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WETLAND FUNCTIONS AND VALUES ASSESSMENT FOR SITE 4 CODDINGTON COVE
RUBBLE FILL AREA NS NEWPORT RI
1/1/2012
TETRA TECH, NUS

WETLAND FUNCTIONS AND VALUES ASSESSMENT

for

**SITE 04 – CODDINGTON COVE
RUBBLE FILL AREA**

NAVSTA, Newport, Rhode Island



**Naval Facilities Engineering Command
Mid-Atlantic**

**Contract Number N62470-08D-1001
Contract Task Order WE48**

January 2012

**WETLAND FUNCTIONS AND VALUES ASSESSMENT
FOR
SITE 04 – CODDINGTON COVE RUBBLE FILL AREA**

**NAVAL STATION NEWPORT
NEWPORT, RHODE ISLAND**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:
Naval Facilities Engineering Command Mid-Atlantic
9742 Maryland Avenue
Norfolk, Virginia 23511-3095**

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**CONTRACT NUMBER N62470-08D-1001
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- 1 Results of the Highway Method Wetland Functions and Values Assessment

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- 1 Photographs
- 2 Wetland Functions and Values Assessment
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1.0 INTRODUCTION

This Wetland Functions and Values Assessment Report was prepared by Tetra Tech, Inc. (Tetra Tech), to document pre-remediation wetland conditions at Site 04, Coddington Cove Rubble Fill Area (CCRFA), Naval Station (NAVSTA) Newport, Newport/Middletown Rhode Island. The pre-remediation wetland assessment was conducted on behalf of the Navy's Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic, under the Comprehensive Long-term Environmental Action Navy (CLEAN) Contract No. N62470-08D-1001, Contract Task Order (CTO) WE48.

On October 6, 2011, personnel from Navy, Tetra Tech, Rhode Island Department of Environmental Management (RIDEM), and a U.S. Environmental Protection Agency (EPA) contractor (Roberts Environmental, Inc.) conducted a Wetland Functions and Values Assessment (Assessment). This Assessment was completed as part of a Study Area Screening Evaluation (SASE) investigation for this site, and will inform decision making regarding the need to conduct a baseline ecological risk assessment (BERA) at the site. Additionally, this survey can serve as a baseline to compare future surveys to determine if there have been any changes following implementation of any remedial action conducted.

A qualitative evaluation of the functions and values was performed at the CCRFA survey area using methods described in the U.S. Army Corps of Engineers: The Highway Methodology Workbook Supplement "Wetlands Functions and Values: A Descriptive Approach" (1999), hereafter referred to as the Highway Method. Photographic documentation is included in Attachment 1. The Highway Method Assessment evaluation form, site sketch, and plant and wildlife species lists are included in Attachment 2. The Highway Method Rationale Reference Number Descriptions are included as Attachment 3.

2.0 CODDINGTON COVE RUBBLE FILL AREA (CCRFA) SURVEY AREA

The CCRFA Study Area (i.e., Study Area or Site) primarily comprises a vegetated upland that historically was a disposal site for inert rubble materials, and an abutting wetland area between the fill area and the Penn Central Railroad Right of Way. The original railroad line was established before 1863. The wetland comprises approximately 3 acres of the approximately 8 acres site. Based on the wetland types described in the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et. al 1979), the wetland appears to be a palustrine emergent wetland dominated by common reed (*Phragmites australis*) (i.e., PEM5).

The CCRFA consists of a former disposal area located in the central portion of the Site. At the northern edges of the disposal area, the Site topography slopes downward into a wetland. This change in elevation is marked by a ridge which trends southwest-northeast through the central portion of the Site,

and then curves toward the southeast in the area of the Newport-Middletown border. The ridge, which denotes the approximate perimeter of the onsite disposal area, slopes approximately 8 to 10 feet downward toward the onsite wetland area. Along the railroad right-of-way which forms the northwestern boundary of the Site, the ground surface slopes downward away from the railroad tracks and toward the southeast.

