smallholdings, and forested upland, and includes Canterbury town center.

The most accurate delineation of the wetland as it existed at the time of evaluation is shown in Figure G-1, which uses both the NRCS soils map and the National Wetlands Inventory map as primary sources.

On the summary page (page G-6) you will find the calculations for each WVU for Burnham Brook wetland. However, the range of scores is almost valueless when viewed on their own. A look at the summary sheet shows the highest numbers (WVU's) are for Flood Control, Sediment Trapping, and Ecological Integrity in that order. However, the scores of 66.0, 56.1, and 53.5 respectively, do not give an indication of whether the scores are low, medium or high.

The WVU scores for any one wetland on its own do not have any real meaning, although the presence of a numerical value shows that the function does exist. It is only when the WVU scores are compared with other wetlands in the study area (either a local watershed or town) that the scores can be subject to meaningful interpretation. The NH Method is based on comparison of the values of like functions for a number of wetlands.

To give this sample evaluation some relative meaning, an example is provided of comparison of this wetland and three hypothetical wetlands in the watershed (Table G-1). By comparing and contrasting these scores, relative values begin to stand out. However, it is important to note that the only comparisons which can be made are those that read from left to right across the results sheet, since like functions are being compared (functions should not be compared vertically). If, for example, four wetlands were evaluated within the same study area, and yielded the scores tabulated in Table G-1, the relative value of the Burnham Brook wetland could be assessed by comparing its scores to other wetland evaluation scores in the study area.

In the example, the Burnham Brook wetland scores the highest in our hypothetical study area for Sediment Trapping and Visual/Aesthetic Quality, and second highest for Wetland Wildlife Habitat, Ecological Integrity, and Educational Potential. This, which a wetland may exhibit a high numerical score for any one Functional Value, it may rate relatively low on the scale when compared with other wetlands that may have even higher WVU's for the same function.

TABLE G-1: Summary of Wetland Evaluation Scores in a Hypothetical Watershed Containing Burnham Brook Wetland

Functional Value	Burnham Brook	Wetland #2	Wetland #3	Wetland #4
Ecological Integrity	53.5	46.4	34.7	58.4
Wetland Wildlife Habitat	48.8	62.7	45.2	41.4
Finfish Habitat:				
Rivers and Streams	0.3	3.4	2.7	6.2
Lakes and Ponds	2.1	3.0	2.9	3.4
Educational Potential	41.6	25.6	59.6	20.7
Visual/Aesthetic Quality	20.0	14.7	18.3	12,2
Water-based Recreation	44.9	49.2	56.3	30.4
Flood Control	66.0	28.0	70.0	75.0
Ground Water Use Potential	42.9	43.0	54.6	48.3
Sediment Trapping	56.1	45.8	39.5	50.1
Nutrient Attenuation	49.5			
Shoreline Anchoring	3.4	6.7	4.6	2.5
Urban Quality of Life:				
Wetland Wildlife Habitat	0	0	0	63.5
Educational Opportunity	0	0	0	32.5
Visual/Aesthetic Quality	0	0	0	20.3
Water-based Recreation	0	0	0	32.0
Historical Site Potential	0	20.0	0	25.0
Noteworthiness	66.0	0	0	75.0