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NSB NEW LONDON
5090.3a

WETLAND DELINEATION
AREA A

NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CONNECTICUT

Prepared For:

Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Lester, PA 19113-2090

Navy Contract No. N62472-88-C-1294

Prepared By:

Atlantic Environmental Services, Inc.
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Atlantic Project No. 1256-31-03

May 4, 1995

TABLE OF CONTENTS

SECTION		PAGE
	PREFACE	*ii*
1.0	INTRODUCTION	1
2.0	SITE HISTORY	5
3.0	WETLAND DELINEATION	6
4.0	DESCRIPTION OF EXISTING CONDITIONS	8
4.1	Area A Upstream Wetland	9
4.2	Area A Downstream Wetlands	10
	4.2.1 Upper Pond Wetland	10
	4.2.2 Lower Pond Wetland	11
	4.2.3 OBDA Pond Wetland	11

LIST OF FIGURES

Figure 1: Site Location Map 2
Figure 2: Limits of Wetland Survey 3

LIST OF EXHIBITS

Exhibit 1: Site Photographs

LIST OF APPENDICES

Appendix A: East and North Coordinates of Wetland Flag Numbers
Appendix B: U.S. Army Corps of Engineers Data 1 Wetland Transect Forms
Appendix C: Detailed Soil Descriptions

LIST OF PLATES

Plate 1: Wetland Delineation Map
Plate 2: Soils Map

PREFACE

This wetland delineation report is a revised version of the original wetland delineation report (dated July 26, 1994); it has been revised based upon comments received from the United States Environmental Protection Agency (EPA), dated October 25, 1994. This preface contains: the EPA comment letter of October 25, 1994; the Navy response to EPA comments letter of March 14, 1995; and the EPA letter of April 21, 1995 in response to the March 14 Navy letter.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

October 25, 1994

Mark Evans, Remedial Project Manager
U.S. Department of the Navy
Naval Facilities Engineering Command
Northern Division
10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

Re: Area A Wetland Delineation Report dated July 26, 1994

Dear Mr. Evans:

I am writing in response to your request for EPA to review the Area A Wetland Delineation Report that was given to us on September 27, 1994. EPA reviewed the document in light of both state and federal methods for delineating wetlands. Since the upper Area A wetlands may be impacted by the landfill cap, the wetland boundary must be accurately defined. It may be beneficial to have the site delineator, Dean Gustafson, and the regulatory agencies jointly verify the wetland boundary. As discussed further below, EPA is primarily concerned with the lack of information needed to accurately draw the wetland boundaries.

First, after examining the data forms in Appendix B and Plate 1, it appears that the wetland boundary falls somewhere between plot 1 and 2 for each transect. A data form for the actual boundary line was not provided. According to the federal manual, a data form should be completed, at a minimum, for the observation point that defines the boundary. If not, the actual wetland boundary line depicted on Plate 1 is questionable and could be off by as much as seven feet. Unless the methods used to delineate the boundary are clarified, refining the wetland boundaries may be necessary.

Second, although the Corps of Engineers methods were referenced, it is unclear which method (either routine or comprehensive) was used. Both methods require a minimum of three transects for wetlands larger than 5 acres. Presently only two exist, "E" and "F." In addition, these transects as shown on Plate 1 do not completely traverse the wetland. Only one end of the transects is included in the map or text depicting a single boundary point. In both of these methods wetland/upland boundaries are to be made along the transect, indicating a boundary at each end of the transect. Once the transects have been defined and boundaries marked, flagging of boundaries can be done between the transects. Further explanation of the exact delineation technique and the need for additional observation points on the opposite side of the wetland is warranted.

PRINTED ON RECYCLED PAPER

There are some minor errors in the report that we have identified on Attachment A. There may be a need to reevaluate at least one of the boundary points in the downstream area particularly if remedial activity in this specific area is necessary.

I look forward to resolving this issue with you before we jointly decide upon sample locations. Please do not hesitate to contact me at (617) 573-5777 should you have any questions or wish to arrange a meeting.

Sincerely,

Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

cc: Mark Lewis, CT DEP, Hartford, CT
Andy Stackpole, NSBNL, New London, CT
Dan Winograd, USEPA, Boston, MA
Mary Sanderson, USEPA, Boston, MA
Patti Tyler, USEPA, Boston, MA
Dale Weiss, TRC, Lowell, MA

ATTACHMENT A

Page	Comment
Appendix B, Transect A, Plot 1	The numerical values in the numerator and denominator for the equation to calculate percent hydrophytes are incorrect. The subtotal value of seven should be in the numerator and the total value of eight in the denominator. The result is correct and appears to be only a typographical error.
Appendix B, Transect B, Plots 1 & 2	Examination of Transect B, Plots 1 and 2 data forms indicate a difference of 14 feet from each other perpendicular to the surface water body. Plot 1 shows 100% hydrophytic vegetation while plot 2 indicates 50%. Because of the distance between the two plots and the closeness to the vegetation cutoff of 50% at Plot 2, EPA recommends that this transect point be reexamined if mitigation is required.
Appendix B, Transect C, Plot 1	The numerical value in the denominator in the equation to calculate percent hydrophytes is incorrect. The total value of five, not nine, should be in the denominator. The result is correct and appears to be only a typographical error.

ATLANTIC

ENVIRONMENTAL SERVICES INC

engineers
geologists
scientists

March 14, 1995

Ms. Kymberlee Keckler
U.S. Environmental Protection Agency - Region I
Waste Management Division - HAN-CAN1
J.F.K. Federal Building
Boston, MA 02203

RE: Wetland Delineation
Naval Submarine Base - New London
Groton, Connecticut
Atlantic Project No. 2072-01-07

Dear Ms. Keckler:

On behalf of the United States Navy, Northern Division Naval Facilities Engineering Command this letter will serve as a response to the October 25, 1994 EPA letter regarding the review of Atlantic Environmental Services, Inc. Wetland Delineation Area A report, dated July 26, 1994.

The delineation of wetlands by federal definition was conducted according to the *Corps of Engineers Wetlands Delineation Manual*, dated January 1987. The routine method was used in conjunction with a September 9, 1991 Corp memorandum document titled *Guidance for the Interpretation of Wetland Boundaries Using the 1987 Corps Manual in the Six New England States*. I have attached a copy of this document for your review. The differences between the federal manual and the New England region interpretation should explain the concerns the EPA has over the accuracy of the wetland boundaries and the supporting data forms. The Wetland Delineation Area A report satisfies the requirements for federal wetland delineation in accordance with the Corps guidance document.

The first concern noted by the EPA was the omission of a data form for the actual federal boundary line. Attachment 1 (Performance Standards and Supplemental Definitions for Use with the 1987 Corps Manual) of the *Guidance for the Interpretation of Wetland Boundaries Using the 1987 Corps Manual in the Six New England States* specifies that one observation plot (documenting details about vegetation, soils and hydrology) be established upgradient and another downgradient from the wetland boundary. Therefore, no observation plot for the actual boundary is required.

The second concern noted by the EPA was with respect to methodology and establishment of transects. The methodology used is as described in the second paragraph of this letter. Attachment 1 of the Corps guidance document, regarding transects, states that a baseline is used to establish and recover locations of transects and observation points.

> *Transects are used to represent conditions along the boundary of federal jurisdiction. The number of transects must be sufficient to insure that all plant community types in the impact area along the wetland/nonwetland interface are revealed in the sampling. Generally, transects will be sampled at a rate of 3 per linear mile of baseline and increase at a rate of 1 transect per additional 0.5 mile of baseline length. Ideally, the intervals between transects should be equal;*

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— Offices in Colchester, CT • St. Louis, MO • Syracuse, NY —

however, this consideration is subordinate to the stated need to sample all plant community types and represent conditions is close proximity to the areas of the most direct impacts.

A baseline was established perpendicular to the hydrologic gradient along the edge of Area A Landfill, the area of potential impact. Since the baseline was 1,700 feet (0.3 mile) in length and the vegetative community was generally homogeneous throughout the area of potential impact, two transects were judged sufficient and established within the area of potential impact to document vegetation, soils and hydrology conditions on both the wetland and nonwetland sides of the boundary. No transects were established elsewhere along the wetland boundary in Area A since no other areas of potential impact are planned. If future plans include potential impacts to other areas of the wetland in Area A, additional appropriate transects should be established within the impact areas in order to document the federal boundary and wetland/nonwetland conditions in these areas.

With respect to your comments in Attachment A, the typographical errors will be corrected in the final submission of the wetland delineation report. Item 2 in EPA's Attachment A discusses the closeness of Transect B, Plots 1 and 2 (14 feet), to the vegetation cutoff of 50 percent at Plot 2. This is likely caused by the lack of herbaceous vegetation at the time the plots were recorded. In this particular case, a reevaluation of these plots may be warranted once the herbaceous vegetation has leafed out, if mitigation is required.

Should you have any further questions or comments regarding these issues, feel free to contact Mark Evans or us.

Sincerely,

ATLANTIC ENVIRONMENTAL
SERVICES, INC.

Dean Gustafson
Professional Soil Scientist

Barry L. Giroux, P.E.
Project Manager

DG/BLG:sr
Enclosures

cc: Mark Evans (NOR-DIV)
Mark Lewis (CTDEP)
Jean-Luc Glorieux (Halliburton NUS)

DRAFT

CENED-OD-R (1145-2-303B) 9 September 1991

MEMORANDUM THRU Chief, Policy Analysis Branch

FOR Chief, Regulatory Division, Operations Directorate

SUBJECT: Guidance for the Interpretation of Wetland Boundaries Using the 1987 Corps Manual in the Six New England States

1. On July 4, 1989 this Division disseminated a public notice announcing the "Mandatory Technical Criteria" from the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. It described a format and a protocol to be used by our staff to support wetland jurisdictional determinations throughout New England. During the two years since that notice, this Division has reviewed or generated documents for innumerable wetland delineations. While the 1989 form was a vast improvement over earlier formats, our staff has noted many inadequacies. I have also received countless comments and suggestions from the regulated public, scientists and other professionals outside the Corps of Engineers. As you know we are now required to use the Corps of Engineers Wetlands Delineation Manual (1987 Manual) However, the technical criteria for hydric soils are the same in both manuals. The efforts made to refine our use of the 1989 Manual are still of value since the information can also be used with the 1987 Manual. I have attached a draft revised dataform for use with the 1987 Manual. We issued a public notice on September 4, 1991 that supersedes the 1989 public notice and informs the public of the required use of the 1987 Manual.

2. A basic weakness in the Mandatory Technical Criteria found in the 1989 Manual has been the use of soil drainage classification. In the past, this interpretation related to agricultural use and did not require any level of precision. Throughout New England, interviews with hundreds of soil scientists suggests that most of them use soil morphology to determine drainage class; yet, the range of their differences has made it difficult to uniformly interpret soils throughout our region. In the recent past, our staff was augmented by Soil Scientist Peter Fletcher under contract from the U.S. Soil Conservation Service in Massachusetts. Peter collated the regional concepts of soil drainage classification and enabled us to develop concise guidelines and a revised dataform for use by our staff. These guidelines for soils determinations and the dataform are consistent with the 1987 Manual. By putting our ongoing operating concepts into text and illustrations, I expect improved consistency among our staff in their field interpretations. Consistency and predictability are in the interest of the regulated public.

CENED-OD-R
SUBJECT: Guidance for the Interpretation of Wetland Boundaries Using the 1987 Corps Manual in the Six New England States

3. The enclosed materials have considered the views of numerous experts from our region. It is my belief that nobody knows New England wetlands better than its community of practicing wetland scientists. The final products may not address every concern; nevertheless, without holding them completely accountable, I am grateful to the following for their continuing contributions and criticisms: Jim Gove, Steve Hundley, Norman Kalloch, Kipen Kolesinskas, Dr. Harvey Luce, Kenneth LaFlamme, Tom Peragallo, Sid Pilgrim, David Rocque, Jerry Rosenburg, Dick Scanu, Frank Smigelski, Matt Schweisburg, Chris Smith, Ralph Tiner, David Van Houten, Dr. Peter L.M. Veneman, Thomas Villars, Dr. William R. Wright. We are also indebted to the Soil Conservation Service staff in each of the six New England States for escorting our staff to the field and sharing their insights and interpretations on numerous unique and difficult soils. I also thank the Maine Association of Professional Soil Scientists, the Societies of Soil Scientists of Southern and Northern New England, the New England Chapters of Soil and Water Conservationists; as well as the New Hampshire Association of Consulting Soil Scientists, the New Hampshire Association of Wetland Scientists, and the New Hampshire Board of Certification of Natural Scientists. Several hundred of the members of these organizations participated in the field examination of versions of the enclosed materials.

Michael J. Sheehan
Senior Wetland Scientist
Environmental Resources Section

Enclosures:

1. Wetland Delineation Guidelines
   a. Performance Standards and Supplemental Definitions
   b. Sample Wetland Delineation Dataform
   c. Sample Illustration of Wetland Delineation Details
   d. Blank -- Delineation Dataform -- Version 24Aug91
2. Guidelines For Soil Drainage Class Determinations Operational Draft [Text Version 27Feb91, Illustrations 1Aug91]
3. Soil Interpretation References -- Addresses
4. Important Resource Information -- Addresses

PERFORMANCE STANDARDS AND SUPPLEMENTAL DEFINITIONS FOR USE WITH THE 1987 CORPS MANUAL

KNOWN STATION -- an easily recognizable, accessible and reasonably permanent cultural or natural feature used as a reference point for horizontal survey control and included with the plan of the project site. A known station must be available within 1000 feet of recorded observation plots. Where such reference points are not available, known stations should be established by land survey, visibly marked and illustrated on the plan view. The land survey must be verifiable with an accuracy of 1/500 ratio of error.

BASELINE -- A wetland survey control feature used to establish and recover locations of transects and observation points. It is usually parallel to the water course or perpendicular to the hydrologic gradient. The length of the baseline may be used to guide the minimum number of transects.

TRANSECT -- A line on the ground along which observations are made. Transects are used to represent conditions along the boundary of federal jurisdiction. The number of transects must be sufficient to insure that all plant community types in the impact area along the wetland/nonwetland interface are revealed in the sampling. Generally, transects will be sampled at a rate of 3 per linear mile of baseline and increase at a rate of 1 transect per additional 0.5 mile of baseline length. Ideally, the intervals between transects should be equal; however, this consideration is subordinate to the stated need to sample all plant community types and represent conditions in close proximity to the areas of the most direct impacts.

OBSERVATION PLOT -- Sites along a transect where the details about vegetation, soils and hydrology are observed and recorded. Minimally, one observation plot upgradient and another downgradient from the wetland boundary will be recorded. Together, these two points are the delineator's reasoning behind his wetland boundary. Consequently, it's important that these plots are fair representations of the site conditions along the boundary. It's also important that the two documented plots can be recovered and confirmed by the authenticating agency. Ideally, the centers of these 2 plots should be in the range 5 to 15 feet from one another. Record plot locations must be recoverable from a known station.

VEGETATION SAMPLING: -- 6 strata are defined:

A. WOODY OVERSTORY: stems in 30-ft. radius from center of observation point
   1. TREES -- woody, nonclimbing, at least 5.0in. dbh (diameter at breast height) and at least 20ft. tall.
   2. LIANAS -- woody vines, climbing on trees, shrubs or saplings.
B. WOODY UNDERSTORY: foliage in 15-ft. radius from center of observation plot
   3. SAPLINGS -- woody, nonclimbing, at least 0.4in., but less than 5.0in. dbh, and at least 20ft. tall.
   4. SHRUBS -- woody, nonclimbing, at least 3ft. tall, but less than 20ft. tall
C. HERBACEOUS UNDERSTORY: foliage in 5-ft. radius from center of observation plot
   5. SEEDLINGS & HERBS -- woody, less than 3ft. tall, or nonwoody (any height)
   6. MOSSES & LIVERWORTS -- Only when considered an important component of the community

DOMINANT VEGETATION -- Using the dominance measures below, estimate and list the species in each stratum of the plot that, when ranked in descending order of abundance (i.e. Percent Dominance) and cumulatively totalled, immediately exceeds 50% of the total dominance measure for the stratum plus any additional species that comprise 20% or more. of the dominance measure for that stratum.

DOMINANCE MEASURES -- as indicated for the strata below:

Trees -- BASAL AREA (i.e. the cross sectional area at BREAST HEIGHT (4.5 ft.)

Lianas -- number of stems (i.e. at ground level) or basal area, as appropriate

Other Strata -- percent areal coverage (i.e. estimated peak growing season foliage)

TOTAL DOMINANCE MEASURE -- the sum of the dominance measure of all species in a stratum.

PERCENT DOMINANCE -- The sum of the dominance measure of a species divided by total dominance measure for a stratum, expressed as a percent. For example -- the total cover by Carex stricta compared to the total cover of all species in the herb layer.

HYDROPHYTES are considered to be prevalent when more than 50% of the list of dominant vegetation are within the range OBL through FAC on the current National List of Plant Species That Occur in Wetlands: Northeast (Region I). NOTE: FAC-, FACU and UPL species are considered hydrophytes when observable morphological or physiological adaptations to wetland hydrology are found in the observation plot. Except FAC-, the other + and - signs may be ignored when processing the wetland indicator status data, i.e. OBL-, FACW+, FACW-, FAC+, FACU+, FACU- are considered OBL, FACW, FAC and FACU, respectively.

OBSERVABLE PLANT ADAPTATIONS TO WETLAND HYDROLOGY:

Pneumatophores	Buttressed Trees	Hypertrophied Lenticels
Stooling	Adventitious Roots	Inflated Leaves, Stems, or Roots
Shallow Root Systems	Floating Leaves	Rhizospheric Oxidation
Polymorphic Leaves	Floating Stems	

HYDRIC SOIL -- a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part.

SOIL SURFACE -- For organic soils (Histosols) or mineral soils with a thick organic surface layer (histic epipedon), the soil surface is the uppermost organic horizon or layer that is, or has been, saturated for prolonged periods. Otherwise, the soil surface is the top of the mineral soil. (This will be used to describe the depth to the horizons or layers, and their thickness.)

WETLAND HYDROLOGY -- permanent or periodic inundation, or soil saturation for a significant period (usually two weeks or more) during the growing season.

NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1) January 1987

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

Project Title: Mantel Cata-bolism, Inc. File Number:

Transect: T2 Plot: 2 Date: 1 Nov 91

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
Tree	Acer rubrum	320/440	73	FAC
	Pinus strobus	120/440	27	*FACU
Liana	Smilax glauca	several	100	FACU
Sapling	Acer rubrum	63/72	88	FAC
Shrub	Clethra alnifolia	10.5/21	50	FAC+
	Vaccinium corymbosum	10.5/21	50	FACW
Herb	Osmunda cinnamomea	10.5/36	29	FACW
	Clethra alnifolia	10.5/36	29	FAC+

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	2	4		1			1	

SUBTOTAL (HYDROPHYTES): 7 SUBTOTAL: 1

TOTAL: 8

100 x SUBTOTAL (HYDROPHYTES) / TOTAL = 100 x 7/8 = 88 = PERCENT HYDROPHYTES

DESCRIBE VEGETATION DISTURBANCE: None

DESCRIBE ADAPTATIONS: Shallow root system

DATA -- SOIL Soil Taxonomy: Aeric Haplaquept

Corps of Engineers Regional Drainage Class: Poorly Drained Criterion: B3b(1)

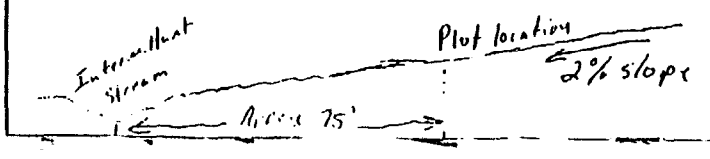
Is Published Soil Survey Available? Yes ☒ No ☐ Title/Date: Wayne Co. 1 Apr. 1990

Soil Type Mapped: Ridgebury fine sandy loam Field Observations Confirm Type Mapped? Yes ☒ No ☐

Depth inches	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
3-2	O1	-	-	fibric (maple leaves, pine needles)
2-0	Oa	5YR 2.1/1	-	Sapric
0-3	A	10YR 2/1	-	fsl, oxidized root channels, many med. + coarse roots
3-9	Bw	10YR 5/3	2.5Y 5/2 md	fsl, common fine + v. fine roots in upper part, no roots below
9-20	Bg	2.5Y 5/2	10YR 5/4 fp	fsl
20-30	Cd	2.5Y 5/4	10YR 5/2	fsl, compact basal till (restrictive layer)
≥30	-	-	-	- Not observed, below 30"

Remarks: Pit + mound topography, pits comprise more than 50% of the surface area. Profile describes typical pit. This data point is approximately 75' from intermittant stream

Sketch Landscape Position:



NOTE: This form reflects changes that are consistent with the guidance of the Corps of Engineers Regional Supplements to the Corps Wetlands Delineation Manual (Technical Report Y-87-1) January 1987

Wetland Determination Data Form -- Version 2 (Aug 1987)

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

SOIL DETERMINATION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).
☐	☑	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☑	☐	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes	NO	
☐	☐	1. Within 6 inches of the soil surface there are:
☐	☐	a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
☐	☐	b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
☐	☐	c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.
☐	☐	2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:
☐	☐	a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
☐	☐	b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
- Stream, lake or tidal gage — Identification: _____
- Aerial Photograph — Identification: _____
- Other — Identification: _____

☑ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 8"

Depth to Saturation: Saturated to surface

Describe Altered Hydrology: None

☐ Inundated

☑ Saturated in upper 12 inches

☐ Water Marks

☐ Drift Lines

☐ Sediment Deposits

☑ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: Martel Catabolism Inc.