A small intermittent stream traverses the northeast portion of the Site through the wetland. The stream begins at the outfall of a storm drainage pipe that originates on base and eventually discharges directly into Narragansett Bay after flowing along the northeast border of the Site into the wetland which flows toward the railroad track, becoming diffuse. Surface water movement is towards an outlet near the northern corner of the Site, where water flows through an underground culvert beneath the railroad track for approximately 550 feet (ft) where it discharges into Narragansett Bay. Surface water also enters the Site, diffusely, from the southwest, between the Reliance Row housing area and the railroad tracks. The direction of surface water movement is in a northeasterly direction towards the outlet near the northern corner of the Site.

Vegetation growing within the upland fill area includes those species that are typical colonizers of disturbed sites, including many species considered to be invasive or noxious weed species, according to the U.S., Department of Agriculture Natural Resources Conservation Service (USDA NRCS) Plants Database. Table 1 in Attachment 2 provides a list of plant species observed in the Study Area, and identifies the plant type, location observed, and which species are considered to be invasive or noxious weed species. The dominant wetland vegetation is common reed; the wetland fringe supports a more diverse assemblage of species, including herbaceous, shrub, tree, and vine plant types (Table 1 in Attachment 2).

The steep ridge that bisects the Site provides an exposed face to see the type of rubble fill material that is present at the Site, including concrete, asphalt, metal, and other inert materials. There was some trash (e.g., plastic bags, bottles) in or along the stream channel that may have been washed into the wetland through the storm drain located upstream of the wetland. A chain link fence cuts across the stream channel in multiple places, and acts as a trap for vegetation debris and trash (See Photographs in Attachment 1).

Wildlife species or signs observed in the Study Area included various birds, mammals, and invertebrates. Table 2 in Attachment 2 provides a list of wildlife species observed or suspected to be present in the Study Area.

Fourteen (14) photographs show the upland and wetland areas of the CCRFA Study Area (Attachment 1).

3.0 HIGHWAY METHOD ASSESSMENT

According to the Assessment criteria, the wetland in the CCRFA Study Area provides two principal functions: floodflow alteration and sediment/toxicant retention. Table 1 summarizes the results of the Highway Method Assessment for the CCRFA.

- Floodflow Alteration – There are signs of variable water levels associated with flooding, as evidenced by the wrack line. Effective flood storage is absent upslope of the wetland due to impervious surfaces. Wetland position is in a low, relatively flat area, with flood storage potential between higher elevation areas adjacent to the Site. The wetland is associated with an intermittent stream, fed by a stormwater outfall that handles runoff from the base and sections of Coddington Highway within the watershed.
- Sediment/Toxicant Retention – There are potential sources of toxicants (e.g., PAHs associated with the roads, adjacent railroad, and paved areas) upslope of the wetland. There is an opportunity for sediment trapping by slow moving water and dense vegetation (i.e., common reed).

Five secondary functions were identified that the wetland in the CCRFA Study Area provides: groundwater recharge/discharge, nutrient removal, production export, sediment/shoreline stabilization, and wildlife habitat.

- Groundwater Recharge/Discharge – There are signs of variable water levels associated with flooding, as evidenced by the wrack line. The wetland is associated with an intermittent stream, and has a constricted outlet. The overburden groundwater appears to flow towards the wetland, as determined from groundwater elevation readings from the site monitoring wells.
- Nutrient Removal – The overall potential for sediment trapping exists in the wetland, however it is unknown whether excess nutrients are present in the watershed upslope of the wetland. Dense emergent vegetation is present and dominant. Water retention/ detention time in this wetland is increased by a constricted outlet and dense vegetation.
- Production Export – Detritus (i.e., non-living particulate organic matter) development is present within the wetland. Use of wetland by higher trophic level consumers is minor. Dense emergent vegetation is present. No signs of production export are present. However, “flushing” of organic material is assumed to occur following storm events.