Delineator: Bub Sixpack

Transect: T2 Plot: 2 Date: 1 Nov. 91

	Yes	No
Greater than 50 Percent Hydrophytes?	☑	☐
Hydric Soils Criterion Met?	☑	☐
Wetland Hydrology Present?	☒	☐

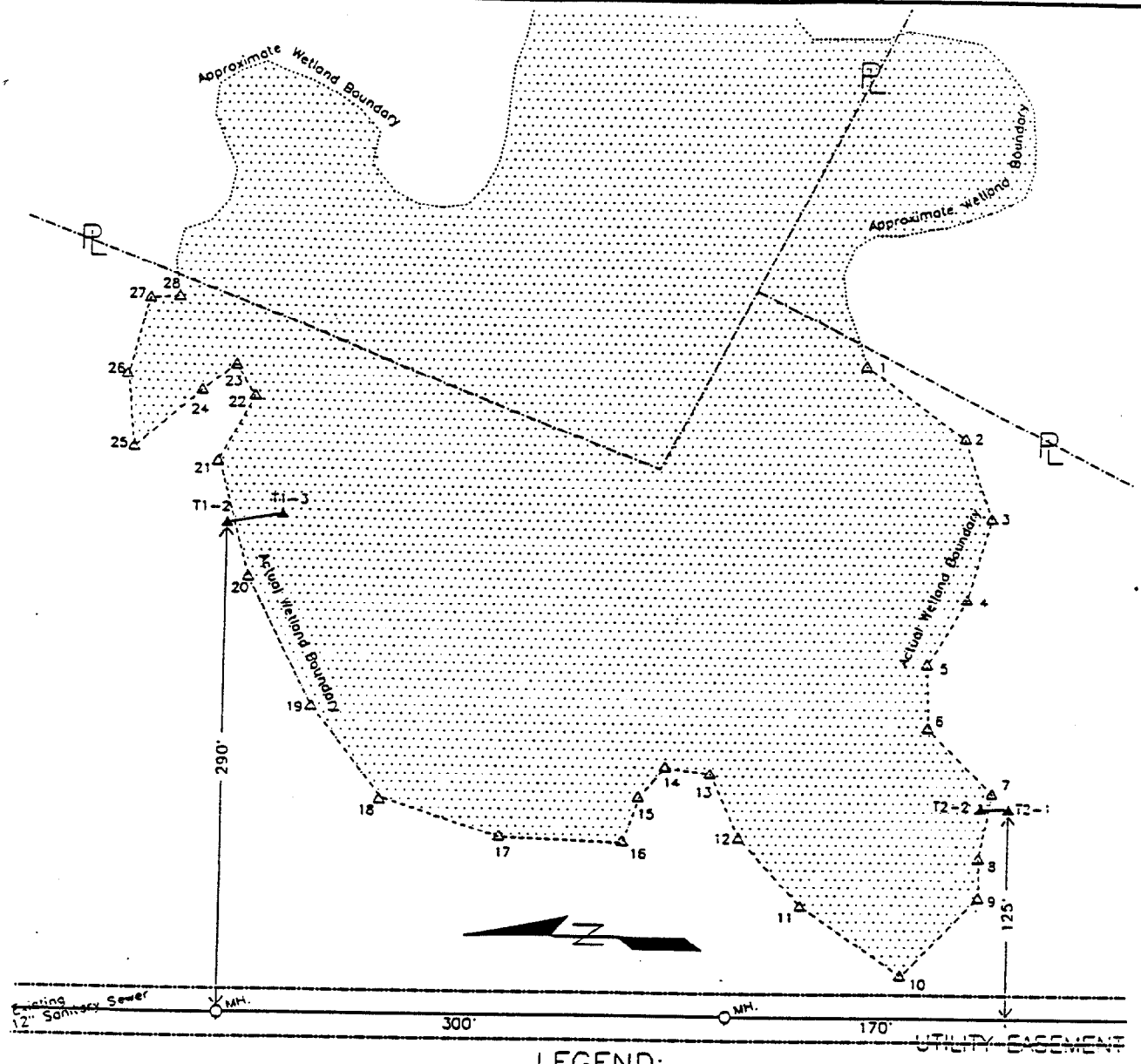
IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

Remarks: The recorded upland datapoint, T2-1 is approximately 35' due South. The wetland boundary is 10' due South in the vicinity of boundary flag #7

NOTE: This form replaces changes that are consistent with the guidance of the Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1) January 1987

Wetland Delineation Checklist -- Version 2-NAEN91

Contour and project features have been removed to illustrate ground controls and recoverable points.



LEGEND:

- Property Boundary
- Approx. Wetland Limits
- Actual Wetland Limits
- 10 Wetland Flags
- T6-4 / T6-5 Transect & Datapoints
- 0 50 100 SCALE IN FEET
- Sanitary Sewer used as Baseline
- MH. Manhole used as Known Station

PURPOSE:
Regional Flea Market for the Culturally Disadvantaged
DATUM: NGVD = 0.0
ADJACENT PROPERTY OWNERS:
1. Willie Prophet
2. Reginald O'Day

DETAILS OF WETLAND DELINEATION

MARTEL CATABOLISM INC.
P.O. Box 404B
Wazoo, MA 02254

LANDSCAPING IMPROVEMENTS
IN: Wetlands adjacent to Fetid Brook
AT: Quasi, MA
COUNTY OF: Whatnot
APPLICATION BY: Daniel Martel, Esq.
Sheet 2 of 13 DATE: 1 NOV 91

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

SOIL DETERMINATION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes No

☐ ☐ Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).

☐ ☐ The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☐ The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☐ The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO

☐ ☐ 1. Within 6 inches of the soil surface there are:

Yes No

☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:

Stream, lake or tidal gage — Identification: _____

Aerial Photograph — Identification: _____

Other — Identification: _____

☐ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology: _____

☐ Inundated

☐ Saturated in upper 12 inches

☐ Water Marks

☐ Drift Lines

☐ Sediment Deposits

☐ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title:

Delineator:

Transect: Plot: Date:

	Yes	No
Greater than 50 Percent Hydrophytes?	☐	☐
Hydric Soils Criterion Met?	☐	☐
Wetland Hydrology Present?	☐	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☐

Remarks:

NOTE: This form reflects changes that are consistent with the guidance of the Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1) January 1987

Wetland Determination Datasheet -- Version 2.0(6/29)

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

SOIL DETERMINATION

NOTE:
1. "NO" in all the following is evidence that the soil is "NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate
3. This interpretive routine may be inappropriate in unusual cases.

Yes No

☐ ☐ Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).

☐ ☐ The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☐ The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☐ The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO

☐ ☐ 1. Within 8 inches of the soil surface there are:

Yes No

☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:

Stream, lake or tidal gage — Identification: _____

Aerial Photograph — Identification: _____

Other — Identification: _____

☐ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology: _____

☐ Inundated

☐ Saturated in upper 12 inches

☐ Water Marks

☐ Drift Lines

☐ Sediment Deposits

☐ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title:

Delineator:

Transect: Plot: Date:

	Yes	No
Greater than 50 Percent Hydrophytes?	☐	☐
Hydric Soils Criterion Met?	☐	☐
Wetland Hydrology Present?	☐	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☐

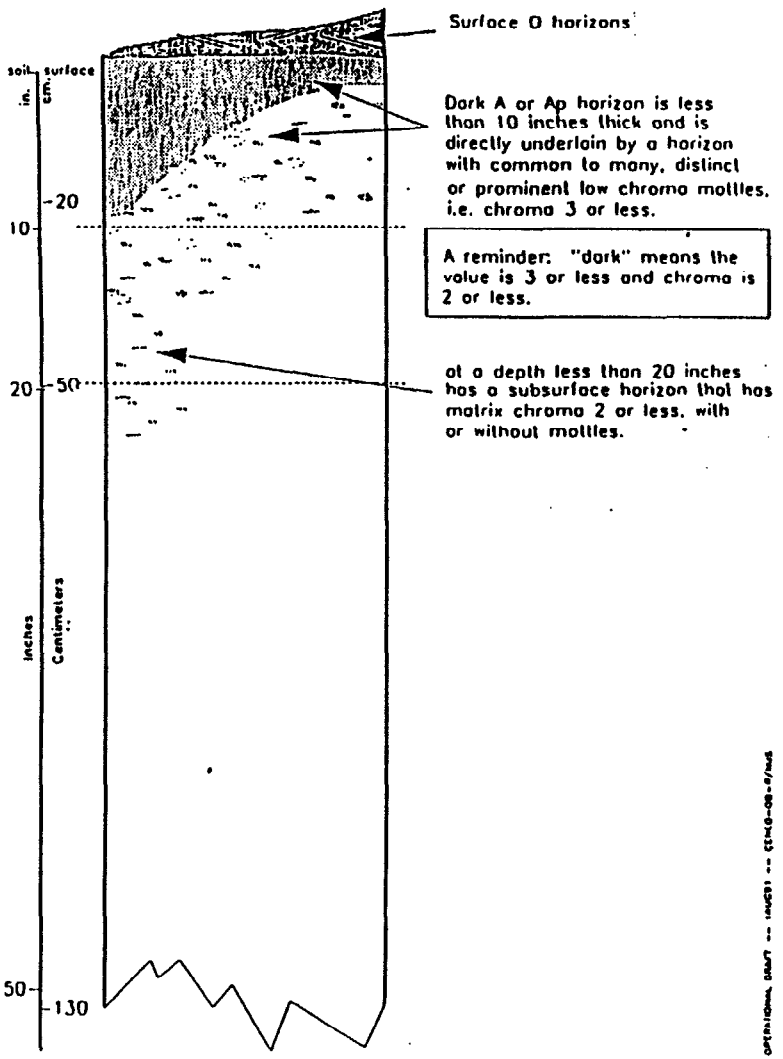
Remarks:

NOTE: This form reflects changes that are consistent with the guidance of the Corps of Engineers Regional Supplement (Technical Report Y-87-1) January 1987

Hydric Determination Checklist -- version 2 (AUG 91)

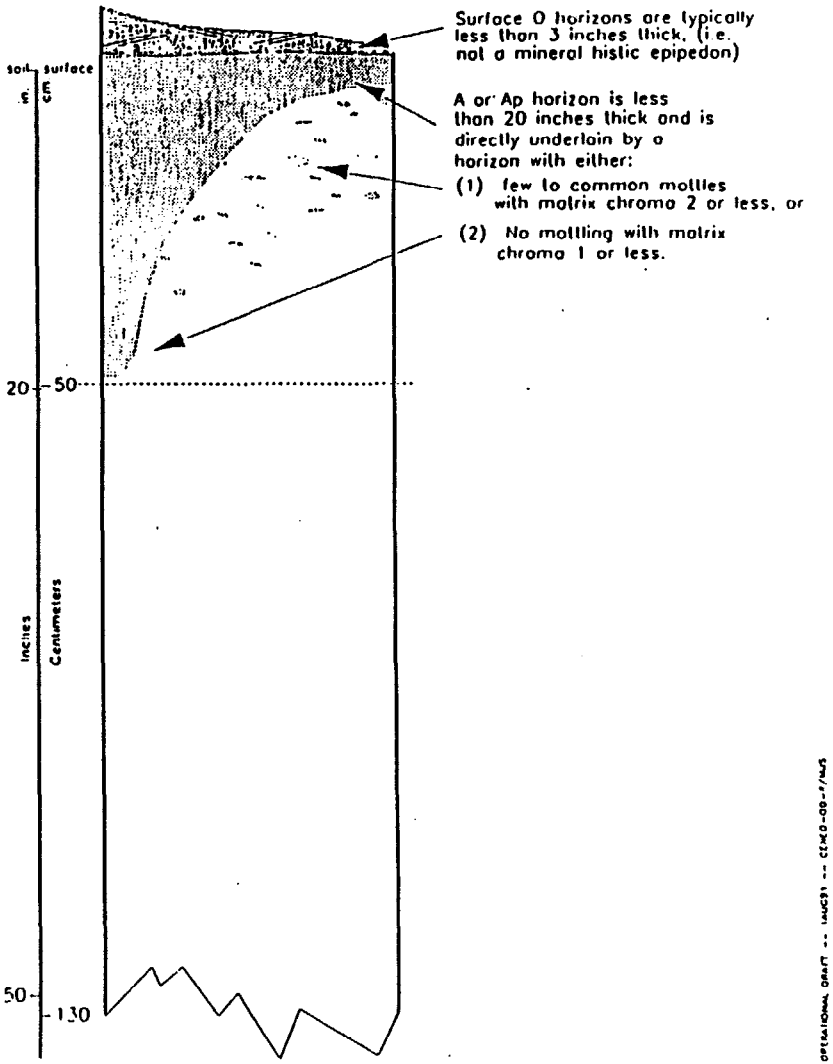
B3c(1) POORLY DRAINED

No spodic horizon, textures are loamy fine sand or coarser in all subhorizons within 20 inches of the soil surface



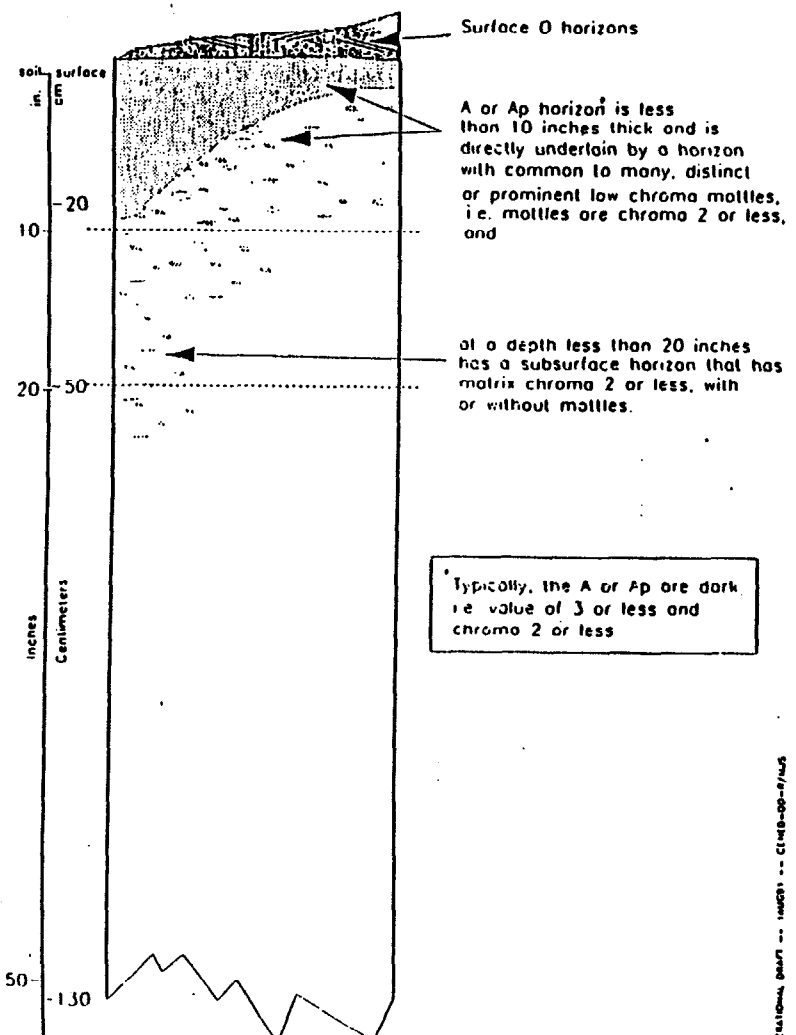
B3a POORLY DRAINED

No spodic horizon, and no textural criteria



B3b(1) POORLY DRAINED

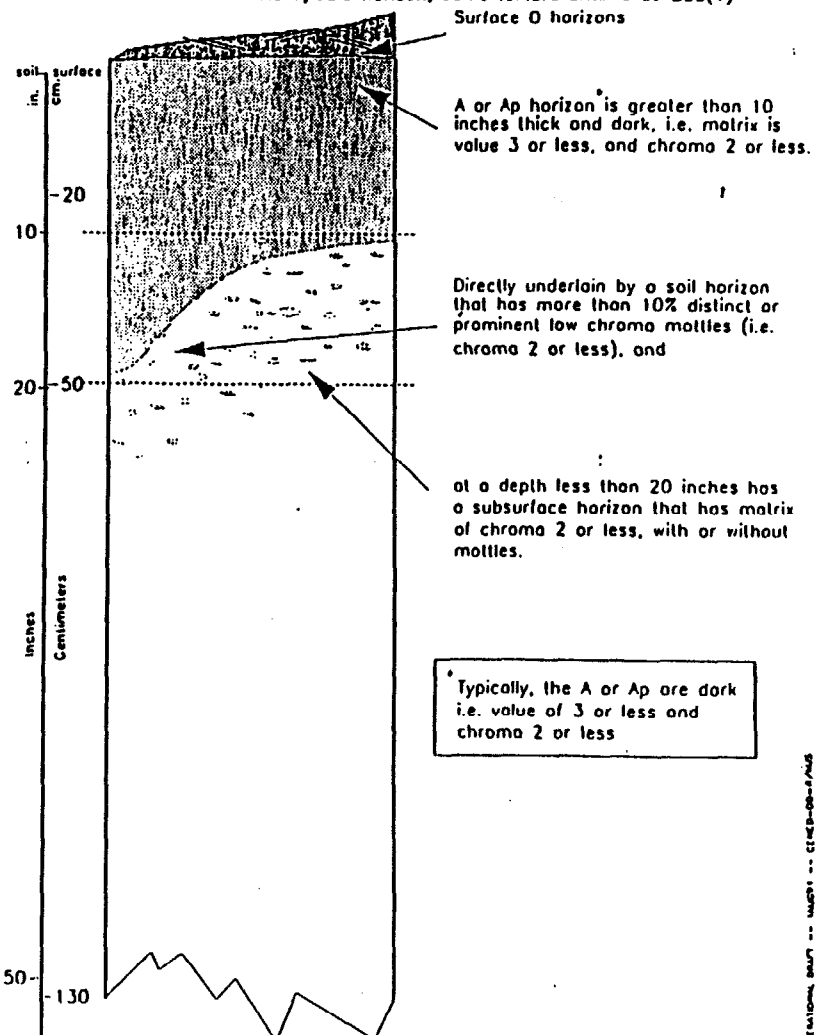
No spodic horizon, textures are finer than loamy fine sand in any or all subhorizons within 20 inches of the soil surface



Fold or Cut Along this Line

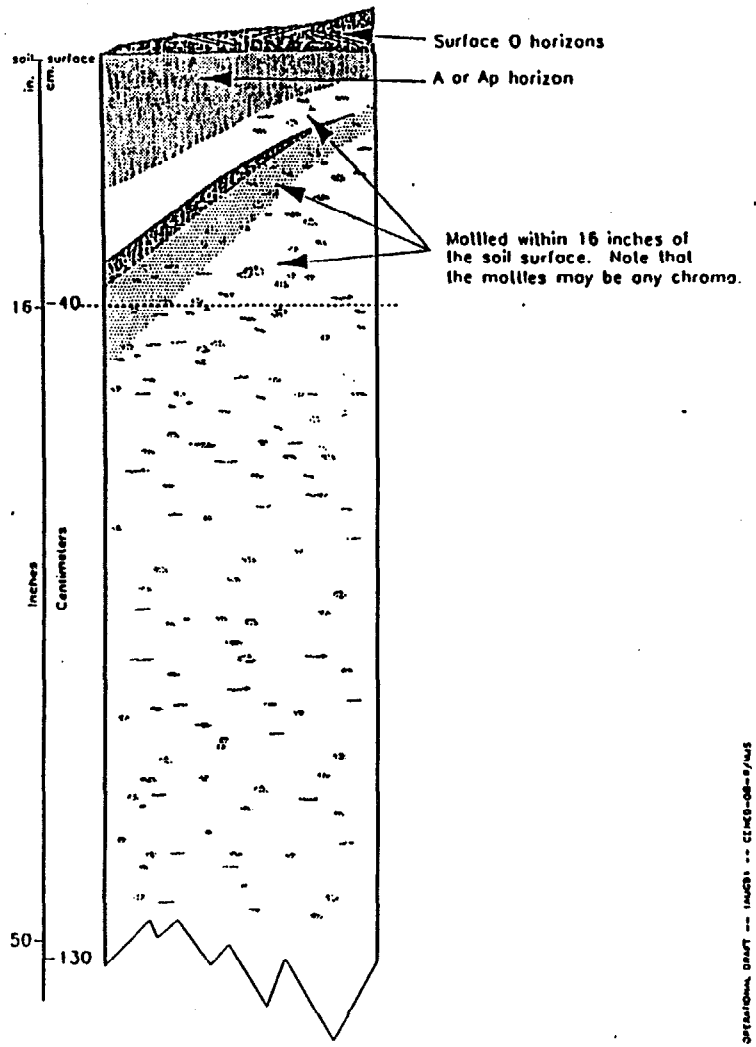
B3b(2) POORLY DRAINED

No spodic horizon, same texture criteria as B3b(1)



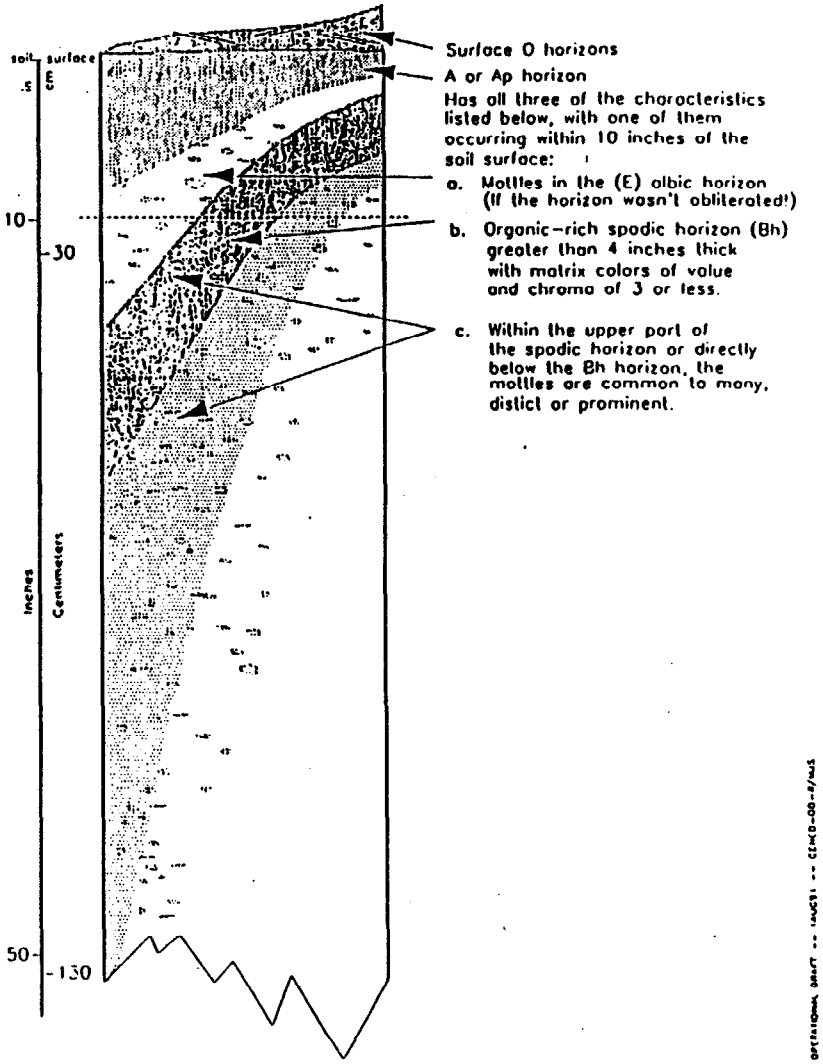
C1 SOMEWHAT POORLY DRAINED

Spodosols, and no texture criteria
(Both aquic and udic soils may be included)



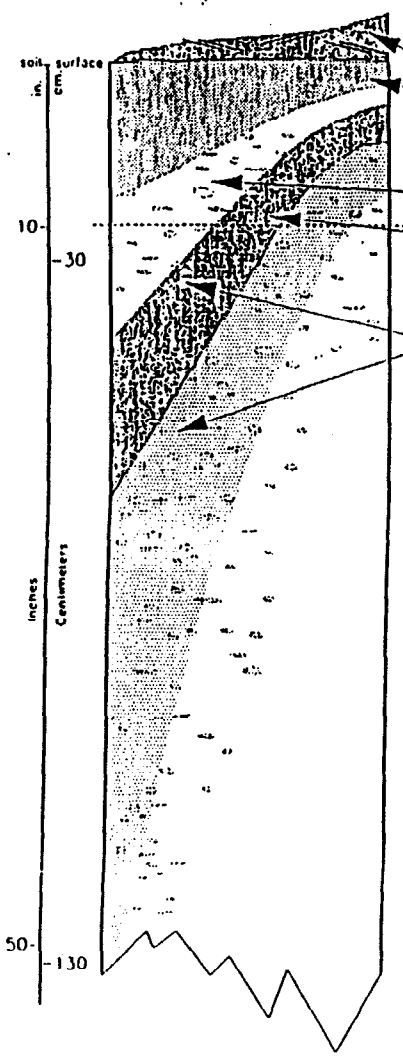
B1 POORLY DRAINED

Spodosol with textures that are finer than loamy fine sand in any or all subhorizons within 20 inches of the soil surface, and



B2 POORLY DRAINED

Spodosol with textures that are loamy fine sand or coarser in all subhorizons within 20 inches of the soil surface, and



Surface O horizons

A or Ap horizon

Has all three of the characteristics listed below, with one of them occurring within 10 inches of the soil surface.

a. Mottles in the (E) albic horizon (if the horizon wasn't obliterated!)

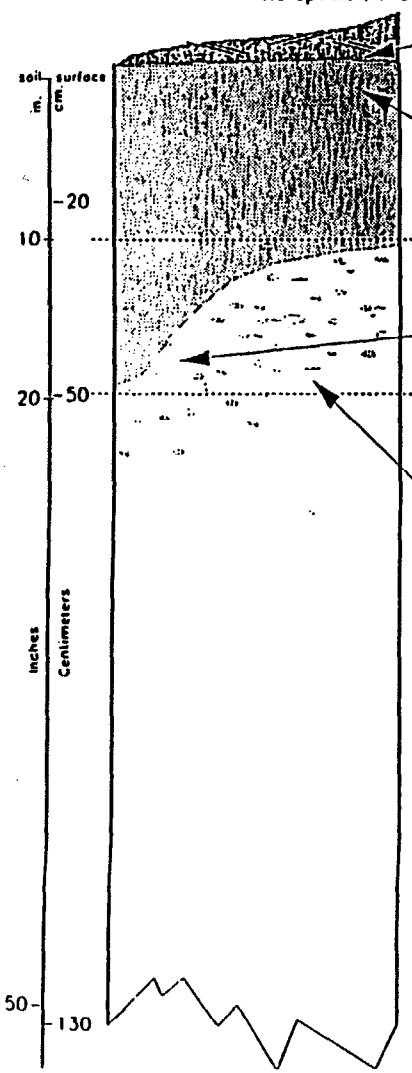
b. Organic-rich spodic horizon (Bh) greater than 2 inches thick with matrix colors of value and chroma of 3 or less.

c. Within the upper part of the spodic horizon or directly below the Bh horizon, the mottles are common to many, distict or prominent.

NOTE: The difference between this and B1 are related to texture and the thickness of the Bh.

B3c(2) POORLY DRAINED

No spodic horizon, same texture criteria as B3c(1)



Surface O horizons

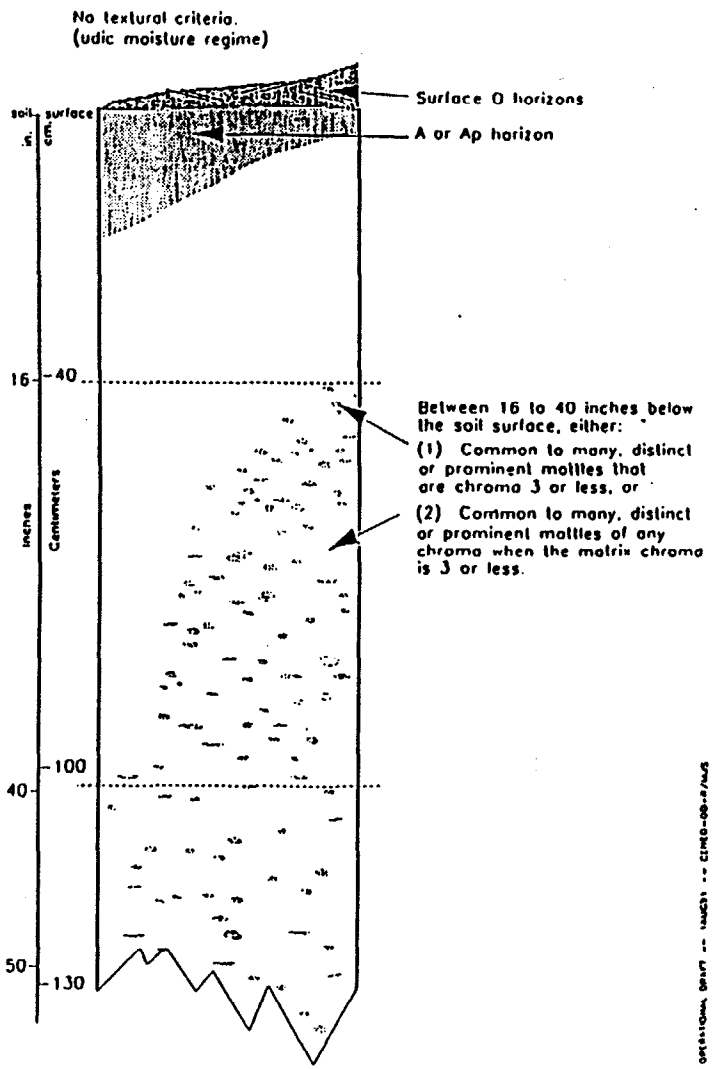
A or Ap horizon* is greater than 10 inches thick and matrix is value 3 or less, and chroma 2 or less.

Directly underlain by a soil horizon that has more than 10% distinct or prominent low chroma mottles (i.e. chroma 3 or less), and

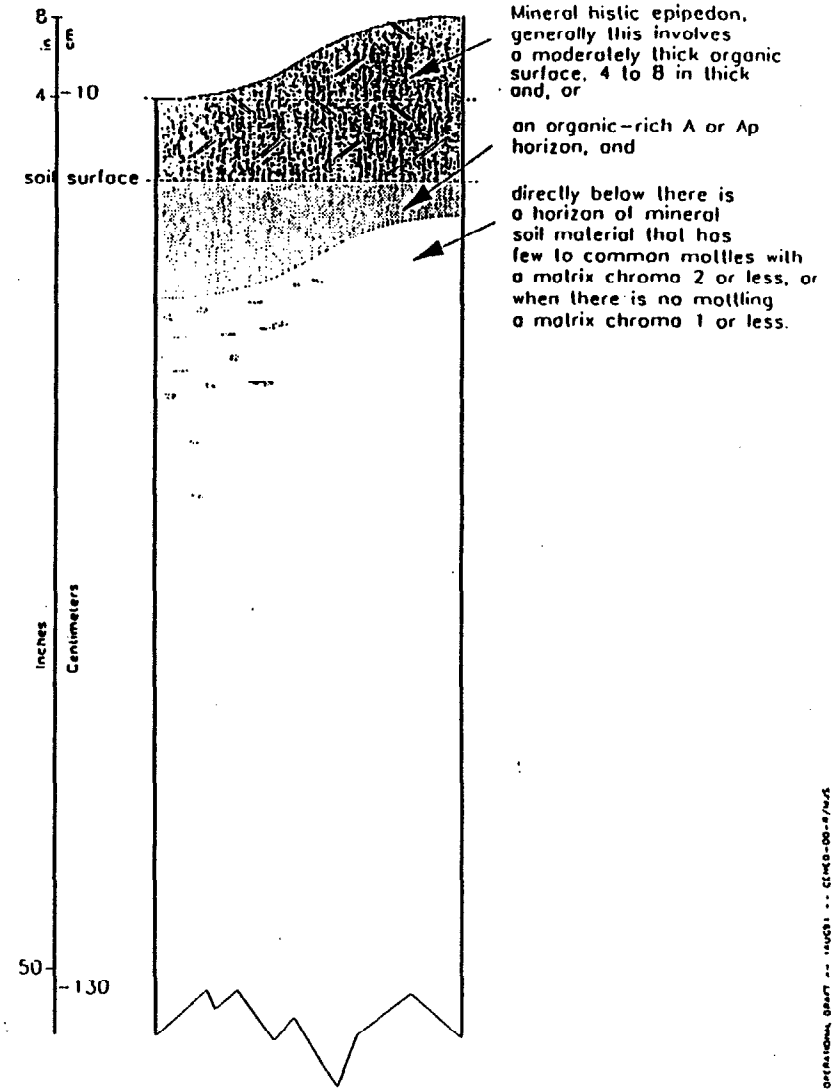
at a depth less than 20 inches has a subsurface horizon that has matrix of chroma 3 or less, with or without mottles.

*Typically, the A or Ap are dark i.e. value of 3 or less and chroma 2 or less

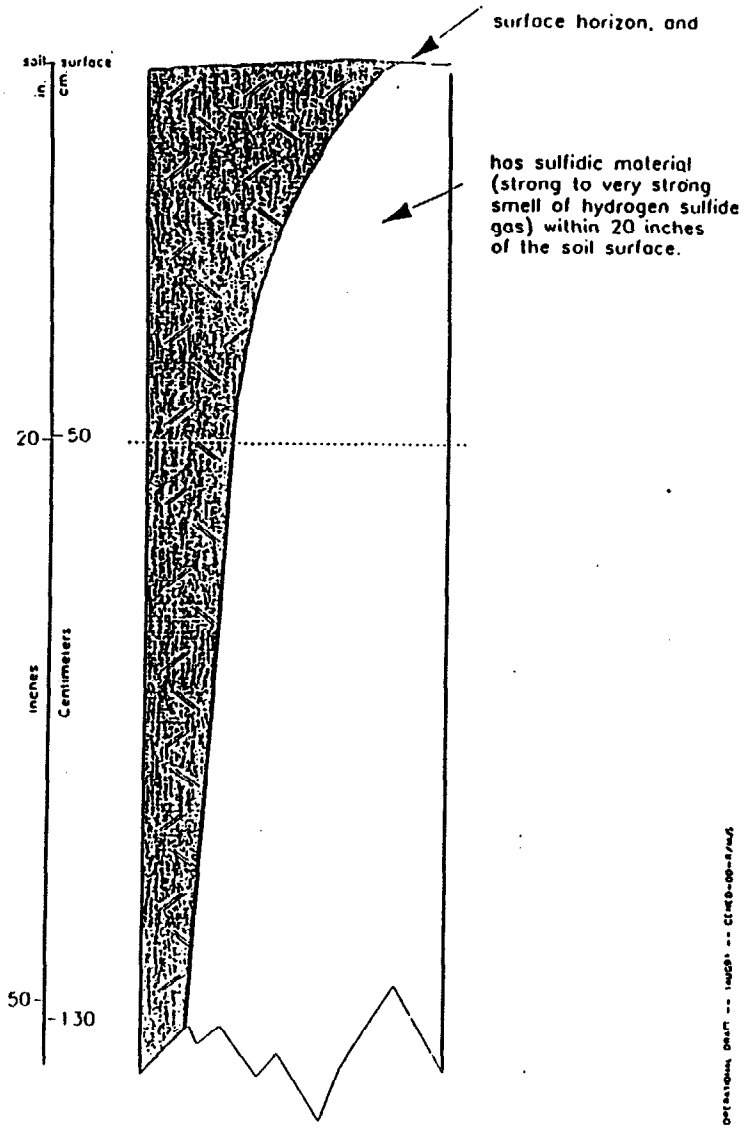
D MODERATELY WELL DRAINED



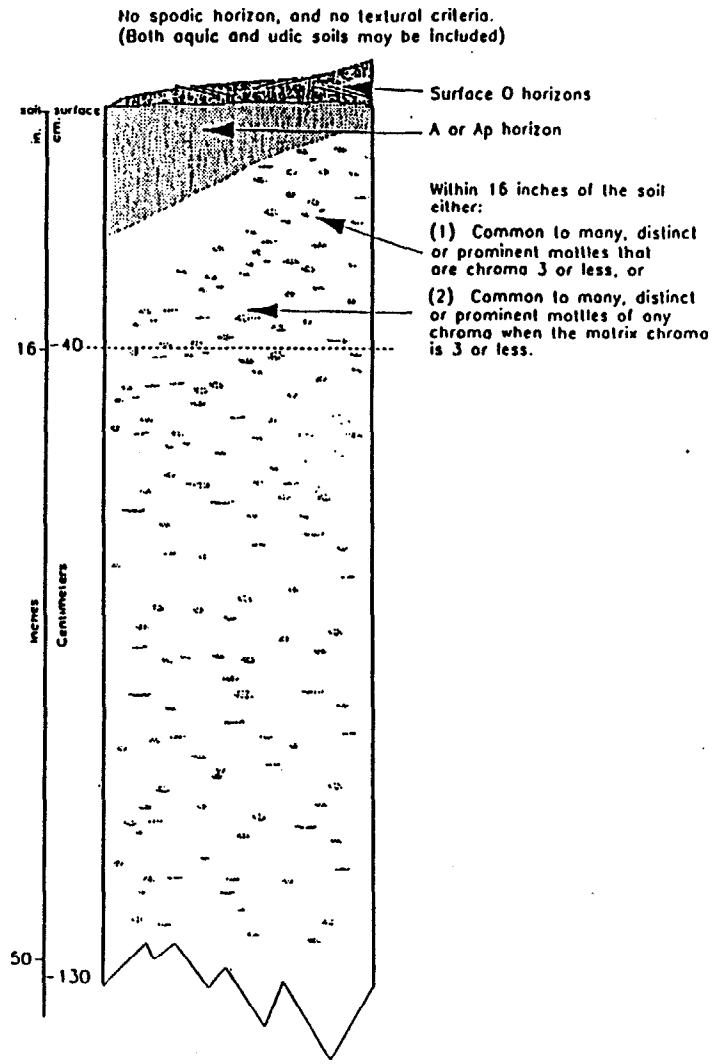
A3 VERY POORLY DRAINED



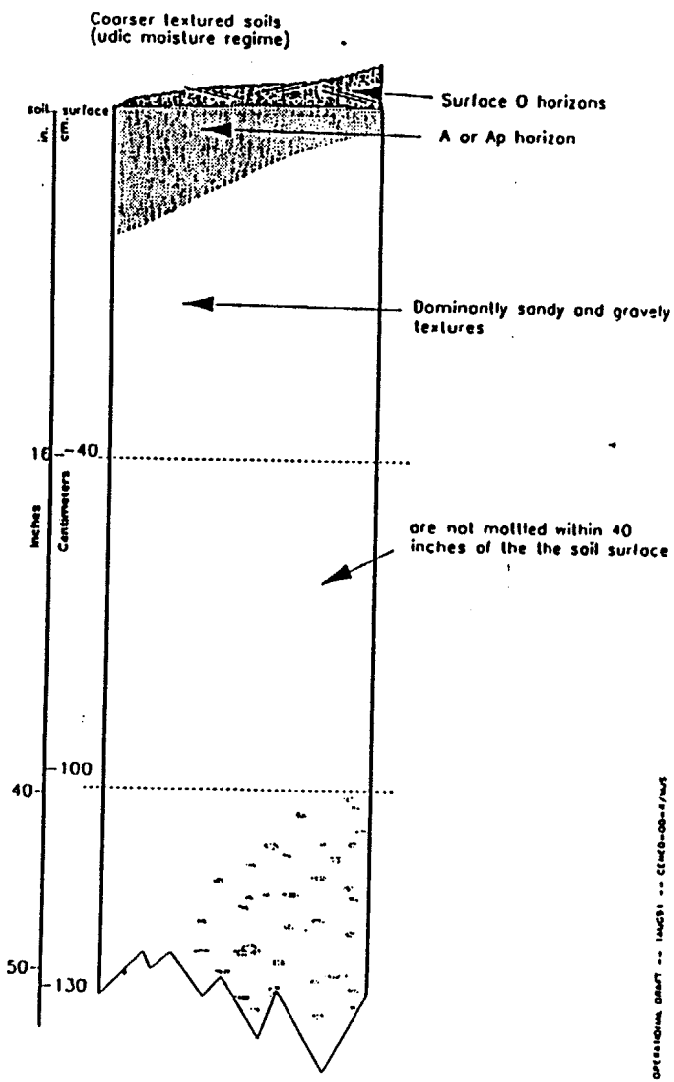
A4 VERY POORLY DRAINED



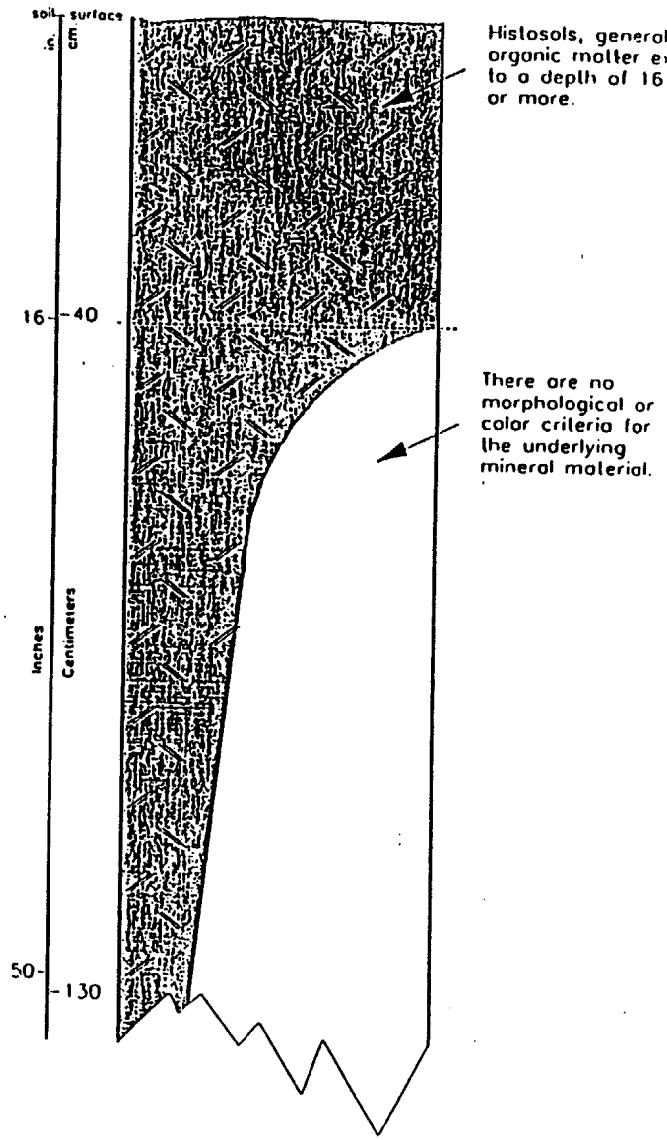
C2 SOMEWHAT POORLY DRAINED



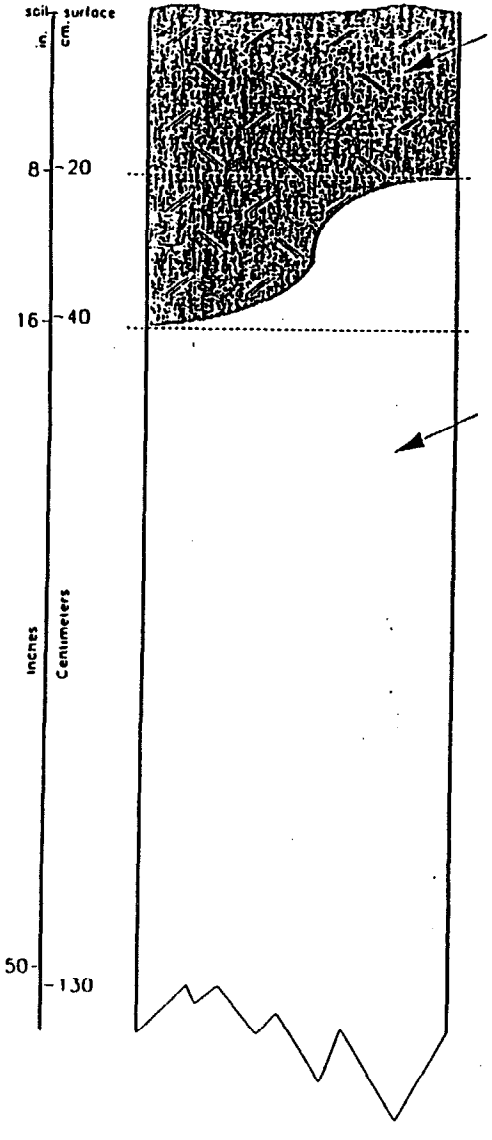
F SOMEWHAT EXCESSIVELY TO EXCESSIVELY DRAINED SOILS



A1 VERY POORLY DRAINED



A2 VERY POORLY DRAINED

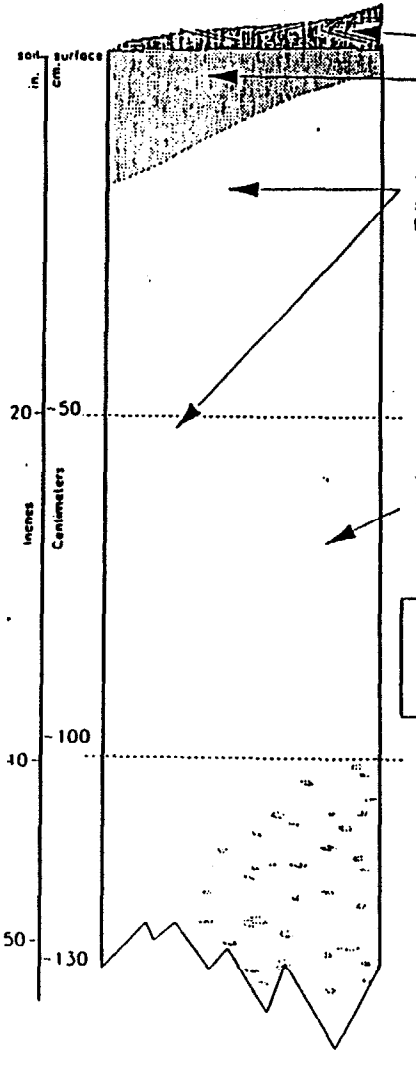


Histic epipedon, generally this involves a thick organic surface that is 8 to 16 in. thick,

no specific morphological or color criteria for the underlying mineral material, but some wetness features should be documented.

E WELL DRAINED

Fine textured materials (udic moisture regime)



Surface O horizons

A or Ap horizon

Textures are finer than loamy fine sand that extend to a depth greater than 20 inches from the soil surface.