- Sediment/Shoreline Stabilization – Indications of siltation are present. A distinct shoreline bank is limited in extent, becoming diffuse. The intermittent stream is partially channelized. Dense vegetation has the potential to trap and stabilize sediments.
- Wildlife Habitat – Wildlife sign (e.g., raccoon tracks) is present in the wetland, and a muskrat encounter is suspected. Food sources are present in the wetland and adjacent upland, but are predominantly from invasive or noxious weed species. The dense vegetation found at the site likely supports a high insect population, such as predatory and plant-eating species within the common reed.

One function and five values were determined not to be applicable to the wetland in the CCRFA Study Area. These include: fish and shellfish habitat, recreation, education/scientific value, uniqueness heritage, visual quality/aesthetics, and endangered species habitat.

- Fish and Shellfish Habitat – The source water for this wetland is stormwater and precipitation. The stream is intermittent, and does not provide permanent habitat for fish or shellfish. The outlet is constricted and does not provide a reliable connection to Narragansett Bay.
- Recreation – The Site is fenced in, with posted “no trespassing” signs; public use of the Site is restricted. The Site is not intended to provide recreational opportunities.
- Education/Scientific Value – No educational or scientific value was identified for the CCRFA Study Area.
- Uniqueness/Heritage – Although the upland area surrounding the wetland is primarily urban, no uniqueness/heritage value was identified for the CCRFA Study Area.
- Visual Quality/Aesthetics – The surrounding land use is developed, industrial and residential. The adjacent upland contains historically disposed inert rubble fill material, and the entire Site is dominated by invasive and noxious weed species. No visual quality/aesthetic value was identified for the CCRFA Study Area.
- Endangered Species Habitat – According to the RI Department of Environmental Management (RI DEM) Environmental Resource Map (www.dem.ri.gov/maps/index.htm), there are no known threatened or endangered species or critical habitat in the vicinity of the Study Area.

Table 1. Results of the Highway Method Wetland Functions and Values Assessment for Coddington Cove Rubble Fill Area, Naval Station Newport.

Wetland Functions and Values	2011	Future Post-Remedial Action
Principal Functions		TBD
Floodflow Alteration	X	
Sediment/Toxicant Retention	X	
Secondary Functions and Values		TBD
Groundwater Recharge/Discharge	X	
Nutrient Removal	X	
Production Export	X	
Sediment/Shoreline Stabilization	X	
Wildlife Habitat	X	
Not Applicable Functions and Values		TBD
Fish & Shellfish Habitat	N/A	
Recreation	N/A	
Education/Scientific Value	N/A	
Uniqueness/Heritage	N/A	
Visual Quality/Aesthetic	N/A	
Endangered Species Habitat	N/A	

4.0 SUMMARY

The palustrine emergent, common reed-dominated wetland in the CCRFA Study Area provides the principal functions of floodflow alteration and sediment/toxicant retention. Secondary functions include recharging or discharging of groundwater, removing nutrients from surface water runoff (potential), exporting production such as organic plant material, stabilizing sediments against erosion, and providing habitat for wildlife.

REFERENCES

REFERENCES

Cowardin, L. W., et al. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

U.S. Army Corps of Engineers: 1999. The Highway Methodology Workbook Supplement "Wetlands Functions and Values: A Descriptive Approach".

U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS). 1982. National list of scientific plant names.

ATTACHMENT 1
PHOTOGRAPHS



**PHOTO 1 – CODDINGTON COVE RUBBLE FILL AREA
UPSTREAM END NEAR STORMWATER CULVERT
10/06/11**



**PHOTO 2 – CODDINGTON COVE RUBBLE FILL AREA
RACCOON PRINTS
10/06/11**



**PHOTO 3 – CODDINGTON COVE RUBBLE FILL AREA
STREAM CHANNEL, LOOKING UPSTREAM
10/06/11**



**PHOTO 4 – CODDINGTON COVE RUBBLE FILL AREA
PHRAGMITES VEGETATION, ADJACENT TO STREAM CHANNEL
10/06/11**



**PHOTO 5 – CODDINGTON COVE RUBBLE FILL AREA
OLD FENCE IN STREAM CHANNEL, TRAPS VEGETATION AND DEBRIS
10/06/11**



**PHOTO 6 – CODDINGTON COVE RUBBLE FILL AREA
FROM STREAM, LOOKING UPSLOPE
ASIATIC BITTERSWEET VINE COVERS FOREGROUND
10/06/11**