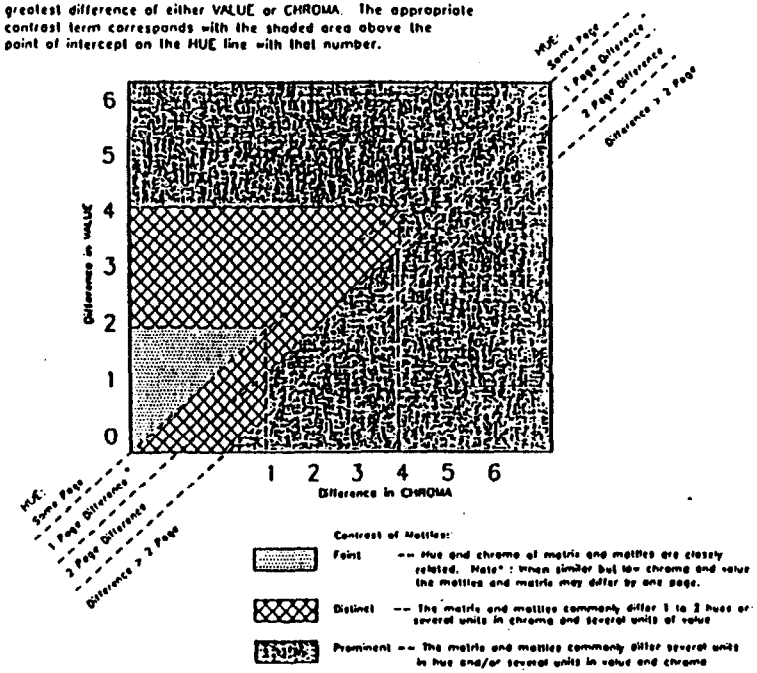
Typically, not mottled within 40 inches of the the soil surface; however, mottles may be found that do not meet *abundance, contrast or chroma requirements* of the Moderately Well Drained Soil

Faint mottles may be associated with the borders between layers of contrasting textures or directly overlying a restrictive layer, such as in a compact basal till.

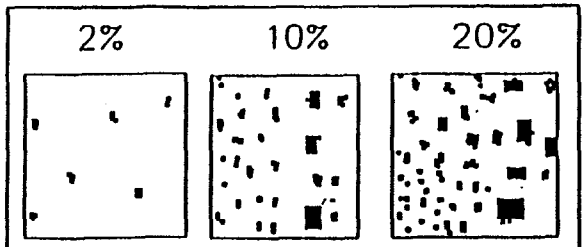
CONTRAST OF MOTTLES

For use with Munsell Color Charts

Directions: First, select the number of pages between the Hue of the matrix and the HUE of the mottle. Next, determine the greatest difference of either VALUE or CHROMA. The appropriate contrast term corresponds with the shaded area above the point of intercept on the HUE line with that number.



ABUNDANCE OF MOTTLES



FEW
Less than 2%

COMMON
Abundance ranges from 2% to 20%

MANY
More than 20%

GUIDELINES FOR SOIL DRAINAGE CLASS DETERMINATION
used for Section 404 of Clean Water Act Jurisdictional Interpretations by
U.S. Army Corps of Engineers, New England Division
-- OPERATIONAL DRAFT --
(Version 27Feb91)

The range of soil profile conditions are illustrated on the pages following the entire text. Above each stylized drawing there are large letters and numbers corresponding to the paragraphs in the text. The full range of conditions that are described in the text is represented by vertical section through each profile.

A. **VERY POORLY DRAINED SOILS** are soils that have an aquic moisture regime and one of the following:

1. Organic soil materials that extend from the soil surface[a] to a depth of 16 or more inches (i.e. Histosols).
2. Organic soil materials that extend from the soil surface to a depth of 8 to 16 inches (i.e. histic epipedon).
3. A mineral histic epipedon (e.g. organic surface layers that are 4 to 8 inches thick and/or have an organic-rich A or Ap horizon) and, in the soil horizon that lies directly under an O, A, or Ap horizon there are few to common mottles with the matrix chroma[b] of 2 or less or, if there are no mottles in this underlying layer, the matrix chroma is 1 or less.
4. Sulfidic materials[c] within 20 inches of the soil surface.

B. **POORLY DRAINED SOILS** are soils that have an aquic moisture regime and one of the following:

1. A spodic horizon and a texture that is finer than loamy fine sand in some or all subhorizons within 20 inches of the soil surface; and have all the following characteristics, with one of these characteristics evident within 10 inches of the soil surface:

   a. Mottles within the albic horizon.[d]
   b. Organic-rich spodic (Bh) horizon greater than 4 inches thick with matrix colors of value and chroma of 3 or less.
   c. Mottles[e] that are common to many, distinct or prominent, are within the upper part of the spodic horizon or are directly below the organic-rich (Bh) horizon.

2. A spodic horizon and a texture that is loamy fine sand or coarser in all subhorizons within 20 inches of the soil surface; and have all the following characteristics, with one these characteristics evident within 10 inches of the soil surface:

   a. Mottles within the albic horizon.[d]
   b. Organic-rich spodic (Bh) horizon greater than 2 inches thick with matrix colors of value and chroma of 3 or less.
   c. Mottles[e] that are common to many, distinct or prominent, are within the upper part of the spodic horizon or are directly below the organic-rich (Bh) horizon.

3. Do not have a spodic horizon and have one of the following:

   a. Any soil texture, and the matrix of the soil horizon which is within 20 inches of the surface and directly underlying an O, A, or Ap horizon, is chroma 2 or less when mottles are few to common; or if there are no mottles in this horizon, the matrix chroma is 1 or less.

   b. Within 20 inches of the soil surface, both the texture is finer than loamy fine sand in some or all subhorizons, and there is a subsurface horizon with a matrix color of chroma 2 or less, and one of the following:
   (1) In the soil horizon directly underlying an A or Ap horizon and within 10 inches of the soil surface, there are mottles that are common to many, distinct or prominent, and that are chroma 2 or less.
   (2) In the soil horizon directly underlying a thick, dark A or Ap horizon[f], there are mottles that are distinct or prominent, greater than 10% in abundance and that are chroma 2 or less.

   c. Within 20 inches of the soil surface, the texture is loamy fine sand or coarser in all subhorizons, and there is a subsurface horizon with a matrix color of chroma of 3 or less, and one of the following:
   (1) In the soil horizon directly underlying a dark[g] A or Ap horizon and within 10 inches of the soil surface, there are mottles that are common to many, distinct or prominent, and that are chroma 3 or less.
   (2) In the soil horizon directly underlying a thick, dark A or Ap horizon[f], there are mottles that are distinct or prominent, greater than 10% in abundance, and that are chroma 3 or less.

C. SOMEWHAT POORLY DRAINED SOILS are soils that have an aquic or udic moisture regime and either of the following:

1. A spodic horizon that is mottled within 16 inches of the soil surface, regardless of the chroma of those mottles.

2. No spodic horizon and, within 16 inches of the soil surface, there is one of the following:
   a. Mottles that are common to many, distinct or prominent, and have a chroma of 3 or less.
   b. A matrix chroma of 3 or less with mottles which are common to many, distinct or prominent, regardless of their chroma.

D. MODERATELY WELL DRAINED SOILS are soils that have a udic moisture regime and, between a depth of 16 to 40 inches below the soil surface, have one of the following:

1. Mottles that are common to many, distinct or prominent, and that are chroma 3 or less.

2. A matrix chroma of 3 or less and mottles that are common to many, distinct or prominent, regardless of their chroma.

E. WELL DRAINED SOILS are soils that have a udic moisture regime and textures finer than loamy fine sand that extend below 20 inches, and are not mottled[h] within 40 inches of the soil surface.

F. SOMEWHAT EXCESSIVELY TO EXCESSIVELY DRAINED SOILS are all other soils.[i]

Endnotes:

a. SOIL SURFACE -- For Organic Soils (Histosols) or mineral soils with a thick organic surface layer (histic epipedon), the soil surface is the top of the uppermost organic horizon that is, or has been saturated for prolonged periods. Otherwise, the soil surface is the top of the mineral soil. This definition is intended to be used throughout these guidelines.

b. SOIL COLORS -- All soil colors are documented under moist conditions using a Munsell system standardized soil color book. The terms "value" and "chroma" are soil color descriptors used in these guidelines. The term matrix refers to the dominant color that occupies the greatest volume of the horizon or layer.

c. Sulfidic materials -- In a sample from within a 20 inch depth, hydrogen sulfide gas is present if a strong to very strong odor of rotten eggs is immediately detected. This procedure is accomplished in the field, generally when you open up your pit to describe the soil profile.

d. It is our intent to require this criterion only when an albic horizon is evident. When the horizon is evident, mottling should appear within 10 inches of the soil surface. Obliteration of the albic horizon may occur in areas of poorly drained Spodosols where repeated tree throws mix and often disguise any evidence of a discrete albic (E) horizon above the spodic horizon. Plowing may produce a similar result. Mottling of the albic horizon may be difficult to interpret and may involve faintly contrasting shades of gray.

e. Mottles may be of any chroma.

f. To be thick and dark, this horizon must have a thickness greater than 10 inches and the matrix color must be a value 3 or less and chroma 2 or less.

g. To be dark, this horizon must have a matrix color that is value 3 or less and chroma 2 or less.

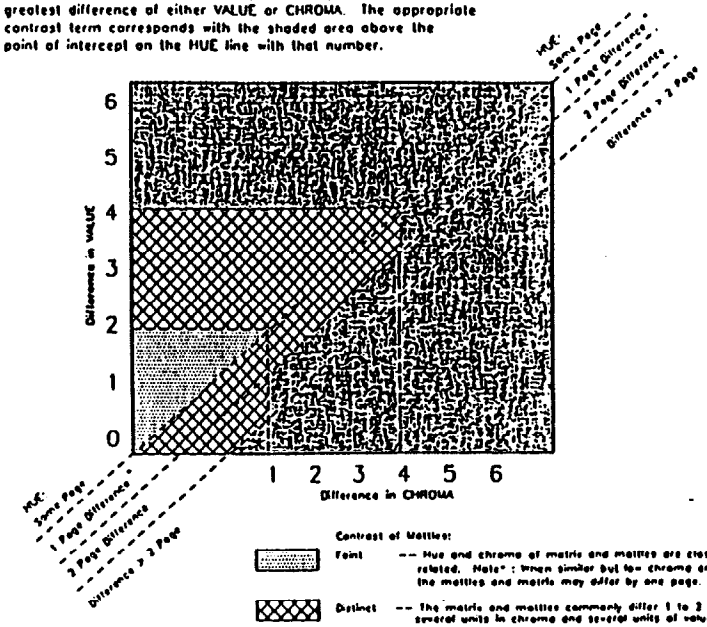
h. Faint mottling is allowed within 40 inches of the soil surface for some well drained soils when the soil mottling is associated with contrasting textures or directly overlying a restrictive layer, such as in a compact glacial till.

i. Not all wet soils have been excluded by the morphological criteria used in these guidelines for moderately well drained or better. Some soils within the New England region have developed within mineral parent materials that mask or inhibit the development of soil morphology. These difficult interpretations may include soils developed in Triassic red sandstones, carboniferous schists, strongly calcarious sediments, recently deposited sediments, and some soils adjacent to brackish and salt water bodies, etc. In this region, we recognize the need to identify the general locations of these unique soils and the need to develop reliable field criteria for these exceptions.

CONTRAST OF MOTTLES

For use with Munsell Color Charts

Directions: First, select the number of pages between the Hue of the matrix and the HUE of the mottle. Next, determine the greatest difference of either VALUE or CHROMA. The appropriate contrast term corresponds with the shaded area above the point of intercept on the HUE line with that number.



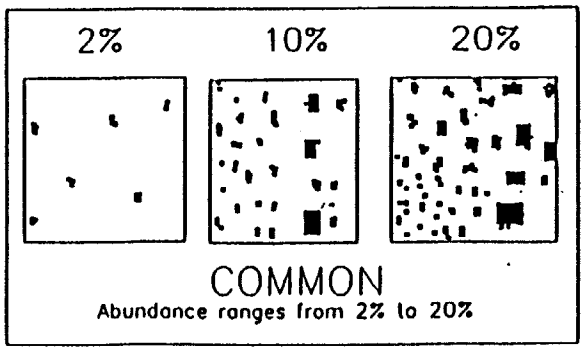
Contrast of Mottles:

Faint -- Hue and chroma of matrix and mottles are closely related. Note*: When similar but low chroma and value the mottles and matrix may differ by one page.

Distinct -- The matrix and mottles commonly differ 1 to 2 hues or several units in chroma and several units of value

Prominent -- The matrix and mottles commonly differ several units in hue and/or several units in value and chroma

ABUNDANCE OF MOTTLES



EW
ss than 2%

MANY
More than 20%

GUIDELINES FOR SOIL DRAINAGE CLASS DETERMINATION
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-- OPERATIONAL DRAFT --
(Version 27feb91)

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1. Organic soil materials that extend from the soil surface[a] to a depth of 16 or more inches (i.e. Histosols).
2. Organic soil materials that extend from the soil surface to a depth of 8 to 16 inches (i.e. histic epipedon).
3. A mineral histic epipedon (e.g. organic surface layers that are 4 to 8 inches thick and/or have an organic-rich A or Ap horizon) and, in the soil horizon that lies directly under an O, A, or Ap horizon there are few to common mottles with the matrix chroma[b] of 2 or less or, if there are no mottles in this underlying layer, the matrix chroma is 1 or less.
4. Sulfidic materials[c] within 20 inches of the soil surface.

B. POORLY DRAINED SOILS are soils that have an aquic moisture regime and one of the following:

1. A spodic horizon and a texture that is finer than loamy fine sand in some or all subhorizons within 20 inches of the soil surface; and have all the following characteristics, with one of these characteristics evident within 10 inches of the soil surface:

   a. Mottles within the albic horizon.[d]
   b. Organic-rich spodic (Bh) horizon greater than 4 inches thick with matrix colors of value and chroma of 3 or less.
   c. Mottles[e] that are common to many, distinct or prominent, are within the upper part of the spodic horizon or are directly below the organic-rich (Bh) horizon.

2. A spodic horizon and a texture that is loamy fine sand or coarser in all subhorizons within 20 inches of the soil surface; and have all the following characteristics, with one these characteristics evident within 10 inches of the soil surface:

   a. Mottles within the albic horizon.[d]
   b. Organic-rich spodic (Bh) horizon greater than 2 inches thick with matrix colors of value and chroma of 3 or less.
   c. Mottles[e] that are common to many, distinct or prominent, are within the upper part of the spodic horizon or are directly below the organic-rich (Bh) horizon.

3. Do not have a spodic horizon and have one of the following:

   a. Any soil texture, and the matrix of the soil horizon which is within 20 inches of the surface and directly underlying an O, A, or Ap horizon, is chroma 2 or less when mottles are few to common; or if there are no mottles in this horizon, the matrix chroma is 1 or less.

   b. Within 20 inches of the soil surface, both the texture is finer than loamy fine sand in some or all subhorizons, and there is a subsurface horizon with a matrix color of chroma 2 or less, and one of the following:
   (1) In the soil horizon directly underlying an A or Ap horizon and within 10 inches of the soil surface, there are mottles that are common to many, distinct or prominent, and that are chroma 2 or less.
   (2) In the soil horizon directly underlying a thick, dark A or Ap horizon[f], there are mottles that are distinct or prominent, greater than 10% in abundance and that are chroma 2 or less.

   c. Within 20 inches of the soil surface, the texture is loamy fine sand or coarser in all subhorizons, and there is a subsurface horizon with a matrix color of chroma of 3 or less, and one of the following:
   (1) In the soil horizon directly underlying a dark[g] A or Ap horizon and within 10 inches of the soil surface, there are mottles that are common to many, distinct or prominent, and that are chroma 3 or less.
   (2) In the soil horizon directly underlying a thick, dark A or Ap horizon[f], there are mottles that are distinct or prominent, greater than 10% in abundance, and that are chroma 3 or less.

1. Soil Taxonomy:

Keys to Soil Taxonomy 4th Ed.
SMSS Technical Monograph No. 19
Virginia Polytechnical Institute
and State University
Mail to: International Soils
$12 Check -> Crop & Soil Environmental
Sciences Department
Virginia Tech
Blacksburg, VA 24061-0404

Keys to The Taxonomic
Classification of New England
Soils
$14 -> Michael Cuomo
22 Jewett Avenue
S. Berwick, ME 03908

2. Published Soil Surveys:

Connecticut:
USDA-SCS
16 Professional Park Road
Storrs, CT 06268

Massachusetts:
USDA-SCS
451 West Street
Amherst, MA 01002

Rhode Island:
USDA-SCS
46 Quaker Lane
West Warwick, RI 02893

Maine:
USDA- SCS Office Building
University of Maine
Orono, ME 04473

New Hampshire:
USDA-SCS
Federal Building
Durham, NH 03824

Vermont:
USDA-SCS
69 Union Street
Winooski, VT 05404

3. Horizons, Mottles, USDA Texture and
Other Appropriate Features:

Soil Survey Manual
Chapter 3
"Examination and Description of Soils"

4. Soil Colors:

Munsell Soil Color Charts
Macbeth Division of
Kollmorgen Corporation
2441 North Calvert Street
Baltimore, MD 21218

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

April 21, 1995

Mark Evans, Remedial Project Manager
U.S. Department of the Navy
Naval Facilities Engineering Command
Northern Division
10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

Re: Area A Wetland Delineation Report Responses to EPA Comments

Dear Mr. Evans:

Thank you for the opportunity to review the responses to EPA comments on the *Area A Wetland Delineation Report*. As discussed in my letter to you dated October 25, 1994, EPA is concerned that the upper Area A wetlands may be impacted by the landfill cap. Therefore, it is important that the wetland boundary be accurately defined.

The technical concerns expressed by the EPA regarding transect number, observation point locations and supporting data forms and wetland line determination were adequately addressed (*see* Guidance For The Interpretation Of Wetland Boundaries Using The 1987 Corps Manual In The Six New England States). Our concern regarding one of the wetland boundary points was also resolved. However, as we have discussed in meetings past, if future plans impact other areas of the Area A wetland additional transects should be placed within the impact areas to document the federal wetland boundary and conditions in these areas. In addition, it may be necessary to reevaluate Transect B, Plots 1 and 2 dependent upon mitigation plans and goals. This will need to be discussed with the appropriate stakeholders.

I look forward to working with you on this and other wetland protection issues. Please do not hesitate to contact me at (617) 573-5777 should you have any questions or wish to arrange a meeting.

Sincerely,

Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

cc: Mark Lewis, CT DEP, Hartford, CT

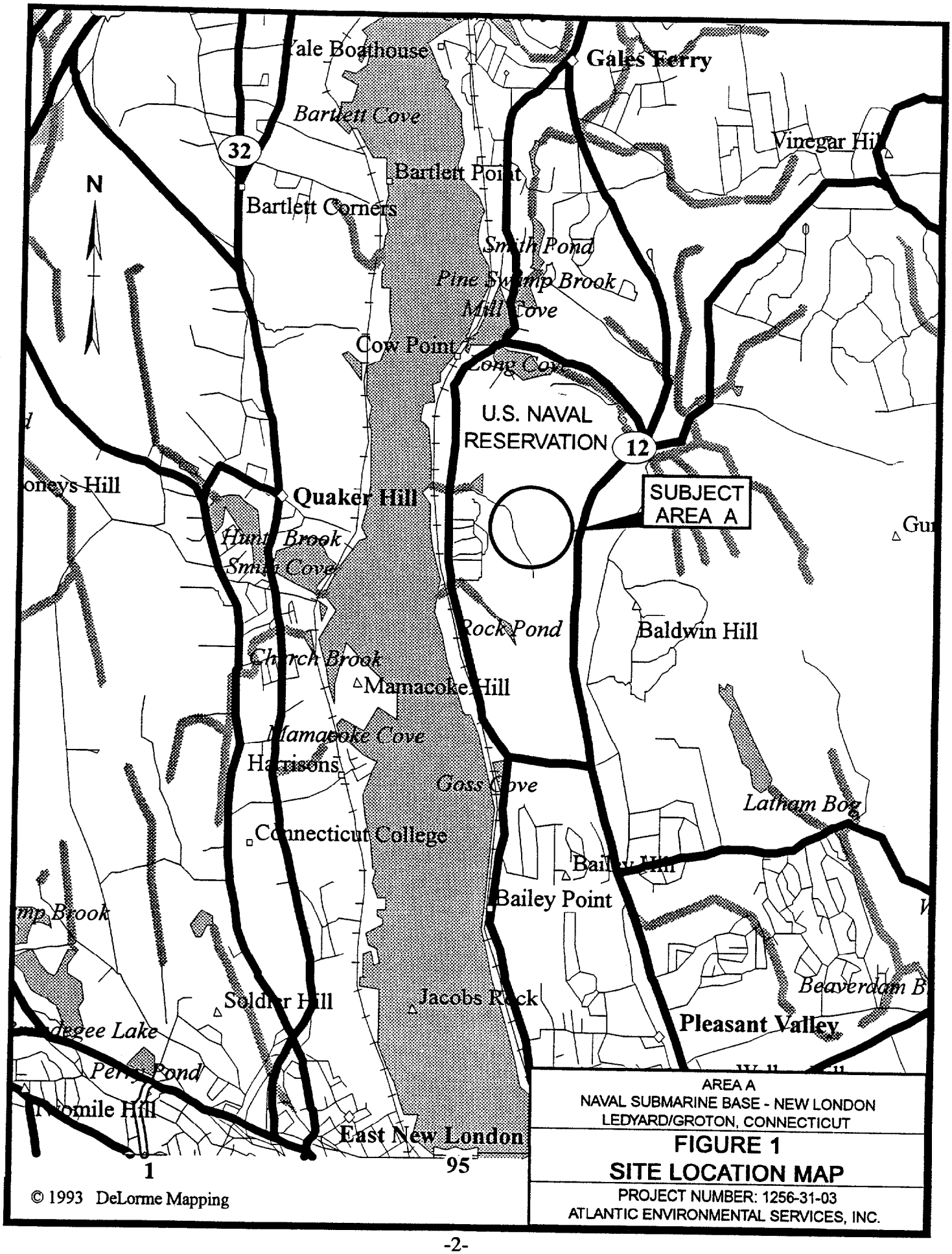
PRINTED ON RECYCLED PAPER

Andy Stackpole, NSBNL, New London, CT
Dan Winograd, USEPA, Boston, MA
Patti Tyler, USEPA, Boston, MA
Dale Weiss, TRC, Lowell, MA

1.0 INTRODUCTION

The wetland survey identified wetlands at the Naval Submarine Base-New London, Groton, Connecticut, based on both federal and state of Connecticut classification guidelines. A site location map showing the subject area of wetland delineation is provided as Figure 1, and the limits of the wetland survey are shown in Figure 2. The area investigated encompasses approximately 100 acres and is generally bound by the racquetball clubhouse, deployed parking area and Wahoo Avenue to the south, North Lake to the west, Triton Road and the Weapons Center to the north, and Route 12 to the east. The survey was performed as part of the design efforts for remedial actions at three installation restoration program sites, i.e., Area A Landfill, Area A Downstream, and Overbank Disposal Area (OBDA). Remedial actions proposed at the Area A Landfill include installation of a landfill cover or cap and may include some disturbance or filling of the wetland at the toe of the landfill slope, which generally is in the wetland. Remedial actions proposed at Area A Downstream and OBDA sites include removal of contaminated soils and sediments from within the wetlands and re-establishment of the wetlands. The wetland survey also included areas bounded by the following installation restoration sites: Area A Wetland, Weapons Center, and Outbank Disposal Area Northeast (OBDANE). These areas are hereinafter referred to collectively as Area A.

The delineation of wetlands by federal definition was conducted according to the *Corps of Engineers Wetlands Delineation Manual*, dated January 1987. The routine method was used in conjunction with a September 9, 1991 Corp memorandum document titled *Guidance for the Interpretation of Wetland Boundaries Using the 1987 Corps Manual in the Six New England States*. This manual describes technical guidelines and methods using a multi-parameter approach (vegetation, soils, and hydrology) to identify and delineate wetlands for purposes of

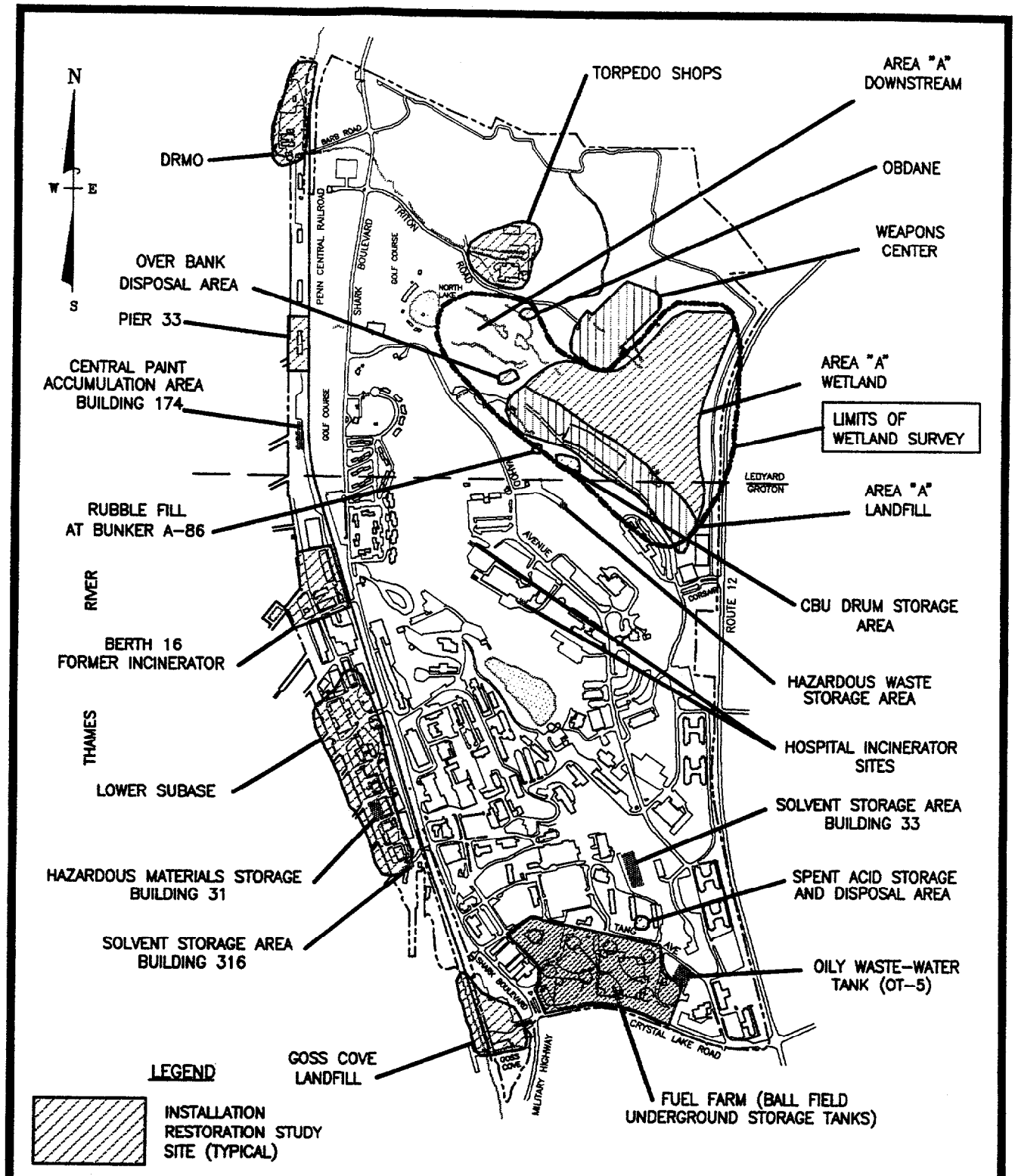


AREA A
NAVAL SUBMARINE BASE - NEW LONDON
LEDYARD/GROTON, CONNECTICUT

FIGURE 1
SITE LOCATION MAP

PROJECT NUMBER: 1256-31-03
ATLANTIC ENVIRONMENTAL SERVICES, INC.

ATLANTIC



WETLAND DELINEATION
NAVAL SUBMARINE BASE – NEW LONDON
GROTON, CT

0 600 1200
GRAPHIC SCALE IN FEET

FIGURE 2
LIMITS OF WETLAND SURVEY

ATLANTIC ENVIRONMENTAL SERVICES, INC.

ATLANTIC

Section 404 of the Clean Water Act within the six New England states. By state definition, delineation of wetlands included both wetlands and watercourses, in accordance with the Connecticut Inland Wetlands and Watercourses Act (Section 22a-38 of the state regulations). Wetlands, as defined by Connecticut statute, are those soil types designated as poorly drained, very poorly drained, floodplain, or alluvial, in accordance with the National Cooperative Soil Survey of the United States Department of Agriculture Soil Conservation Service (USDA-SCS), which is amended from time to time. Watercourses are defined as rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs, and all other bodies of water, natural or artificial, public or private, that are contained within or flow through the state.

In general, the field delineation of wetlands within Area A was determined through visual observations of hand-dug test pits, vegetation, and hydrologic conditions as well as best professional judgement exercised in the field. A transect was established extending from within the wetland perpendicular to the approximated wetland boundary and into the nonwetland area. A plot was established on the lower (e.g., wetland) end of the transect and observations of vegetation, soils, and hydrology were documented to define the wetland both by the federal and state criteria. A second plot was established upgradient of the estimated wetland boundary (e.g., nonwetland) to document nonwetland conditions. Additional plots were established as needed to refine the location of the wetland boundary. Once the boundary was established in this manner, it was walked and flagged (using consecutively numbered flags) approximately every 50 feet using visual observations (concerning vegetation, soils, hydrology, and topography) and best professional judgement. Additional transects were established as described above when different conditions (vegetation, soils, hydrology, or topography) were encountered.

2.0 SITE HISTORY

The historical land use of Area A provides significant insight into wetland conditions which currently exist on site. Based on historic aerial photographic interpretation discussed in the *EPA Site Analysis, New London Submarine Base, Groton, Connecticut*, dated March 1992, Area A was significantly altered by the pumping of dredge spoils from the Thames River in circa 1960. An earthen dike was constructed at the western end of the area which is now referred to as the Area A Wetland across a relatively narrow valley. Dredge spoils were dewatered by pumping them behind the dike and allowing the water to drain through a culverted drop structure. Downstream of the dike, hereinafter referred to as Area A Downstream, an existing small watercourse was dredged to allow flow of the water from the drop structure into a man-made secondary sediment containment pond (Upper Pond), allowing further dewatering of the dredge spoils. A second dredged watercourse outlets into the stormwater sewer system along Triton Road, eventually discharging to the Thames River. An overflow structure and culvert were installed, as part of the original dredge spoils dewatering system, on the southern bank of Upper Pond and designed to allow overflows to enter the adjoining wetland (OBDA Pond). This dewatering system (i.e., dikes and culverts) and disposal of dredge spoils eventually created 24.1± acres of man-made wetlands, hereinafter referred to as Area A Wetland, behind (east of) the earthen dam, and the Upper Pond. Earlier aerial photographs (1943, 1952, and 1957) reveal generally undisturbed conditions; wetland systems located within Area A appear (during these dates) to be isolated to relatively narrow wetland corridors generally associated with a watercourse. It is likely that only a fraction of the current 24.1± acres of wetlands existed prior to the placement of the dredge spoils and associated structures (e.g., dike, sedimentation areas).

3.0 WETLAND DELINEATION

The wetland survey identified wetlands based on both federal and state classification guidelines. Delineation of wetlands according to both criteria was performed concurrently by Dean Gustafson, certified Professional Soil Scientist, and Bob Russo, Biologist, of Atlantic Environmental Services, Inc. Variations in the wetland boundary of less than 10 feet were not distinguished; no significant variations in the wetland boundaries were detected. Therefore, the wetland boundary represents both federal and state criteria. The wetland boundary was delineated with consecutively numbered survey flags. These flags were subsequently professionally surveyed and plotted on an AutoCADD file by Criscuolo/Shepard Associates, P.C. of North Branford, Connecticut. East and north coordinates of each wetland flag are provided in Appendix A. A wetland delineation map is provided as Plate 1. Photographs of the subject wetlands are provided as Exhibit 1.

The Area A Wetland site, hereinafter referred to as the Area A Upstream Wetland, consisting of 23.6± acres, is delineated by wetland flag numbers 172 through 327. Two nonwetland upland islands were identified within this wetland. One island, delineated by flag numbers 329 through 344 and encompassing 1.7± acres, is located near the northern end of the wetland adjacent to the weapons center; the other upland island, delineated by flag numbers 347 through 369 and encompassing 1.9± acres, is located along the southern wetland boundary, near the deployed parking area. These were small elevated hills that were not completely covered by the dredge soil material.

Four individual wetlands were delineated in Area A Downstream. The Upper Pond wetland covers an area of 0.48± acre and is delineated by flag numbers 67 through 121. The Lower Pond wetland is delineated by wetland flag numbers 123 through 162 and encloses an area of 0.5± acre. A small wetland (0.027± acre) wetland was identified adjacently north of the Lower Pond wetland with flag numbers 164 through 170. The OBDA wetland is located in

the southernmost portion of this area. This wetland is delineated by wetland flag numbers 1 through 63 and encompasses an area of 1.29± acres.

4.0 DESCRIPTION OF EXISTING CONDITIONS

The subject wetlands are comprised of both a broad, shallow marsh and several narrow corridors associated with intermittent watercourses and ephemeral hydrologic conditions. The majority of wetlands and adjoining upland areas have been subject to some form of disturbance (e.g., filling, sediment deposition, etc.). The vegetative communities dominating the landscape consist of disturbed fill areas, mowed lawns, shrub/sapling hedge row areas, scrub/shrub, shallow marsh, and wooded areas. Site wetland soils consist of poorly and very poorly drained fine textured marine sediments (dredge spoils from the Thames River) and native, moderately textured, poorly drained glacial till soils. The wetland boundaries generally occur along sharp slope breaks between both the disturbed, filled and native bedrock-controlled topography uplands and the wetland areas.

A total of six U.S. Army Corps of Engineers wetland delineation Data 1 transects were established and documented within the subject wetlands; transect locations are depicted in Plate 1. Baselines were established perpendicular to the hydrologic gradient along each wetland area. Vegetative communities within each wetland unit were found to be generally homogeneous. Therefore, typically one transect was established within each wetland unit in an area of proposed disturbance perpendicular to the established baselines. In the case of Area A Wetland Upstream, the largest wetland unit (23.6± acres), two transects were established in the area of proposed disturbance (landfill cap). No transects were established elsewhere along the wetland boundary in Area A since no other areas of potential impact are planned. If future plans include potential impacts to other areas of the wetland in Area A Upstream Wetland, additional appropriate transects should be established within the impact areas in order to document the federal boundary and wetland/nonwetland conditions in these areas.

Attachment 1 (Performance Standards and Supplemental Definitions for Use with the 1987 Corps Manual) of the *Guidance for the Interpretation of Wetland Boundaries Using the*

1987 Corps Manual in the Six New England States specifies that one observation plot (documenting details about vegetation, soils and hydrology) be established along the transect upgradient and another downgradient from the wetland boundary; no observation plot for the actual boundary is required. Data 1 forms for each transect are provided in Appendix B. Mapped soil units (wetland and non-wetland) are depicted in the soils map provided as Plate 2. Detailed soil descriptions of the identified soil units are provided in Appendix C.

4.1 Area A Upstream Wetland

This wetland area encompasses 23.6± acres and is predominately classified as a palustrine emergent, nonpersistent, narrow-leaved and broad-leaved deciduous scrub/shrub wetland with a nontidal artificial water regime; isolated, scattered areas of open water (generally shallow) wetland areas are also contained within this wetland unit. Two Data 1 transects (Transects E and F) were established along the subject wetland boundary, situated on the southern side of the wetland in the area of the proposed landfill cap. Emergent, nonpersistent, narrow-leaved wetland vegetation is dominated by dense common reed (*Phragmites australis*). The nontidal water regime is classified as artificially flooded due to the earthen dike positioned at the western end of the wetland. The open water areas appear to be semipermanently flooded, with the majority of the wetland either seasonally flooded or saturated. Wetland soils are dominated by poorly to very poorly drained, fine-textured, marine sediments which originated from the Thames River. Wetland soils are classified as Aquents (Aq), defined as poorly to very poorly drained disturbed soil where two or more feet of the original soil surface has been filled over or excavated. Aquents are characterized by a seasonal-to-prolonged high groundwater table and either support, or are capable of supporting, wetland vegetation. In addition, two upland islands were identified within this wetland: one island is located near the northern end of the wetland adjacent to the weapons center; the other upland island is located along the southern wetland boundary, near the deployed parking area.

Surrounding upland soils were identified as both disturbed, classified as Udorthents-Urban land complex, and undisturbed native glacial till soils. Udorthents-Urban land complex (Ud) is defined as excessively drained to moderately well-drained soil that have been disturbed by cutting or filling, and areas that are covered by buildings or pavement. Native glacial till soils were classified as Charlton-Hollis fine sandy loams (Cr), which are deep, moderately deep and shallow to bedrock, well-drained, moderately coarse texture, friable glacial till soils, and Hollis-Charlton-Rock outcrop complex (Hr), which are mostly shallow to bedrock, somewhat excessively drained, moderately coarse textured, friable glacial till soils. Between 10 to 50 percent of the Hr map unit consists of rock outcrop.

4.2 Area A Downstream Wetlands

4.2.1 Upper Pond Wetland

The Upper Pond wetland encompasses 0.48± acre and is classified as a palustrine open water (shallow) wetland surrounded by a palustrine emergent, nonpersistent, narrow-leaved wetland with a nontidal artificial water regime. One Data 1 transect (Transect C) was established along the wetland boundary situated on the southern side of the open water area. Emergent, nonpersistent, narrow-leaved wetland vegetation is dominated by dense common reed (*Phragmites australis*). The nontidal water regime is classified as artificially flooded due to the earthen embankment positioned at the western and southern end of the subject wetland and appears to be intermittently exposed/permanently flooded. Wetland soils classified as Aquents (Aq), are dominated by poorly to very poorly drained fine-textured marine sediments which were transported from the upgradient Thames River dredge spoils dewatering system.

Surrounding upland soils were identified as both disturbed, classified as Udorthents-Urban land complex (Ud), and undisturbed native glacial till soils. Native glacial till soils were classified as Canton and Charlton fine sandy loams (Cb), which are deep, well-drained, moderately coarse texture, friable glacial till soils, and Hollis-Charlton-Rock outcrop complex (Hr).

4.2.2 Lower Pond Wetland

The subject wetland contains 0.50± acre and is classified as a palustrine open water (shallow) wetland surrounded by a palustrine scrub/shrub and wooded, broad-leaved, deciduous wetland with a nontidal seasonal water regime. One Data 1 transect (Transect B) was established along the wetland boundary, situated on the southern side of the wetland. Sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), and red maple (*Acer rubrum*) are the dominate vegetative species of this wetland. Wetland soils are classified as native Ridgebury fine sandy loam (Rd), defined as poorly drained, moderately coarse textured, glacial till soil developed over compact till. A small (0.027± acre) disturbed wetland, resulting from a previous excavation, which intercepted the shallow groundwater, was also identified adjacently north of the Lower Pond wetland. This wetland is classified as a palustrine scrub/shrub and forested, broad-leaved, deciduous wetland with a nontidal seasonal water regime. Sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), and red maple (*Acer rubrum*) also dominate the vegetative species of this wetland. Wetland soils are classified as Aq.

Surrounding upland soils were identified as both disturbed, classified as Udorthents-Urban (Ud) land complex, and undisturbed native glacial till soils. Native glacial till soils were classified as Sutton fine sandy loam (Sv), which is a deep, moderately well-drained, moderately coarse texture, friable glacial till soil.

4.2.3 OBDA Pond Wetland

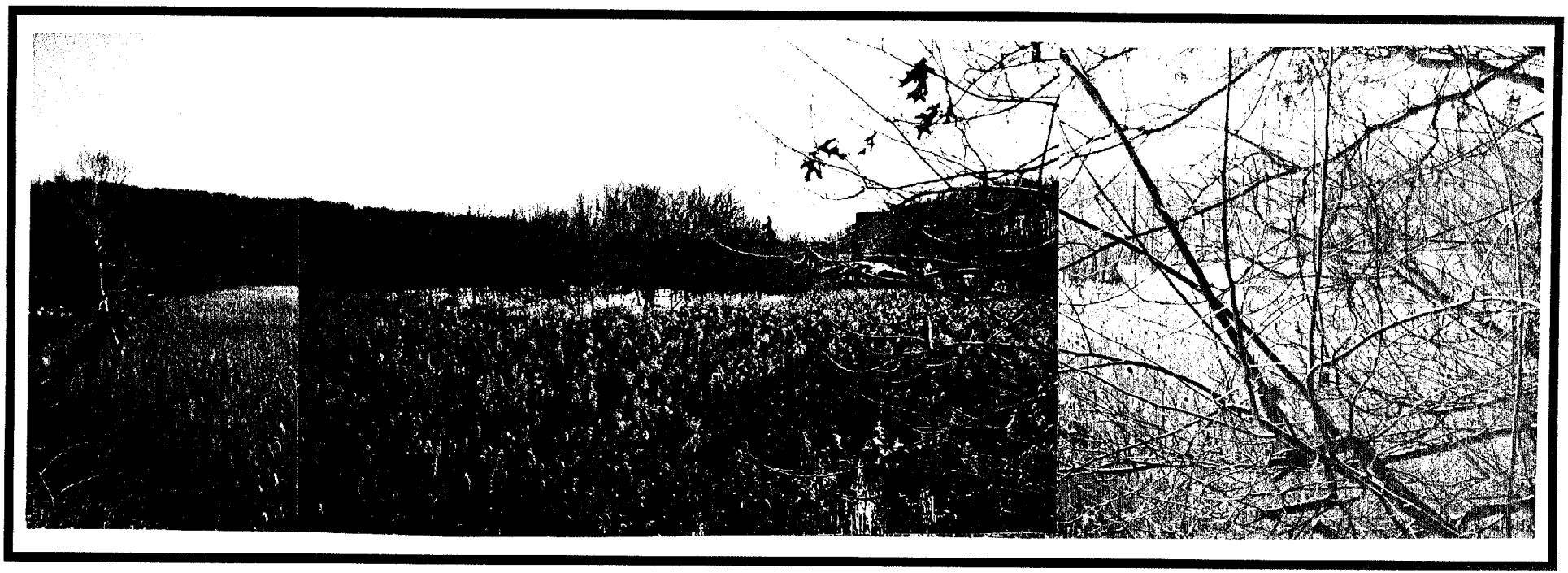
This wetland area encompasses 1.29± acres and is classified as a palustrine emergent, nonpersistent, narrow-leaved wetland surrounded by a scrub/shrub and forested broad-leaved deciduous wetland with a nontidal seasonal water regime. Two Data 1 transects (Transects A and D) were established along the wetland boundary, situated, respectively, on the northern and southern sides of the wetland. Emergent, nonpersistent, narrow-leaved wetland vegetation is

dominated by dense common reed (*Phragmites australis*). Sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), and red maple (*Acer rubrum*) also dominate shrub and tree vegetation of this wetland. Wetland soils are classified as Ridgebury fine sandy loam (Rd), defined as poorly drained, moderately coarse-textured, glacial till soil developed over compact till; isolated areas of overlying fine textured marine sediments (generally less than 1 foot) were also observed.

Surrounding upland soils were identified as both disturbed, classified as Udorthents-Urban land complex (Ud), and undisturbed native glacial till soils. Ud is defined as excessively drained to moderately well-drained soil that have been disturbed by cutting or filling, and areas that are covered by buildings or pavement. Native glacial till soils were classified as Canton and Charlton fine sandy loams (Cb), Sutton fine sandy loam (Sv), Charlton-Hollis fine sandy loams (Cr), and Hollis-Charlton-Rock outcrop complex (Hr).

EXHIBIT 1

SITE PHOTOGRAPHS



Photograph 1

Overview of Area A Upstream Wetland, looking south/southeast
from earthen dike at drop structure/culvert location.

Photograph 2

Overview of Upper Pond Wetland, looking northwest.

Photograph 3

Overview of Lower Pond Wetland, looking northwest.

Photograph 4

View of disturbed wetland located adjacent to Lower Pond, looking southeast.

Photograph 5

Overview of OBDA Pond Wetland, looking northwest from earthen dike.