**PHOTO 7 – CODDINGTON COVE RUBBLE FILL AREA
VIEW OF SHRUB-LIKE HONEYSUCKLE SPECIES
10/06/11**



**PHOTO 8 – CODDINGTON COVE RUBBLE FILL AREA
RUBBLE FILL DEBRIS EXPOSED ALONG RIDGE NEAR EDGE OF WETLAND
10/06/11**



**PHOTO 9 – CODDINGTON COVE RUBBLE FILL AREA
UPLAND FILL AREA (1)
10/06/11**



**PHOTO 10 – CODDINGTON COVE RUBBLE FILL AREA
UPLAND FILL AREA (2)
10/06/11**



**PHOTO 11 – CODDINGTON COVE RUBBLE FILL AREA
VIEW OF WETLAND FROM RIDGE (1)
10/06/11**



**PHOTO 12 – CODDINGTON COVE RUBBLE FILL AREA
VIEW OF WETLAND FROM RAILROAD TRACKS (1)
10/06/11**



**PHOTO 13 – CODDINGTON COVE RUBBLE FILL AREA
VIEW OF WETLAND FROM RAILROAD TRACKS (2)
10/06/11**



**PHOTO 14 – CODDINGTON COVE RUBBLE FILL AREA
REMAINS OF EASTERN COTTONTAIL IN UPLAND FILL AREA
10/06/11**

ATTACHMENT 2

WETLAND FUNCTIONS AND VALUES ASSESSMENT

- **COMPLETED WETLAND FUNCTION-VALUE EVALUATION FORM**
- **MAP OF PROJECT AREA**
- **AERIAL PHOTO MARK-UP OF PROJECT AREA**
- **PLANT SPECIES OBSERVED IN PROJECT AREA**
- **WILDLIFE SPECIES OBSERVED IN PROJECT AREA**

✗ altered
 ✗ wetland

Wetland Function-Value Evaluation Form

Total area of wetland ~3 ac. Human made? N* Is wetland part of a wildlife corridor? N or a "habitat island"? Y
 Adjacent land use residential, industrial, railroad Distance to nearest roadway or other development abutting parking
 Dominant wetland systems present PEM Contiguous undeveloped buffer zone present N
 Is the wetland a separate hydraulic system? N If not, where does the wetland lie in the drainage basin? (disturbed buffer landfill depression basin)
 How many tributaries contribute to the wetland? N/A Wildlife & vegetation diversity/abundance (see attached list)
stormwater & precipitation sources Tables 1 + 2

Wetland I.D. Coddington Cove
 Latitude 41° 31' 13.24" N Longitude 71° 18' 43.69" W
 Prepared by: SW Date 10-6-11
 Wetland Impact:
 Type _____ Area _____
 Evaluation based on:
 Office Field
 Corps manual wetland delineation completed? Y N

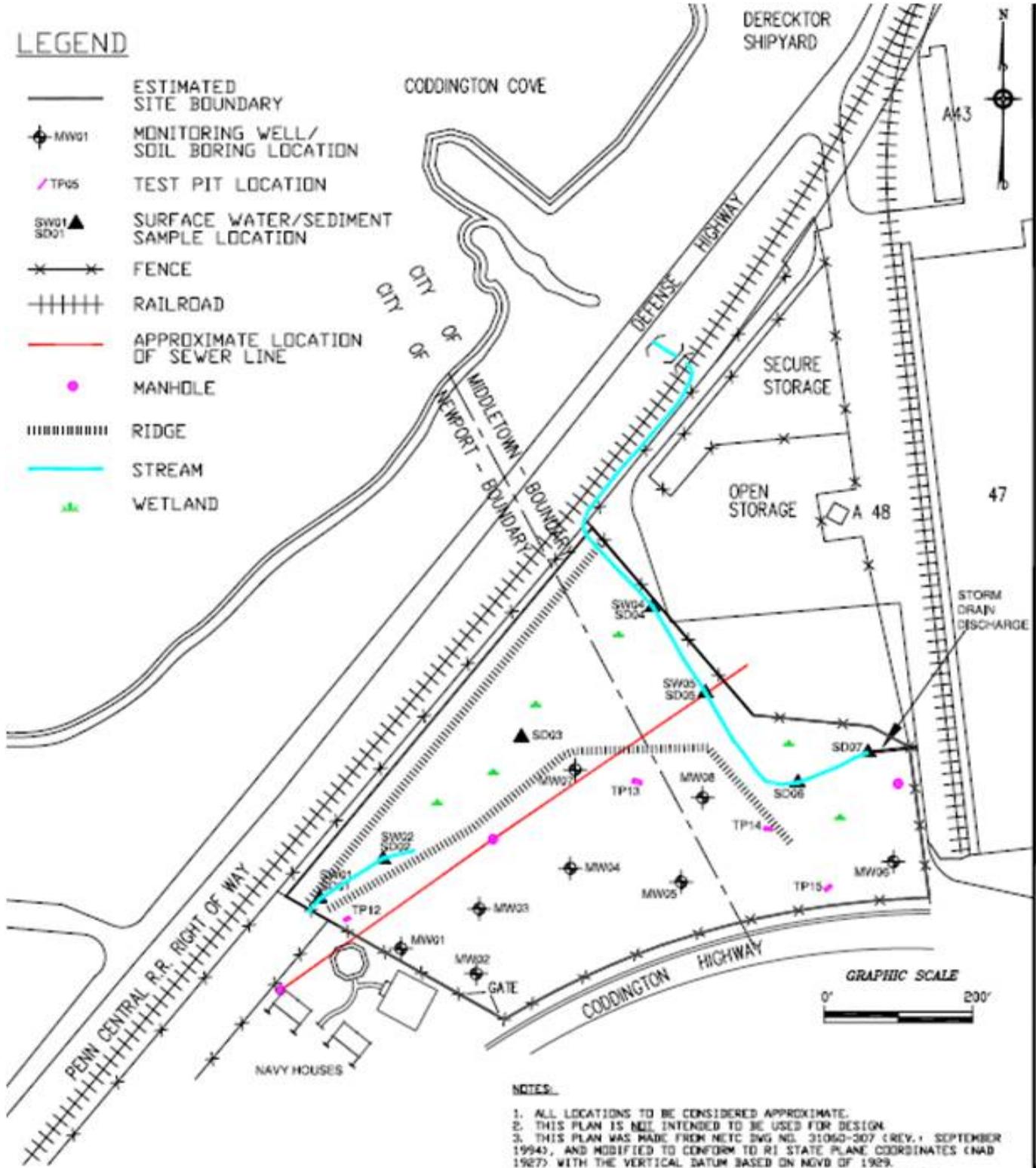
Function/Value	Suitability		Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
	Y	N			
Groundwater Recharge/Discharge	X		4, 5, 7, 8, 9, 15		Signs of variable water level assoc. w/ flooding (wreck line). Constricted outlet. **Notes
Floodflow Alteration	X		3, 4, 5, 6, 7, 8, 9, 13, 14, 15, 16, 18, 10	X	Same as above, plus ✗ has flood storage capacity. Impervious surface & little to no flood storage upslope.
Fish and Shellfish Habitat		X	8		Source water - stormwater & precip. Outlet constricted. Intermittent stream. Fish & shellfish habitat absent.
Sediment/Toxicant Retention	X		2, 3, 4, 5, 8, 10, 11, 12, 14, 15, 16, 9	X	Potential toxicants (CPAHs assoc w/ roads) upslope of ✗. Dense Phragmites provides opportunity for sediment trapping.
Nutrient Removal	X		3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14		Potential for sediment trapping exists. Unknown whether excess nutrients are present in the watershed upslope of ✗.
Production Export	X		2, 4, 7, 10, 11, 14, 5		Use of ✗ by higher trophic level consumers is minor. No signs of production export. "Flushing" assumed following storm event.
Sediment/Shoreline Stabilization	X		1, 5, 7, 9, 12, 15		Distinct shoreline bank is limited in extent, becoming diffuse. Partially channelized flow. Dense vegetation stabilizes sediments.
Wildlife Habitat	X		8, 13, 17, 19		Food sources predominantly invasive or weed species. Raccoon tracks. Muskrat encounter (suspected). Insect population in Phrag. likely high.
Recreation		X	N/A		Access to site is restricted. Not intended to provide recreation opportunities.
Educational/Scientific Value		X	N/A		Not a potential educational site.
Uniqueness/Heritage		X	1, 2, 7		Not enough to be considered of unique or heritage value.
Visual Quality/Aesthetics		X	6		Surrounding land use is developed, industrial & residential. Low visual quality/aesthetic because predom. invasive & weed species.
ES Endangered Species Habitat		X	N/A		No known rare species in vicinity of Project area (RI DEM, Environmental Resource Map)
Other					