APPENDIX A

EAST AND NORTH COORDINATES OF WETLAND FLAG NUMBERS

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	East Coordinate	North Coordinate
WL#1	782,002.90	208,213.79
WL#2	781,973.24	208,227.46
WL#3	781,951.69	208,236.28
WL#4	781,943.47	208,260.83
WL#5	781,943.46	208,271.91
WL#6	781,956.45	208,286.66
WL#7	781,973.29	208,314.02
WL#8	781,968.15	208,331.81
WL#9	781,932.74	208,332.55
WL#10	781,898.12	208,326.47
WL#11	781,895.73	208,296.47
WL#12	781,892.50	208,275.72
WL#13	781,869.07	208,275.64
WL#14	781,841.11	208,277.95
WL#15	781,827.63	208,289.44
WL#16	781,833.66	208,315.67
WL#17	781,868.30	208,318.03
WL#18	781,873.64	208,331.48
WL#19	781,850.10	208,351.10
WL#20	781,835.18	208,341.22
WL#21	781,838.88	208,322.65
WL#22	781,825.48	208,320.80
WL#23	781,806.83	208,306.68
WL#24	781,766.89	208,309.87
WL#25	781,740.87	208,296.63
WL#26	781,718.43	208,319.66
WL#27	781,693.64	208,338.32
WL#28	781,670.90	208,352.00
WL#29	781,652.49	208,359.30
WL#30	781,627.83	208,372.95
WL#31	781,596.54	208,391.23
WL#32	781,577.65	208,404.04
WL#33	781,558.79	208,417.90
WL#34	781,541.02	208,407.89
WL#35	781,517.68	208,419.74

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	East Coordinate	North Coordinate
WL#36	781,477.25	208,422.78
WL#37	781,450.87	208,415.23
WL#38	781,413.70	208,413.26
WL#39	781,383.49	208,405.55
WL#40	781,361.10	208,408.02
WL#41	781,325.22	208,421.88
WL#42	781,322.60	208,417.35
WL#43	781,341.49	208,400.31
WL#44	781,358.65	208,390.49
WL#45	781,383.53	208,379.93
WL#46	781,437.09	208,377.94
WL#47	781,471.40	208,365.09
WL#48	781,493.87	208,348.80
WL#49	781,521.55	208,337.88
WL#50	781,556.05	208,330.39
WL#51	781,558.33	208,347.86
WL#52	781,570.77	208,317.05
WL#53	781,582.30	208,309.22
WL#54	781,623.37	208,290.69
WL#55	781,647.94	208,284.83
WL#56	781,692.56	208,265.02
WL#57	781,716.52	208,243.57
WL#58	781,744.50	208,224.42
WL#59	781,783.01	208,199.50
WL#60	781,825.69	208,165.69
WL#61	781,866.86	208,139.58
WL#62	781,888.96	208,137.08
WL#63	781,902.93	208,154.42
WL#67	782,127.99	208,250.46
WL#68	782,131.61	208,255.95
WL#69	782,113.73	208,261.41
WL#70	782,083.60	208,255.68
WL#71	782,056.93	208,270.46
WL#72	782,035.25	208,318.75
WL#73	782,010.29	208,351.56

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	East Coordinate	North Coordinate
WL#74	781,987.01	208,396.90
WL#75	781,969.68	208,404.73
WL#76	781,955.21	208,405.56
WL#77	781,940.39	208,439.50
WL#78	781,962.04	208,451.83
WL#79	781,981.98	208,482.61
WL#80	781,991.97	208,519.04
WL#81	781,969.59	208,574.80
WL#82	781,953.75	208,596.30
WL#83	781,927.25	208,627.50
WL#84	781,899.97	208,651.46
WL#85	781,868.78	208,678.90
WL#86	781,850.16	208,685.17
WL#87	781,820.24	208,703.64
WL#88	781,774.41	208,736.73
WL#89	781,760.59	208,733.76
WL#90	781,757.80	208,730.60
WL#91	781,775.87	208,708.32
WL#92	781,809.10	208,695.49
WL#93	781,848.83	208,674.25
WL#94	781,887.92	208,647.45
WL#95	781,911.76	208,620.01
WL#96	781,949.17	208,581.65
WL#97	781,964.61	208,553.30
WL#98	781,974.16	208,496.12
WL#99	781,956.34	208,461.98
WL#100	781,941.14	208,453.61
WL#101	781,925.39	208,463.62
WL#102	781,902.32	208,474.58
WL#103	781,875.94	208,487.36
WL#104	781,858.46	208,494.89
WL#105	781,843.76	208,492.71
WL#106	781,831.18	208,453.38
WL#107	781,841.51	208,407.67
WL#108	781,857.16	208,379.81

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	East Coordinate	North Coordinate
WL#109	781,872.11	208,379.46
WL#110	781,900.52	208,375.24
WL#111	781,907.69	208,358.28
WL#112	781,935.57	208,356.69
WL#113	781,964.75	208,358.90
WL#114	781,968.30	208,391.15
WL#115	781,984.49	208,369.25
WL#116	782,020.87	208,326.37
WL#117	782,034.91	208,292.32
WL#118	782,049.35	208,264.42
WL#119	782,069.31	208,245.90
WL#120	782,097.52	208,243.60
WL#121	782,118.84	208,245.48
WL#123	781,792.71	208,436.87
WL#124	781,799.56	208,460.10
WL#125	781,791.17	208,498.84
WL#126	781,792.39	208,513.80
WL#127	781,778.43	208,542.78
WL#128	781,772.56	208,564.13
WL#129	781,762.59	208,577.43
WL#130	781,747.11	208,583.42
WL#131	781,728.07	208,586.18
WL#132	781,715.07	208,586.41
WL#133	781,697.13	208,582.52
WL#134	781,692.66	208,587.39
WL#135	781,672.38	208,600.00
WL#136	781,646.54	208,615.86
WL#137	781,632.33	208,627.16
WL#138	781,612.36	208,640.01
WL#139	781,598.95	208,653.61
WL#140	781,565.94	208,653.29
WL#141	781,547.48	208,659.28
WL#142	781,540.57	208,671.00
WL#143	781,524.23	208,679.02
WL#144	781,496.05	208,691.48

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	East Coordinate	North Coordinate
WL#145	781,471.26	208,695.94
WL#146	781,436.10	208,705.82
WL#148	781,436.18	208,698.08
WL#149	781,476.87	208,680.35
WL#150	781,497.56	208,662.73
WL#151	781,528.21	208,651.02
WL#152	781,562.98	208,632.22
WL#153	781,585.77	208,612.78
WL#154	781,598.86	208,589.92
WL#155	781,619.26	208,571.77
WL#156	781,628.96	208,549.85
WL#157	781,629.17	208,538.94
WL#158	781,650.69	208,538.05
WL#159	781,657.59	208,517.65
WL#160	781,689.36	208,486.26
WL#161	781,719.25	208,462.88
WL#162	781,754.49	208,443.00
WL#164	781,777.49	208,616.25
WL#165	781,796.77	208,594.92
WL#166	781,804.69	208,572.39
WL#167	781,808.84	208,552.82
WL#168	781,790.66	208,570.24
WL#169	781,759.09	208,606.45
WL#170	781,763.16	208,619.14
WL#172 & 328	782,173.33	208,206.63
WL#173	782,172.66	208,184.48
WL#174	782,136.07	208,144.55
WL#175	782,102.02	208,132.74
WL#176	782,079.77	208,112.68
WL#177	782,047.83	208,095.02
WL#178	782,043.30	208,024.68
WL#179	782,086.79	207,992.64
WL#180	782,111.35	207,953.36
WL#181	782,162.09	207,904.71
WL#182	782,218.85	207,819.21

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	East Coordinate	North Coordinate
WL#183	782,275.09	207,802.89
WL#184	782,338.01	207,770.12
WL#186	782,418.35	207,715.92
WL#187	782,448.48	207,710.83
WL#188	782,479.60	207,697.92
WL#189	782,531.20	207,667.73
WL#190	782,538.42	207,656.56
WL#191	782,627.70	207,581.00
WL#192	782,730.98	207,525.54
WL#193	782,765.08	207,457.16
WL#194	782,877.04	207,355.41
WL#195	782,955.15	207,265.80
WL#196	782,998.90	207,188.40
WL#197	783,012.72	207,183.10
WL#198	783,029.32	207,173.45
WL#199	783,040.56	207,166.92
WL#200	783,073.67	207,173.31
WL#201	783,096.46	207,160.90
WL#202	783,107.48	207,154.49
WL#203	783,145.06	207,146.07
WL#204	783,175.40	207,156.56
WL#205	783,194.53	207,146.99
WL#206	783,218.11	207,129.43
WL#207	783,241.48	207,119.97
WL#208	783,266.60	207,101.77
WL#209	783,291.71	207,090.82
WL#210	783,323.98	207,070.64
WL#211	783,344.18	207,047.26
WL#212	783,344.77	207,016.47
WL#213	783,328.01	206,975.55
WL#214	783,323.84	206,935.43
WL#215	783,321.81	206,899.85
WL#216	783,303.22	206,888.34
WL#217	783,317.45	206,868.59
WL#218	783,359.37	206,866.74

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	East Coordinate	North Coordinate
WL#219	783,391.15	206,863.39
WL#220	783,423.07	206,866.39
WL#221	783,422.10	206,880.08
WL#222	783,394.32	206,957.23
WL#223	783,375.71	206,978.16
WL#224	783,389.10	207,013.48
WL#225	783,406.27	207,041.18
WL#226	783,425.55	207,063.83
WL#227	783,433.41	207,089.53
WL#228	783,435.78	207,136.38
WL#229	783,425.62	207,219.13
WL#230	783,435.87	207,284.83
WL#231	783,425.10	207,348.62
WL#232	783,405.44	207,423.57
WL#233	783,382.76	207,498.76
WL#234	783,378.29	207,544.11
WL#235	783,394.05	207,566.72
WL#236	783,368.59	207,636.27
WL#237	783,332.30	207,705.07
WL#238	783,325.04	207,758.61
WL#239	783,288.13	207,775.99
WL#240	783,254.34	207,772.34
WL#241	783,185.48	207,735.70
WL#242	783,178.03	207,783.54
WL#243	783,170.47	207,851.30
WL#244	783,168.07	207,907.36
WL#245	783,175.26	207,932.35
WL#246	783,215.37	207,936.35
WL#247	783,278.84	207,938.51
WL#248	783,272.29	207,983.99
WL#249	783,272.90	208,031.28
WL#250	783,291.55	208,096.77
WL#251	783,336.54	208,160.21
WL#252	783,316.26	208,220.90
WL#253	783,285.69	208,284.41

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	East Coordinate	North Coordinate
WL#254	783,233.65	208,314.50
WL#255±	783,099.52	208,403.05
WL#256±	783,055.55	208,459.89
WL#257±	783,078.79	208,507.93
WL#258±	783,099.90	208,527.60
WL#259	783,137.14	208,521.50
WL#260	783,208.16	208,486.64
WL#261	783,297.36	208,461.02
WL#262	783,343.25	208,438.45
WL#263	783,373.03	208,379.53
WL#264	783,406.45	208,339.35
WL#265	783,444.14	208,319.56
WL#266	783,462.09	208,359.25
WL#267	783,472.16	208,404.12
WL#268	783,527.95	208,485.65
WL#269	783,541.47	208,546.36
WL#270	783,558.43	208,621.88
WL#271	783,585.85	208,731.44
WL#272	783,598.03	208,810.02
WL#273	783,550.90	208,834.57
WL#275	783,423.00	208,811.16
WL#277	783,300.64	208,718.41
WL#278	783,255.49	208,697.54
WL#279	783,182.70	208,682.65
WL#280	783,111.96	208,678.06
WL#281	783,058.10	208,668.97
WL#282	783,033.70	208,696.79
WL#283	783,032.29	208,771.55
WL#284	783,028.74	208,827.42
WL#285	783,017.28	208,870.25
WL#286	783,015.19	208,902.91
WL#287	783,011.95	208,928.75
WL#288	782,998.77	208,978.94
WL#289	782,984.38	208,988.08
WL#290	782,964.35	208,976.92

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	East Coordinate	North Coordinate
WL#291	782,945.07	208,962.47
WL#292	782,916.62	208,948.20
WL#293	782,909.91	208,930.84
WL#294	782,929.07	208,951.16
WL#295	782,944.15	208,934.52
WL#296	782,961.59	208,923.83
WL#297	782,975.41	208,858.47
WL#298	783,015.88	208,804.83
WL#299	783,027.76	208,757.58
WL#300	783,013.75	208,714.05
WL#301±	782,908.91	208,597.72
WL#302	782,794.73	208,471.02
WL#303±	782,748.41	208,412.47
WL#304	782,754.39	208,379.76
WL#305	782,785.24	208,345.78
WL#306	782,819.68	208,310.00
WL#307	782,838.80	208,271.91
WL#308	782,835.55	208,246.57
WL#309	782,761.79	208,318.47
WL#310	782,758.31	208,313.84
WL#311	782,816.19	208,248.09
WL#312	782,803.95	208,217.73
WL#313	782,833.02	208,165.73
WL#314	782,824.90	208,110.66
WL#315	782,825.77	208,070.55
WL#316	782,787.44	208,053.91
WL#317	782,745.41	208,077.80
WL#318	782,698.56	208,128.70
WL#319	782,648.56	208,176.66
WL#320	782,585.32	208,161.66
WL#321	782,501.67	208,159.83
WL#322	782,395.59	208,206.80
WL#323	782,369.17	208,206.36
WL#324	782,318.34	208,207.93
WL#325	782,261.74	208,207.89

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	East Coordinate	North Coordinate
WL#326	782,206.77	208,197.88
WL#327	782,187.35	208,205.66
WL#329 & 345	782,555.49	207,958.94
WL#330	782,498.40	207,966.06
WL#331	782,427.53	208,018.49
WL#332	782,381.55	208,021.27
WL#333	782,343.98	208,016.80
WL#334	782,318.67	207,983.80
WL#335	782,327.19	207,895.55
WL#336	782,346.03	207,831.40
WL#337	782,422.71	207,763.58
WL#338	782,488.40	207,740.23
WL#340	782,606.24	207,682.12
WL#341	782,664.66	207,749.85
WL#342	782,676.08	207,800.41
WL#343	782,647.09	207,850.22
WL#344	782,602.53	207,914.64
WL#347	782,825.34	208,410.74
WL#348	782,849.99	208,359.39
WL#349	782,886.82	208,331.54
WL#350±	782,902.54	208,266.83
WL#351	782,919.86	208,195.53
WL#352	782,936.26	208,117.54
WL#353	782,950.06	208,029.40
WL#354	782,960.01	207,991.79
WL#355	782,992.58	207,980.50
WL#356	783,041.73	208,024.71
WL#357	783,072.87	208,006.53
WL#358	783,092.28	208,031.85
WL#360	783,056.19	208,180.61
WL#361	783,029.64	208,277.28
WL#362	783,007.93	208,409.08
WL#363	782,993.75	208,461.00
WL#364	782,994.58	208,522.99
WL#365	782,956.15	208,550.26

AREA A WETLAND BOUNDARY COORDINATES		
Wetland Flag #	**East Coordinate**	**North Coordinate**
WL#366	782,967.93	208,622.31
WL#367	782,981.87	208,646.95
WL#368	782,971.44	208,649.82
WL#369	782,806.04	208,464.29

APPENDIX B

U.S. ARMY CORPS OF ENGINEERS DATA 1 WETLAND TRANSECT FORMS

Project Title: Naval Submarine Base Wetland Area A Transect: A Plot: 1	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Tree		68/162.7	41.8%	FAC
	Acer rubrum	70.9/162.7	43.6	FACW+
	Quercus bicolor	23.8/162.7	14.6	FACU-
	Sassafras albidum			
Liana				
	Vitis Labrusca	3	100	FACU
Sapling				
	Acer rubrum	3/6	50	FAC
	Betula populifolia	3/6	50	FAC
Shrub				
	Acer rubrum	3/66	4.6	FAC
	Clethra alnifolia	63/66	95.4	FAC+
Herb				
	Clethra alnifolia	3/13.5	22.3	FAC+
	Phragmites eustrailis	10.5/13.5	77.7	FACW

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	2	5	0	0	0	0	1	0

SUBTOTAL (HYDROPHYTES): 7 SUBTOTAL: 1

TOTAL: 8

$$\frac{100 \times \text{SUBTOTAL (HYDROPHYTES)}}{\text{TOTAL}} = \frac{100 \times 7}{8} = 88\% = \text{PERCENT HYDROPHYTES}$$

Describe Vegetation Disturbance: None

Describe Adaptations: None

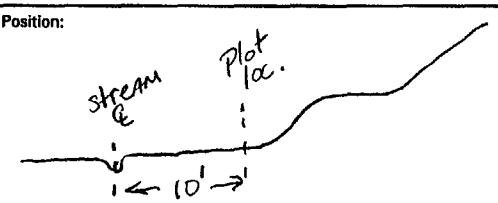
DATA-SOIL	Soil Taxonomy: Aeric Haplaquepts
Corps of Engineers Regional Drainage Class: poorly drained	Criterion: B3a
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Charlton-Hollis fine sandy loams, very rocky	Field Observations Confirm Type Mapped? Yes __ No X

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-4"	Oe	10 YR 2/1	---	muck
4-20"	Cpg	N 3/0	---	silt loam
20-26"	Oeb	10 YR 2/1	---	muck
26-32"	Ab	10 YR 2/1	---	fine sandy loam
32-38"+	Bb	10 YR 6/1	10 YR 6/3 c, f	fine sandy loam

Remarks:

Data point is approximately 10 feet north from intermittent stream.

Sketch Landscape Position:



NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

X __ *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eivdence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 2"

Depth to Saturation: Saturated to surface

Describe Altered Hydrology: None

__	Inundated	__	Drift Lines
X	Saturated in upper 12 inches	__	Sediment Deposits
__	Water Marks	X	Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: Naval Base Area A

Delineator: Dean Gustafson

Transect: A | Plot: 1 | Date: 1/14/94

	Yes	No		Yes	No
Greater than 50 Percent Hydrophytes?	X	__			
Hydric Soils Criterion Met?	X	__			
Wetland Hydrology Present?	X	__	Is this datapoint within a wetland?	X	__

Remarks:

The recorded upland data point A-2 is approximately 13' due north. 55' to monitoring well 3MW12S on 137° bearing.

NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

Project Title: Naval Submarine Base Wetland Area A Transect: A Plot: 2	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Tree				
	Acer rubrum	138.9/1102.4	12.6%	FAC
	Quercus bicolor	70.9/1102.4	6.4	FACW+
	Quercus rubra	892.6/1102.4	81.0	FACU
Liana				
	Vitis Labrusca	3/3	100	FACU
Sapling				
	Acer rubrum	3/6	50	FAC
	Betula lenta	3/6	50	FACU
Shrub				
	Clethra alnifolia	3/23.5	12.8	FAC+
	Kalmia latifolia	20.5/23.5	87.2	FACU

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	0	1	0	0	0	0	4	0

SUBTOTAL (HYDROPHYTES): 1 SUBTOTAL: 4

TOTAL: 5

$$\frac{100 \times \text{SUBTOTAL (HYDROPHYTES)}}{\text{TOTAL}} = \frac{100 \times 1}{5} = 20\% = \text{PERCENT HYDROPHYTES}$$

Describe Vegetation Disturbance: None

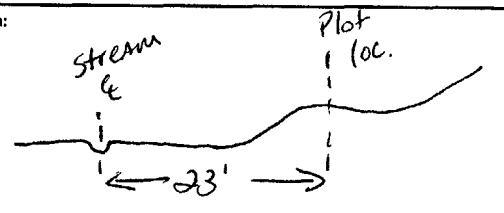
Describe Adaptations: None

DATA-SOIL	Soil Taxonomy: Aquic Dystrachrepts
Corps of Engineers Regional Drainage Class: moderately well drained	Criterion: D1
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Charlton-Hollis fine sandy loams, very rocky	Field Observations Confirm Type Mapped? Yes __ No X

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-4"	A	10 YR 3/1	---	fine sandy loam
4-18"	Bw1	10 YR 5/6	---	fine sandy loam
18-34"	Bw2	10 YR 6/4	---	fine sandy loam
34-38+"	C	2.5 Y 6/2	2.5 Y 6/4 f,f	fine sandy loam

Remarks:

Sketch Landscape Position:



NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology: _____

__ Inundated

__ Saturated in upper 12 inches

__ Water Marks

__ Drift Lines

__ Sediment Deposits

__ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: Naval Base Area A

Delineator: Dean Gustafson

Transect: A | Plot: 2 | Date: 1/14/94

	Yes	No
Greater than 50 Percent Hydrophytes?	__	X
Hydric Soils Criterion Met?	__	X
Wetland Hydrology Present?	__	X

Is this datapoint within a wetland? Yes __ No X

Remarks:

NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

Project Title: Naval Submarine Base Wetland Area A Transect: B Plot: 1	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Tree				
	Acer rubrum	326.2/1131.1	28.8%	FAC
	Betula alleghaniensis	23/1131.1	2	FAC
	Quercus bicolor	70.9/1131.1	6.3	FACW+
	Nyssa sylvatica	711/1131.1	62.9	FAC
Shrub				
	Betula alleghaniensis	3/34	8.8	FAC
	Clethra alnifolia	20.5/34	60.3	FAC+
	Vaccinium corymbosom	10.5/34	30.9	FACW-
Herb				
	Clethra alnifolia	10.5/10.5	100	FAC+

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	1	4	0	0	0	0	0	0

SUBTOTAL (HYDROPHYTES): 5 SUBTOTAL: 0

TOTAL: 5

$$\frac{100 \times \text{SUBTOTAL (HYDROPHYTES)}}{\text{TOTAL}} = \frac{100 \times 5}{5} = 100\% = \text{PERCENT HYDROPHYTES}$$

Describe Vegetation Disturbance: None

Describe Adaptations: None

DATA-SOIL	Soil Taxonomy: Aeric Haplaquepts
Corps of Engineers Regional Drainage Class: poorly drained	Criterion: B3a
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Charlton-Hollis fine sandy loams, very rocky	Field Observations Confirm Type Mapped? Yes __ No X

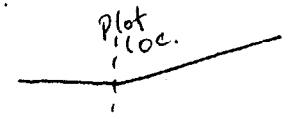
Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-8"	Oe	10 YR 3/3	---	muck
8-18"	A	10 YR 2/1	---	mucky fine sandy loam
18-36"+	Bw	2.5 Y 6/1	2.5 Y 6/3 c, f	fine sandy loam, organic streaking

Remarks:

Data point is located at edge of ponding area.

Sketch Landscape Position:

The recorded upland data point B-2 is approximately 14'. 23' to B-2 due south of wetland flag # 161.



SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

X __ *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 4" of inundation

Depth to Saturation:

Describe Altered Hydrology:

X	Inundated	__	Drift Lines
__	Saturated in upper 12 inches	__	Sediment Deposits
X	Water Marks	X	Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS	Project Title: Naval Base Area A	
	Delineator: Dean Gustafson	
Transect: B	Plot: 1	Date: 1/14/94

	Yes	No		Yes	No
Greater than 50 Percent Hydrophytes?	X	__			
Hydric Soils Criterion Met?	X	__			
Wetland Hydrology Present?	X	__	Is this datapoint within a wetland?	X	__

Remarks:

NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

Project Title: Naval Submarine Base Wetland Area A Transect: B Plot: 2	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Tree				
	Acer rubrum	474.3/1105.7	42.9%	FAC
	Quercus rubra	388.6/1105.7	35.1	FACU-
	Quercus bicolor	70.9/1105.7	6.4	FACW+
	Nyssa sylvatica	171.9/1105.7	15.6	FAC
Shrub				
	Clethra alnifolia	10.5/34	30.9	FAC+
	Kalmia latifolia	20.5/34	60.3	FACU
	Lindera benzoin	3/34	8.9	FACW-

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	0	2	0	0	0	0	2	0

SUBTOTAL (HYDROPHYTES): 2 SUBTOTAL: 2

TOTAL: 4

$$\frac{100 \times \text{SUBTOTAL (HYDROPHYTES)}}{\text{TOTAL}} = \frac{100 \times 2}{4} = 50\% = \text{PERCENT HYDROPHYTES}$$

Describe Vegetation Disturbance: None

Describe Adaptations: None

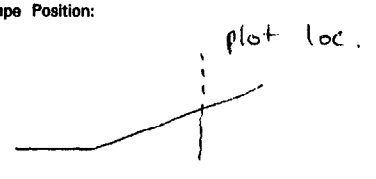
DATA-SOIL	Soil Taxonomy: Aquic Dystrochrepts
Corps of Engineers Regional Drainage Class: moderately well drained	Criterion: D1
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Charlton-Hollis fine sandy loams, very rocky	Field Observations Confirm Type Mapped? Yes __ No X

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-6"	A	10 YR 3/2	---	fine sandy loam
6-20"	Bw1	10 YR 6/6	---	fine sandy loam
20-32"	Bw2	10 YR 7/6	7.5 YR 5/6 c, d	fine sandy loam, iron and manganese staining

Remarks:

The lack of herbaceous vegetation (due to the time of year) may explain the hydrophytic variation over the short distance between plots.