Notes: ** The overburden groundwater appears to flow towards the ✗, as determined from groundwater elevation readings from the site monitoring wells.

* Refer to backup list of numbered considerations.

LEGEND

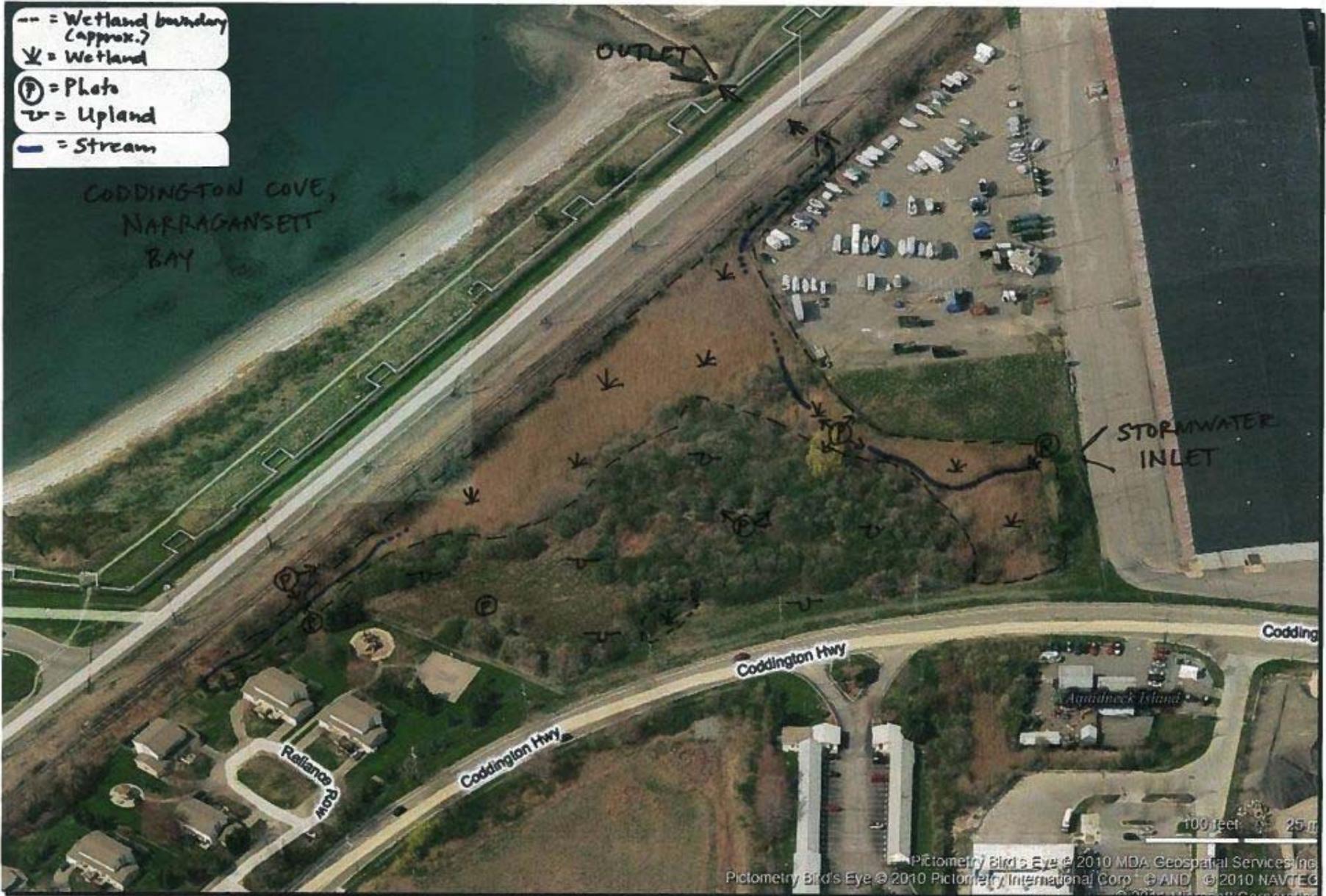
- ESTIMATED SITE BOUNDARY
- ◆ MW01 MONITORING WELL/ SOIL BORING LOCATION
- / TP05 TEST PIT LOCATION
- ▲ SW01 ▲ SD01 SURFACE WATER/SEDIMENT SAMPLE LOCATION
- ✕✕✕✕ FENCE
- ++++ RAILROAD
- APPROXIMATE LOCATION OF SEWER LINE
- MANHOLE
- |||||| RIDGE
- STREAM
- ▲ WETLAND