Sketch Landscape Position:



NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology: _____

__ Inundated

__ Saturated in upper 12 inches

__ Water Marks

__ Drift Lines

__ Sediment Deposits

__ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: Naval Base Area A

Delineator: Dean Gustafson

Transect: B | Plot: 2 | Date: 1/14/94

	Yes	No
Greater than 50 Percent Hydrophytes?	__	X
Hydric Soils Criterion Met?	__	X
Wetland Hydrology Present?	__	X

Is this datapoint within a wetland? Yes __ No X

Remarks:

NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

Project Title: Naval Submarine Base Wetland Area A Transect: C Plot: 1	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Tree				
	Acer rubrum	68/68	100%	FAC
Liana				
	Vitis labrusca	2/2	100	FACU
Sapling				
	Acer rubrum	10.5/51.5	20.4	FAC
	Betula populifolia	38/51.5	73.8	FAC
	Nyssa sylvatica	3/51.5	5.8	FAC
Shrub				
	Acer rubrum	3/16.5	18.2	FAC
	Betula populifolia	3/16.5	18.2	FAC
	Clethra alnifolia	10.5/16.5	63.6	FAC+

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	0	4	0	0	0	0	1	0

SUBTOTAL (HYDROPHYTES): 4 SUBTOTAL: 1

TOTAL: 5

$$\frac{100 \times \text{SUBTOTAL (HYDROPHYTES)}}{\text{TOTAL}} = \frac{100 \times 4}{5} = 80\% = \text{PERCENT HYDROPHYTES}$$

Describe Vegetation Disturbance: See Remarks

Describe Adaptations: None

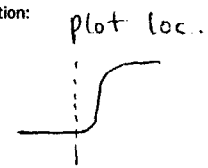
DATA-SOIL	Soil Taxonomy: Aquent
Corps of Engineers Regional Drainage Class: poorly drained	Criterion: B3a
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Charlton-Hollis fine sandy loams, very rocky	Field Observations Confirm Type Mapped? Yes __ No X

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-4"	C_1	2.5 Y 3/1	---	silt loam, oxidized rhizospheres
4-12"	C_2	2.5 Y 4/3	---	silt loam, organic streaking
12-36"+	C_3	2.5 Y 4/1	2.5 Y 5/3 c, d	silt loam, manganese staining

Remarks:

Data point is within the former secondary sediment containment pond which is a man-made structure with disturbed vegetation.

Sketch Landscape Position:



NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

X __ *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 8" of inundation

Depth to Saturation: ____

Describe Altered Hydrology: ____

X	Inundated	__	Drift Lines
__	Saturated in upper 12 inches	__	Sediment Deposits
__	Water Marks	X	Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS	Project Title: Naval Base Area A	
	Delineator: Dean Gustafson	
Transect: C	Plot: 1	Date: 1/14/94

	Yes	No
Greater than 50 Percent Hydrophytes?	X	__
Hydric Soils Criterion Met?	X	__
Wetland Hydrology Present?	X	__

Is this datapoint within a wetland? Yes X No __

Remarks:

The recorded upland data point C-2 is approximately 11' due west. 7' to C-1 due south of wetland flag # 108.

NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

Project Title: Naval Submarine Base Wetland Area A Transect: C Plot: 2	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Tree				
	Acer rubrum	68/115.6	58.8%	FAC
	Betula lenta	23.8/115.6	20.6	FACU
	Quercus rubra	23.8/115.6	20.6	FACU-
Sapling				
	Acer rubrum	10.5/51.5	20.4	FAC
	Betula populifolia	38/51.5	73.8	FAC
	Nyssa sylvatica	3/51.5	5.8	FAC
Shrub				
	Acer rubrum	3/27	11	FAC
	Betula populifolia	3/27	11	FAC
	Clethra alnifolia	10.5/27	39	FAC+
	Kalmia latfolia	10.5/27	39	FACU
Herb				
	Clethra alnifolia	10.5/21	50	FAC+
	Vaccinium corymbosum	10.5/21	50	FACW-

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	1	5	0	0	0	0	3	0

SUBTOTAL (HYDROPHYTES): 6 SUBTOTAL: 3

TOTAL: 9

$\frac{100 \text{ X SUBTOTAL (HYDROPHYTES}}{\text{TOTAL}} = \frac{100 \text{ X } 6}{9} = 67\% =$ PERCENT HYDROPHYTES

Describe Vegetation Disturbance: See Remarks

Describe Adaptations: None

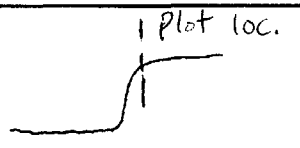
DATA-SOIL	Soil Taxonomy: Udorthents
Corps of Engineers Regional Drainage Class: moderately well drained	Criterion: D1
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Charlton-Hollis fine sandy loams, very rocky	Field Observations Confirm Type Mapped? Yes __ No X

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-22"	C_1	10 YR 4/4	---	fine sandy loam
22-28"	C_2	2.5 Y 5/3	10 YR 5/6 c, d	fine sandy loam
28-34"+	C_3	2.5 Y 4/3	10 YR 4/3 c, d	fine sandy loam

Remarks:

Data point is within berm of former secondary containment pond which is a man-made structure with disturbed vegetation.

Sketch Landscape Position:



SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology: _____

__ Inundated

__ Saturated in upper 12 inches

__ Water Marks

__ Drift Lines

__ Sediment Deposits

__ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: Naval Base Area A

Delineator: Dean Gustafson

Transect: C | Plot: 2 | Date: 1/17/94

	Yes	No
Greater than 50 Percent Hydrophytes?	X	__
Hydric Soils Criterion Met?	__	X
Wetland Hydrology Present?	__	X

Is this datapoint within a wetland? Yes __ No X

Remarks:

NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

Project Title: Naval Submarine Base Wetland Area A Transect: D Plot: 1	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Tree				
	Acer rubrum	44.2/525.5	8.4%	FAC
	Fagus grandifolia	103.9/525.5	19.8	FACU
	Quercus bicolor	188.7/525.5	35.9	FACW+
	Quercus rubra	188.7/525.5	35.9	FACU-
Liana				
	Vitis labrusca	2/2	100	FACU
Sapling				
	Acer rubrum	10.5/21	50	FAC
	Betula lenta	10.5/21	50	FACU
Shrub				
	Acer rubrum	10.5/24	43.8	FAC
	Clethra alnifolia	10.5/24	43.8	FAC+
	Kalmia latifolia	3/24	12.4	FACU
Herb				
	Phragmites australis	3/3	100	FACW

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	2	3	0	0	0	0	3	0

SUBTOTAL (HYDROPHYTES): 5 SUBTOTAL: 3

TOTAL: 8

$$\frac{100 \times \text{SUBTOTAL (HYDROPHYTES)}}{\text{TOTAL}} = \frac{100 \times 5}{8} = 62.5\% = \text{PERCENT HYDROPHYTES}$$

Describe Vegetation Disturbance: None

Describe Adaptations: None

DATA-SOIL | Soil Taxonomy: Aeric Haplaquepts

Corps of Engineers
Regional Drainage Class: poorly drained | Criterion: B3a

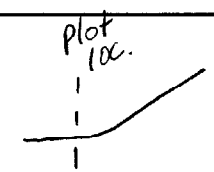
Is Published Soil Survey Available? Yes | Title/Date: New Londo Co. 6/83

Soil Type Mapped: Charlton-Hollis fine sandy loams, very rocky | Field Observations Confirm Type Mapped? Yes __ No X

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-8"	C	10 YR 2/1	---	silt loam
8-10"	Oeb	10 YR 2/1	---	muck
10-22"+	Bwb	10 YR 4/1	---	sandy loam

Remarks:

Sketch Landscape Position:



NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

X __ *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 3"

Depth to Saturation: Saturated to surface

Describe Altered Hydrology: None

__	Inundated	__	Drift Lines
X	Saturated in upper 12 inches	__	Sediment Deposits
__	Water Marks	X	Drainage Patterns within Wetlands

Remarks:
Strong seepage area

CONCLUSIONS

Project Title: Naval Base Area A

Delineator: Dean Gustafson

Transect: D | Plot: 1 | Date: 1/17/94

	Yes	No		Yes	No
Greater than 50 Percent Hydrophytes?	X	__			
Hydric Soils Criterion Met?	X	__			
Wetland Hydrology Present?	X	__	Is this datapoint within a wetland?	X	__

Remarks:

The recorded upland data point D-2 is approximately 13' due southwest. 8' to D-1 due south of wetland flag #60.

Project Title: Naval Submarine Base Wetland Area A Transect: D Plot: 2	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Tree				
	Acer rubrum	115.1/1175.6	9.8%	FAC
	Fagus grandifolia	103.9/1175.6	8.8	FACU
	Quercus bicolor	188.7/1175.6	16.1	FACW+
	Quercus rubra	767.91/1175.6	65.3	FACU-
Liana				
	Vitis labrusca	2/2	100	FACU
Sapling				
	Acer rubrum	10.5/16.5	63.6	FAC
	Betula lenta	3/16.5	18.2	FACU
	Hammamelis virginiana	3/16.5	18.2	FAC-
Shrub				
	Hammamelis virginiana	10.5/13.5	77.8	FAC-
	Kalmia latifolia	3/13.5	22.2	FACU

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	0	1	0	0	0	1	3	0

SUBTOTAL (HYDROPHYTES): 1 SUBTOTAL: 4

TOTAL: 5

$\frac{100 \times \text{SUBTOTAL (HYDROPHYTES}}{\text{TOTAL}} = \frac{100 \times 1}{5} = 20\% =$ PERCENT HYDROPHYTES

Describe Vegetation Disturbance: None

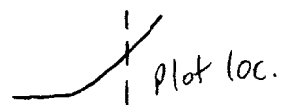
Describe Adaptations: None

DATA-SOIL	Soil Taxonomy: Aquic Dystrochrepts
Corps of Engineers Regional Drainage Class: moderately well drained	Criterion: D2
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Charlton-Hollis fine sandy loams, very rocky	Field Observations Confirm Type Mapped? Yes __ No X

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
1-0"	Oe	10 YR 2/1	---	leaf duff
0-5"	A	10 YR 2/2	---	fine sandy loam
5-12"	Bw1	10 YR 5/4	---	fine sandy loam
12-22"+	Bw2	10 YR 5/3	---	fine sandy loam, iron staining

Remarks:

Sketch Landscape Position:



SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology: _____

__ Inundated

__ Saturated in upper 12 inches

__ Water Marks

__ Drift Lines

__ Sediment Deposits

__ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: Naval Base Area A

Delineator: Dean Gustafson

Transect: D | Plot: 2 | Date: 1/17/94

	Yes	No
Greater than 50 Percent Hydrophytes?	__	X
Hydric Soils Criterion Met?	__	X
Wetland Hydrology Present?	__	X

Is this datapoint within a wetland? Yes __ No X

Remarks:

NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

Project Title: Naval Submarine Base Wetland Area A Transect: E Plot: 1	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Herb				
	Phragmites australis	85.5/85.5	100%	FACW
Note:	use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.			

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	1	0	0	0	0	0	0	0

SUBTOTAL (HYDROPHYTES): 1 SUBTOTAL: 0

TOTAL: 1

$$\frac{100 \times \text{SUBTOTAL (HYDROPHYTES)}}{\text{TOTAL}} = \frac{100 \times 1}{1} = 100\% = \text{PERCENT HYDROPHYTES}$$

Describe Vegetation Disturbance: See Remarks

Describe Adaptations: None

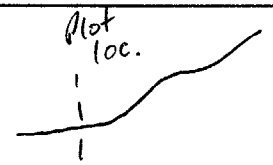
DATA-SOIL	Soil Taxonomy: Aquents
Corps of Engineers Regional Drainage Class: poorly drained	Criterion: B3a
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Udorthents	Field Observations Confirm Type Mapped? Yes __ No X

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-40"+	Cg	N 4/0	10 YR 4/4, c, d; 5 GB 4/1, c, d	silt loam

Remarks:

Data point is within the former primary sediment containment pond which is a man-made structure with disturbed vegetation.

Sketch Landscape Position:



SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

X __ *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 8"

Depth to Saturation: 5"

Describe Altered Hydrology:

__	Inundated	__	Drift Lines
X	Saturated in upper 12 inches	__	Sediment Deposits
__	Water Marks	__	Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: Naval Base Area A

Delineator: Dean Gustafson

Transect: E | Plot: 1 | Date: 1/17/94

	Yes	No		Yes	No
Greater than 50 Percent Hydrophytes?	X	__			
Hydric Soils Criterion Met?	X	__			
Wetland Hydrology Present?	X	__	Is this datapoint within a wetland?	X	__

Remarks:

The recorded upland data point E-2 is approximately 13' due west. 15' to E-2 due south/southwest of wetland flag #177.

Project Title: Naval Submarine Base Wetland Area A Transect: E Plot: 2	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Sapling				
	Populus deltoides	3/3	100%	FAC
Shrub				
	Corus amomum	10.5/31	33.9	FACW
	Rosa multiflora	20.5/31	66	FACU
Herb				
	Phragmites australis	10.5/10.5	100	FACW
Note:	use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.			

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	2	0	0	0	0	0	1	0

SUBTOTAL (HYDROPHYTES): 3 SUBTOTAL: 1

TOTAL: 4

$\frac{100 \text{ X SUBTOTAL (HYDROPHYTES)}}{\text{TOTAL}} = \frac{100 \text{ X } 3}{4} = 75\% =$ PERCENT HYDROPHYTES

Describe Vegetation Disturbance: None

Describe Adaptations: None

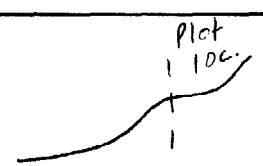
DATA-SOIL	Soil Taxonomy: Udorthents
Corps of Engineers Regional Drainage Class: moderately well drained	Criterion: D2 (assumed)
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Udorthents	Field Observations Confirm Type Mapped? Yes X No _

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-20"+	C	10 YR 4/3	---	gravelly sand and dense rubble

Remarks:

Data point is within former landfill.

Sketch Landscape Position:



SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology: _____

__ Inundated

__ Saturated in upper 12 inches

__ Water Marks

__ Drift Lines

__ Sediment Deposits

__ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: Naval Base Area A

Delineator: Dean Gustafson

Transect: E | Plot: 2 | Date: 1/17/94

	Yes	No		Yes	No
Greater than 50 Percent Hydrophytes?	X	__			
Hydric Soils Criterion Met?	__	X			
Wetland Hydrology Present?	__	X	Is this datapoint within a wetland?	__	X

Remarks:

The recorded upland data point E-2 is approximately 13' due west. 15' to E-2 due south/southwest of wetland flag #177.

Project Title: Naval Submarine Base Wetland Area A Transect: F Plot: 1	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Herb				
	Phragmites australis	85.5/85.5	100%	FACW

Note: *use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.*

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	1	0	0	0	0	0	0	0

SUBTOTAL (HYDROPHYTES): 1 SUBTOTAL: 0

TOTAL: 1

$\frac{100 \times \text{SUBTOTAL (HYDROPHYTES)}}{\text{TOTAL}} = \frac{100 \times 1}{1} = 100\% =$ PERCENT HYDROPHYTES

Describe Vegetation Disturbance: See Remarks

Describe Adaptations: None

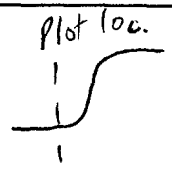
DATA-SOIL	Soil Taxonomy: Aquents
Corps of Engineers *Regional Drainage Class: poorly drained*	*Criterion:* B3a
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Udorthents	Field Observations Confirm Type Mapped? Yes __ No X

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-6"	C	10 YR 2/1	---	silt loam

Remarks:

Data point is within the former primary sediment containment pond which is a man-made structure with disturbed vegetation.

Sketch Landscape Position:



SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

X __ *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 36" of inundation

Depth to Saturation: ---

Describe Altered Hydrology: None

__ Inundated

__ Saturated in upper 12 inches

__ Water Marks

__ Drift Lines

__ Sediment Deposits

__ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: Naval Base Area A

Delineator: Dean Gustafson

Transect: F | Plot: 1 | Date: 1/17/94

	Yes	No
Greater than 50 Percent Hydrophytes?	X	
Hydric Soils Criterion Met?	X	
Wetland Hydrology Present?	X	

Is this datapoint within a wetland? Yes X No __

Remarks:

The recorded upland data point F-2 is approximately 10' due southwest. 5' to F-1 due northeast of wetland flag #192.

Project Title: Naval Submarine Base Wetland Area A Transect: F Plot: 2	File Number: 1256-31-03 Date: 1/14/94

Data-Vegetation	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Liana				
	Celastrus scandens	10.5/10.5	100%	FACU-
Shrub				
	Rosa multiflora	10.5/21	50	FACU
	Rubus spp.	10.5/21	50	---

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology.

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	0	0	0	2	0	0	2	0

SUBTOTAL (HYDROPHYTES): 0 SUBTOTAL: 2

TOTAL: 2

$\frac{100 \times \text{SUBTOTAL (HYDROPHYTES)}}{\text{TOTAL}} = \frac{100 \times 0}{2} = 0\% =$ PERCENT HYDROPHYTES

Describe Vegetation Disturbance: See Remarks

Describe Adaptations: None

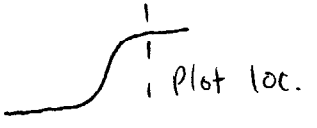
DATA-SOIL	Soil Taxonomy: Udorthents
Corps of Engineers Regional Drainage Class: well drained	Criterion: E (assumed)
Is Published Soil Survey Available? Yes	Title/Date: New Londo Co. 6/83
Soil Type Mapped: Udorthents	Field Observations Confirm Type Mapped? Yes X No __

Depth	Horizon	Matrix Color	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-20"+	C	10 yr 4/3	---	gravelly sand and dense rubble

Remarks:

Data point is within former landfill.

Sketch Landscape Position:



SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

__ X Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (Attach an explanation of the basis for your conclusion.)

__ X The soil meets the Corps of Engineers regional criteria as a *VERY POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X *POORLY DRAINED SOIL and there is no evidence of altered hydrology.

__ X The soil meets the Corps of Engineers regional criteria as a *SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics:

Yes No

__ __ 1. Within 6 inches of the soil surface there are:

Yes No

__ __ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

__ __ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

__ __ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

__ __ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

__ __ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark A or Ap horizon**, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

__ __ b. When a dark Ap horizon** is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when i. hydorphytes are prevalent, ii. there is no eividence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinch or prominent.

__ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (Dipyridif), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less.

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

__ Recorded Data:

Stream, lake or tidal gage — Identification

Aerial Photograph — Identification

Other — Identification

X No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology: _____

__ Inundated

__ Saturated in upper 12 inches

__ Water Marks

__ Drift Lines

__ Sediment Deposits

__ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: Naval Base Area A

Delineator: Dean Gustafson

Transect: F | Plot: 2 | Date: 1/17/94

	Yes	No
Greater than 50 Percent Hydrophytes?	__	X
Hydric Soils Criterion Met?	__	X
Wetland Hydrology Present?	__	X

Is this datapoint within a wetland? Yes __ No X

Remarks:

NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delination Manual (Technical Report Y-87-1) January 1987

APPENDIX C

DETAILED SOIL DESCRIPTIONS

AQUENTS (DISTURBED WETLAND SOILS)

Taxonomic Class: Aquents include all newly, or recently, formed soils which are subject to an aquic moisture regime. Disturbed wetland soils containing a moderately coarse to fine textured soil surface would likely be classified as Haplaquents. Those disturbed wetland soils having a coarse sandy textured surface would likely be classified as Psammaquents.

Drainage: Poorly and very poorly drained. Soil saturation may vary from periodic saturation during the growing season in poorly drained areas, to extended saturation for long periods throughout the year along with periodic ponding in very poorly drained areas. Due to the wide variation of soil materials included in this soil map unit, predictions of water table elevations require on-site investigation and evaluation.

Permeability: Due to the wide variation of soil materials included in this soil map unit, predictions of soil permeability require on-site investigation and evaluation.

This soil map unit consists of poorly drained and very poorly drained, disturbed land areas. They are most often found on landscapes which were subject to prior filling and/or excavation activities. In general this soil map unit occurs where two or more feet of the original soil surface has been filled over or excavated. Aquents are characterized by a seasonal to prolonged high ground water table and either support or are capable of supporting wetland vegetation.

Aquents are recently formed soils which have an aquic moisture regime. An aquic moisture regime is associated with a reducing soil environment that is virtually free of dissolved oxygen because the soil is saturated by groundwater or by water of the capillary fringe. The key feature is the presence of a ground water table at or very near to the soil surface for a period of fourteen days or longer during the growing season.

The Aquents soil mapping unit is a miscellaneous unit which includes a large variety of soil materials and landscape features. Common locations of Aquents include former gravel pits, urban areas abutting marshlands and broad ditches along highways.

TYPICAL USE AND VEGETATION

Determination of the suitability of this soil map unit for any use requires on-site investigation and evaluation. Vegetation is typically dominated by pioneer species including herbaceous, shrub and/or tree species. Often vegetative growth is sparse or stunted due to recent disturbances and/or lack of suitable topsoil for plant growth.

DEVELOPMENT CAPABILITY/CONSTRAINTS

Determination of the suitability of this soil map unit for any use requires on-site investigation and evaluation. A high ground water table at or near the surface either periodically or for extended periods along with possible temporary ponding presents severe constraints for development purposes.

TYPICAL PROFILE

There is no typical pedon for the Aquents soil mapping unit due to the variability of soil materials included in the unit. Aquents are characterized by a lack of well developed upper soil horizons which is a result of their young age. Precise identifiable soil features which are common to native wetland soils are often absent or poorly developed in Aquents. Some common soil features which may be present in the upper 18 inches of an Aquents soil include a dull or gray coloration, red and/or gray mottles, manganese and/or iron stains, oxidized rhizospheres and sulphur compounds. Identification of an Aquents soil in the field often requires a combined evaluation of soil features, vegetative plants and hydrologic indicators.

CANTON SERIES

Taxonomic Class: Coarse-loamy over sandy or sandy skeletal, mixed, mesic Typic Dystrochrepts.

Drainage: Well drained. The water table is commonly at a depth of more than 6 feet.

Permeability: Permeability is moderate or moderately rapid in the surface layer and subsoil and rapid in the substratum. Surface runoff is medium to rapid.

The Canton series consists of deep, well drained soils formed in a coarse-loamy mantle underlain by sandy glacial till on uplands. They are nearly level to very steep soils on till plains and hills. The soils formed in acid glacial till are derived mainly from schist, gneiss or granite.

Typically, these soils have a surface layer of very dark grayish brown fine sandy loam 2 inches thick. The subsoil from 2 to 23 inches is yellowish brown fine sandy loam, gravelly fine sandy loam and gravelly sandy loam. The substratum from 23 to 60 inches is pale brown gravelly loamy sand.

TYPICAL USE AND VEGETATION

Areas cleared of stones are used for cultivated crops, pasture and hay. Many scattered areas are used for community development. Many areas are mostly wooded. Common trees are red, white and black oak, hickory, sugar maple, red maple, yellow and gray birch, white ash, beech, white pine and hemlock.

DEVELOPMENT CAPABILITY/CONSTRAINTS

On-site sewage disposal: slight
Shallow excavations: severe/cutbanks cave
Building footings: slight to moderate
Local roads and streets: slight to moderate
Construction materials:
Roadfill: good
Sand: improbable/excess fines
Gravel: improbable/excess fines
Topsoil: poor/stony

Note: soils on slopes exceeding 15% have severe constraints.

TYPICAL PROFILE

DEPTH (inches)	HORIZON	DESCRIPTION
O-1	A	black fine sandy loam; fine granular structure; very friable; many fine roots; extremely acid
1-2	E	dark gray fine sandy loam; fine granular structure; very friable; many fine roots; 10 percent gravel; extremely acid
2-12	Bw1	yellowish brown fine sandy loam; massive; very friable; many fine and medium tree roots; 10 percent gravel and cobbles; very strongly acid
12-22	Bw2	light yellowish brown gravelly fine sandy loam; massive; very friable; many fine and medium roots; 15 percent gravel and cobbles; very strongly acid
22-31	2C1	light olive gray, gravelly loamy sand, single grain; very friable, few roots; 25 percent gravel and cobbles; very strongly acid
31-60	2C2	olive gray gravelly loamy sand; single grain; friable; 35 percent coarse fragments; very strongly acid

Source: USDA Soil Conservation Service

CHARLTON SERIES

Taxonomic Class: Coarse-loamy, mixed, mesic Typic Dystrochrepts

Drainage: Well drained. The water table is commonly at a depth of more than 6 feet.

Permeability: Permeability is moderate or moderately rapid in the surface layer, subsoil and substratum. Surface runoff is medium to rapid.

The Charlton series consists of very deep, well drained coarse-loamy soils formed in friable, glacial till on uplands. They are nearly level to very steep soils on till plains and hills. The soils formed in acid glacial till are derived mainly from schist, gneiss or granite.

In glacial till areas, these soils have a surface layer of dark brown fine sandy loam 8 inches thick. The subsoil from 8 to 26 inches is yellowish brown fine sandy to sandy loam. The substratum from 26 to 60 inches or more is grayish brown gravelly fine sandy loam.

TYPICAL USE AND VEGETATION

Areas cleared of stones are used for cultivated crops, specialty crops, pasture and hay. Many scattered areas are used for community development. Stony areas are mostly wooded. Common trees are red, white and black oak, hickory, sugar maple, red maple, black and gray birch, white ash, beech, white pine and hemlock.

DEVELOPMENT CAPABILITY/CONSTRAINTS

On-site sewage disposal: slight
Shallow excavations: slight to moderate
Building footings: slight to moderate
Local roads and streets: slight to moderate
Construction materials:
Roadfill: good
Sand: improbable/excess fines
Gravel: improbable/excess fines
Topsoil: fair to poor

Note: soils on slopes exceeding 15% have severe constraints.

TYPICAL PROFILE

DEPTH (inches)	HORIZON	DESCRIPTION
1-0	Oe	black partially and well decomposed forest litter
0-3	A	dark brown fine sandy loam; weak friable granular structure; very friable; many fine roots; 5 percent gravel; very strongly acid
3-6	Bw1	dark brown fine sandy loam; weak coarse granular structure; very friable; many fine and medium roots; 5 percent gravel; very strongly acid
6-18	Bw2	yellowish brown fine sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; 10 percent gravel and cobbles; very strongly acid
18-26	Bw3	light olive brown gravelly fine sandy loam; massive; very friable; few roots; 15 percent gravel and cobbles; very strongly acid
26-60	C	grayish brown gravelly fine sandy loam, thin lenses of loamy sand; massive; friable, some lenses firm; few roots; 25 percent gravel and cobbles; strongly acid

Source: USDA Soil Conservation Service

HOLLIS SERIES

Taxonomic Class: Loamy, mixed, mesic Lithic Dystrochrepts

Drainage: Well to somewhat excessively drained. The water table is commonly at a depth below 6 feet.

Permeability: Permeability is moderate or moderately rapid. Surface runoff is medium to rapid.

The Hollis series consists of shallow, well drained and somewhat excessively drained; loamy soils formed in a thin mantle of friable glacial till over ledge. Depth to bedrock ranges from 10 to 20 inches. They occur on till plains and hills. The soils formed in acid glacial till are derived mainly from schist, gneiss or granite.

Typically, these soils have a surface layer of dark grayish brown fine sandy loam 3 inches thick. The subsoil from 3 to 14 inches is yellowish brown fine sandy loam. Hard unweathered bedrock underlies the subsoil.

TYPICAL USE AND VEGETATION

Mostly forested with some areas in cultivation and community development. Common trees are red, white, chestnut and black oak, hickory, black and gray birch, white pine and hemlock.

DEVELOPMENT CAPABILITY/CONSTRAINTS

On-site sewage disposal: severe/shallow depth to bedrock
Shallow excavations: severe/shallow depth to bedrock
Building footings: severe/shallow depth to bedrock
Local roads and streets: severe/shallow depth to bedrock
Construction materials:
Roadfill: poor/thin layer
Sand: unsuitable/thin layer, excess fines
Gravel: unsuitable/thin layer, excess fines
Topsoil: poor/thin layer

Note: soils on slopes exceeding 15% have additional severe constraints.

TYPICAL PROFILE

DEPTH (inches)	HORIZON	DESCRIPTION
2-O	Oe	partially decomposed forest litter
0-2	A	very dark grayish brown fine sandy loam; fine granular structure; very friable; many fine and medium roots; 5 percent gravel; very strongly acid
2-10	Bw1	dark yellowish brown fine sandy loam; weak subangular blocky structure; friable; common fine and medium roots; 10 percent gravel; very strongly acid
10-15	Bw2	yellowish brown, gravelly fine sandy loam; weak subangular blocky structure; very friable; few fine and medium roots; 20 percent gravel and cobbles; strongly acid
15	R	slightly weathered schist bedrock

Source: USDA Soil Conservation Service

RIDGEBURY SERIES

Taxonomic Class: Coarse loamy, mixed, mesic Aeric Fragiaquepts

Drainage: Poorly drained and the wetter part of somewhat poorly drained. The seasonal high water table is within 0 to 18 inches of the surface from late fall through spring. A perched, fluctuating water table above the dense till saturates the solum to or near the surface for 7 to 9 months of the year.

Permeability: Permeability is moderate to moderately rapid in the surface layer and subsoil and slow or very slow in the dense substratum. Surface runoff is slow to medium.

The Ridgebury series consists of deep, poorly and somewhat poorly drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till on uplands. They are nearly level to moderately steep soils on till plains, low ridges and drumloidal landforms. The soils formed in acid glacial till are derived mainly from schist, gneiss or granite.

Typically these soils have a black sandy loam surface layer 6 inches thick. The mottled subsoil from 6 to 16 inches is olive gray sandy loam. The mottled substratum from 16 to 60 inches is a light olive brown and olive, very firm and brittle gravelly sandy loam.

TYPICAL USE AND VEGETATION

Largely forested with gray birch, yellow birch, red maple, hemlock, elm, spruce and balsam fir. Cleared areas are used mainly for hay and pasture.

DEVELOPMENT CAPABILITY/CONSTRAINTS

On-site sewage disposal: severe/percs slowly, wetness
Shallow excavations: severe/wetness
Building footings: severe/wetness
Local roads and streets: severe/wetness, frost action
Construction materials:
Roadfill: poor/wetness
Sand: improbable/excess fines
Gravel: improbable/excess fines
Topsoil: poor

TYPICAL PROFILE

DEPTH (inches)	HORIZON	DESCRIPTION
0-6	A	black sandy loam; moderate fine granular structure; very friable; many fine roots; 10 percent gravel and stones; strongly acid
6-16	Bwg	olive gray sandy loam; distinct yellowish brown mottles; massive; friable; common fine roots; 10 percent gravel; medium acid
16-26	Cr1	light olive brown gravelly sandy loam, many prominent gray mottles; weak thin plates arranged in very coarse prisms; very firm; brittle; few roots; 15 percent gravel and stones; medium acid
26-60	Cr2	olive gravelly sandy loam; many prominent strong brown and gray mottles; weak thin plates; very firm; brittle; few fine roots; 5 percent gravel; medium acid

Source: USDA Soil Conservation Service

SUTTON SERIES

Taxonomic Class: Coarse-loamy, mixed, mesic Aquic Dystrochrepts.

Drainage: Moderately well drained. The seasonal high water table is within 18 to 30 inches of the surface from late fall through spring.

Permeability: Permeability is moderate or moderately rapid throughout. Surface runoff is slow to medium.

The Sutton series consists of deep, moderately well drained loamy soils formed in friable, glacial till on uplands. They are nearly level to steeply sloping soils on till plains, low ridges and hills, being typically located on lower slopes and in slight depressions. The soils formed in acid glacial till are derived mainly from schist, gneiss or granite.

Typically, these soils have a surface layer of dark brown fine sandy loam 8 inches thick. The subsoil from 8 to 28 inches is yellowish brown, mottled fine sandy loam and sandy loam. The substratum from 28 to 60 inches or more is light olive brown fine sandy loam.

TYPICAL USE AND VEGETATION

Areas cleared of stones are used for cultivated crops, specialty crops, pasture and hay. Many scattered areas are used for community development. Stony areas are mostly wooded. Common trees are red, white and black oak, hickory, sugar maple, red maple, black and gray birch, white ash, white pine and hemlock.

DEVELOPMENT CAPABILITY/CONSTRAINTS

On-site sewage disposal: severe/wetness
Shallow excavations: severe/wetness
Building footings: severe to moderate/wetness
Local roads and streets: moderate/frost action, wetness
Construction materials: Roadfill: fair/wetness
Sand: improbable/excess fines
Gravel: improbable/excess fines
Topsoil: fair to poor/stony

Note: soils on slopes exceeding 15% have severe constraints.

TYPICAL PROFILE

DEPTH (inches)	HORIZON	DESCRIPTION
1-0	Oi	undecomposed organic litter
0-1	Oe	black partially and well decomposed forest litter
1-3	A	very dark grayish brown stony fine sandy loam; fine granular structure; very friable; many fine and medium roots; 25 percent coarse fragments; strongly acid
3-12	Bw1	dark brown fine sandy loam; subangular blocky structure; friable; common fine and medium roots; 10 percent coarse fragments; moderately acid
12-24	Bw2	yellowish brown fine sandy loam; distinct light brownish gray and yellowish red mottles; subangular blocky structure; friable; few medium roots; 10 percent gravel and cobbles; moderately acid

SUTTON SERIES (continued)		
24-28	Bw3	yellowish brown fine sandy loam; distinct light brownish gray and strong brown mottles; subangular blocky structure; friable; few roots; 10 percent gravel and cobbles; moderately acid
28-36	C1	brown gravelly fine sandy loam, distinct light brownish gray and strong brown mottles; weak platy structure; firm, 15 percent gravel and cobbles; moderately acid
36-60	C2	light olive brown gravelly fine sandy loam; massive; friable; 25 percent gravel and cobbles; moderately acid
Source: USDA Soil Conservation Service		

UDORTHENTS SERIES

Taxonomic Class:	Udorthents
Drainage:	Well drained to moderately well drained. The determination of the water table requires on-site investigation and evaluation.
Permeability:	The determination of the permeability requires on-site investigation and evaluation.

Udorthents consist of well drained to moderately well drained soils that have been altered by cutting, filling, or grading. The areas either have had 2 feet or more of the upper part of the original soil removed or have had more than 2 feet of material filled over the original soil. Udorthent soils can be found on any soil type but typically on glacial till plains and outwash plains and stream terraces.

These areas are mostly irregular in shape and generally range from 5 to 60 acres. Slopes range from 0 to 15 percent. Udorthents are commonly more than 60 inches thick and contain 10 to 65 percent rock fragments. Reaction is very strong to slightly acid.

TYPICAL USE AND VEGETATION

Determination of the suitability of this unit for any use requires on-site investigation and evaluation. Vegetation is typically dominated by pioneer species including herbaceous, shrub and/or tree species. Often vegetative growth is sparse or stunted due to recent disturbances and/or lack of suitable topsoil for plant growth.

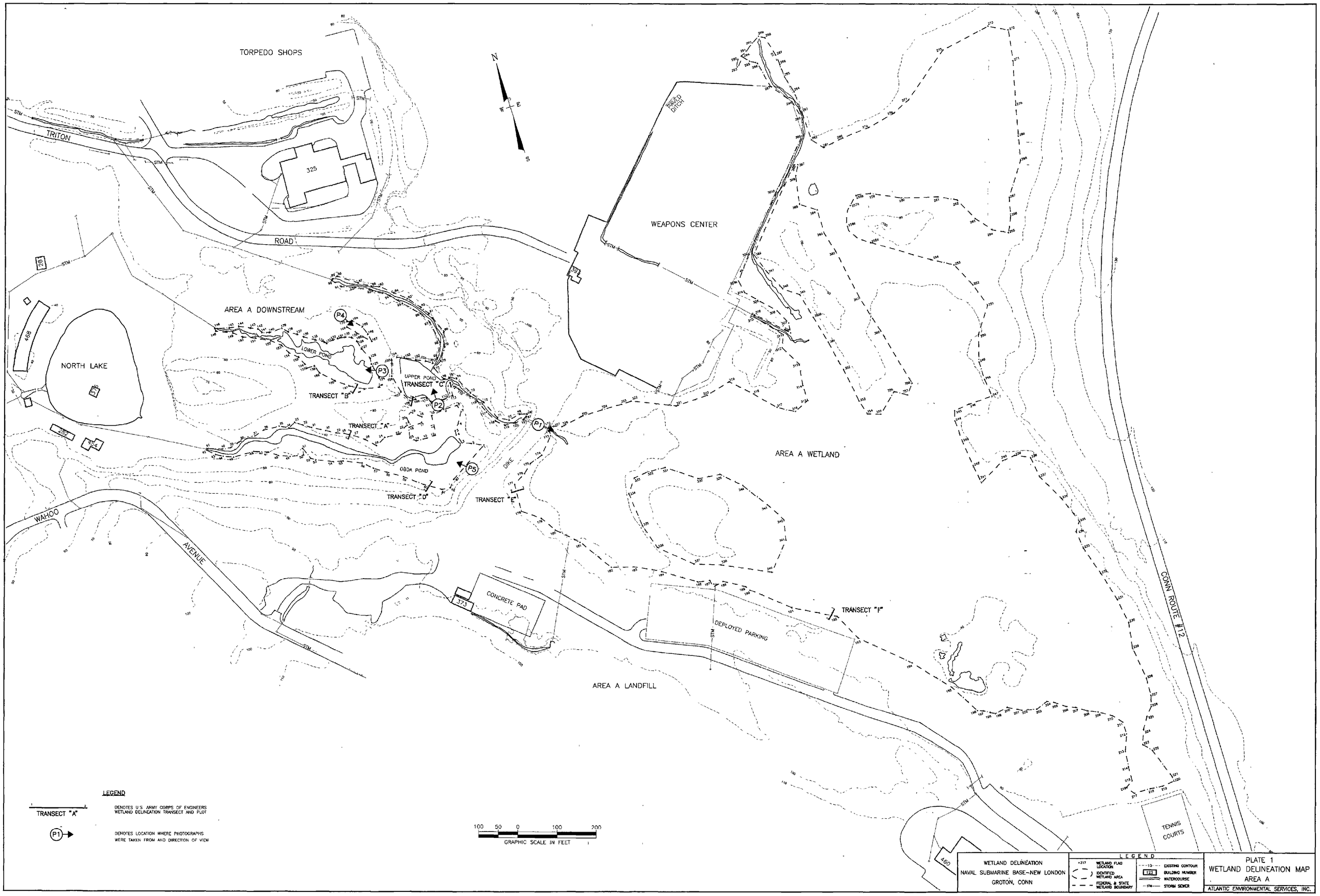
DEVELOPMENT CAPABILITY/CONSTRAINTS

Determination of the suitability of this unit for any use requires on-site investigation and evaluation.

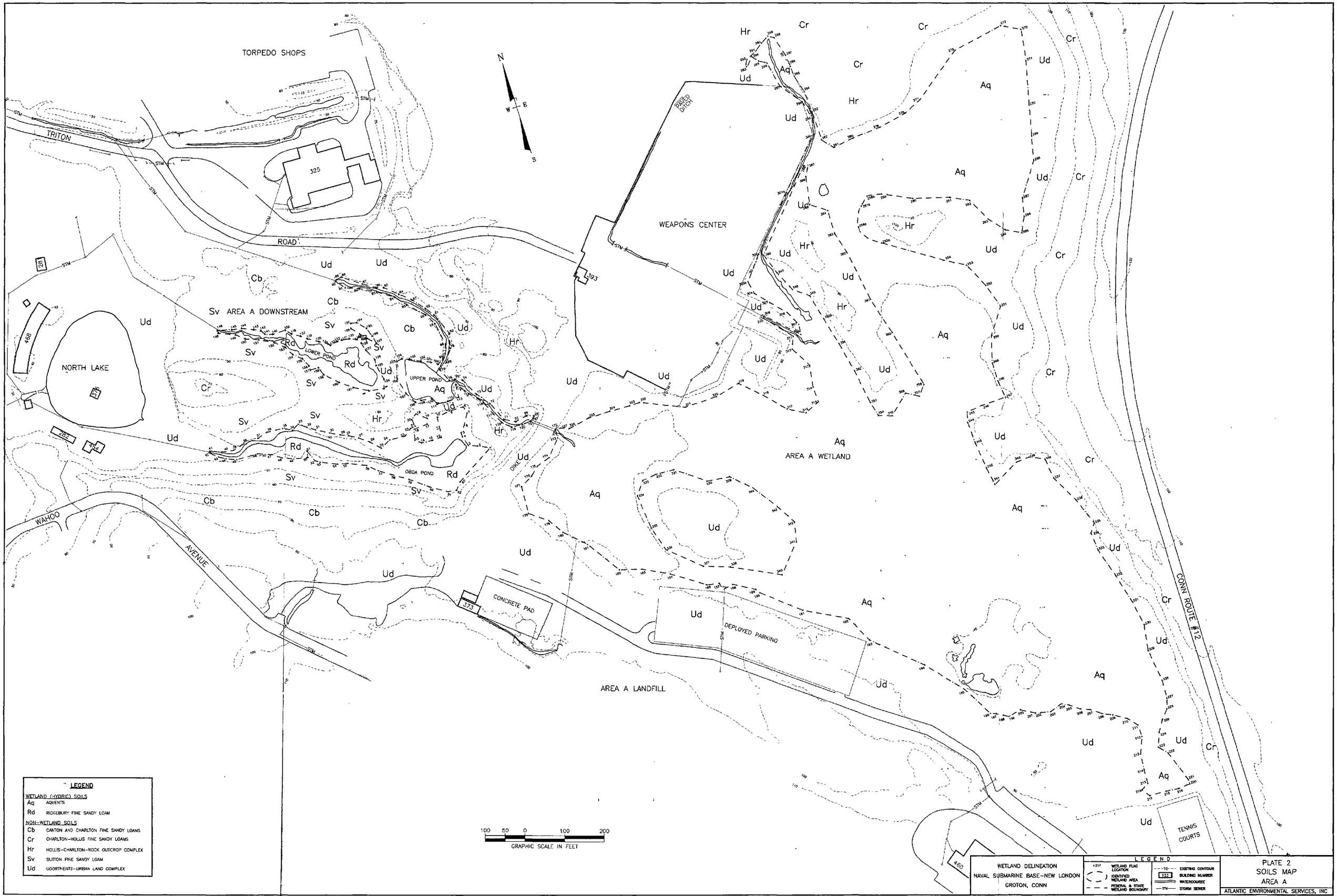
TYPICAL PROFILE

Because of the variability of Udorthents, a typical pedon is not given.

Source: USDA Soil Conservation Service


TORPEDO SHOPS
N
W
E
S
TRITON
STM
325
ROAD
WEAPONS CENTER
PAVED DITCH
331
AREA A DOWNSTREAM
P4
LOWER POND
P3
UPPER POND
TRANSECT "C"
P2
TRANSECT "B"
TRANSECT "A"
P1
NORTH LAKE
458
257
AREA A WETLAND
080A POND
P5
DIKE
TRANSECT "D"
TRANSECT "E"
WAHOO
AVENUE
CONCRETE PAD
373
TRANSECT "F"
DEPLOYED PARKING
AREA A LANDFILL
CONN ROUTE #12
TENNIS COURTS
460
LEGEND
TRANSECT "A"
DENOTES U.S. ARMY CORPS OF ENGINEERS WETLAND DELINEATION TRANSECT AND PLOT
P1
DENOTES LOCATION WHERE PHOTOGRAPHS WERE TAKEN FROM AND DIRECTION OF VIEW
100 50 0 100 200
GRAPHIC SCALE IN FEET
WETLAND DELINEATION
NAVAL SUBMARINE BASE-NEW LONDON
GROTON, CONN
LEGEND
+217 WETLAND FLAG LOCATION
IDENTIFIED WETLAND AREA
FEDERAL & STATE WETLAND BOUNDARY
10 EXISTING CONTOUR
123 BUILDING NUMBER
WATERCOURSE
STM STORM SEWER
PLATE 1
WETLAND DELINEATION MAP
AREA A
ATLANTIC ENVIRONMENTAL SERVICES, INC.

067731301X


TORPEDO SHOPS
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TRITON
ROAD
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NORTH LAKE
468
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283
Sv AREA A DOWNSTREAM
LOWER POND
UPPER POND
OBOA POND
DIKE
WEAPONS CENTER
393
PAVED DITCH
AREA A WETLAND
CONCRETE PAD
373
DEPLOYED PARKING
AREA A LANDFILL
CONN ROUTE #12
TENNIS COURTS
460
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STM
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Cb
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100 50 0 100 200
GRAPHIC SCALE IN FEET
LEGEND
WETLAND (HYDRIC) SOILS
Aq AQUENTS
Rd RIDGEBURY FINE SANDY LOAM
NON-WETLAND SOILS
Cb CANTON AND CHARLTON FINE SANDY LOAMS
Cr CHARLTON-HOLLIS FINE SANDY LOAMS
Hr HOLLIS-CHARLTON-ROCK OUTCROP COMPLEX
Sv SUTTON FINE SANDY LOAM
Ud UDORTHENTS-URBAN LAND COMPLEX
WETLAND DELINEATION
NAVAL SUBMARINE BASE-NEW LONDON
GROTON, CONN
LEGEND
WETLAND FLAG LOCATION
IDENTIFIED WETLAND AREA
FEDERAL & STATE WETLAND BOUNDARY
EXISTING CONTOUR
BUILDING NUMBER
WATERCOURSE
STORM SEWER
PLATE 2
SOILS MAP
AREA A
ATLANTIC ENVIRONMENTAL SERVICES, INC

D6731302X