NOTES:

1. ALL LOCATIONS TO BE CONSIDERED APPROXIMATE.
2. THIS PLAN IS NOT INTENDED TO BE USED FOR DESIGN.
3. THIS PLAN WAS MADE FROM NCTC DWG NO. 31050-207 (REV. 1 SEPTEMBER 1994), AND MODIFIED TO CONFORM TO RI STATE PLANE COORDINATES (NAD 1983) WITH THE VERTICAL DATUM BASED ON MVD OF 1929.
4. SAMPLE LOCATIONS SURVEYED BY LOUIS FEDERICI ASSOCIATES, MARCH 15, 2011. HORIZONTAL DATUM BASED ON NAD 1983, HELD HORIZONTAL CONTROL POINTS NOS NE 001 AND BISHOP 2.

SITE 04, CODDINGTON COVE RUBBLE FILL AREA, NAVSTA NEWPORT, RI



WETLAND FUNCTIONS & VALUES ASSESSMENT

06 OCTOBER 2011

TABLE 1

**PLANT SPECIES OBSERVED IN PROJECT AREA
SITE 04, CODDINGTON COVE RUBBLE FILL AREA
NAVSTA NEWPORT, NEWPORT, RI**

Scientific Name	Common Name	Plant Type ¹	Location
<i>Acer platanooides</i>	Norway maple	Tree	Upland fill area
<i>Achillea millefolium</i>	Common yarrow	Herbaceous	Upland fill area
<i>Aster vimineus</i>	Small white aster	Herbaceous	Upland fill area
<i>Carex scoparia</i>	Broom Sedge	Herbaceous	Tire-rut wetlands
<i>Celastrus orbiculatus</i>	Oriental or Asiatic bittersweet	Vine	Upland fill area
<i>Centaurea</i> spp.	Knapweed species	Herbaceous	Upland fill area
<i>Cyperus strigosus</i>	Strawcolored flatsedge	Herbaceous	Tire-rut wetlands
<i>Elaeagnus umbellata</i>	Autumn olive	Shrub	Upland fill area
<i>Impatiens capensis</i>	Jewelweed	Herbaceous	Wetland fringe
<i>Juncus effusus</i>	Soft rush	Herbaceous	Tire-rut wetlands
<i>Lonicera</i> spp.	Shrub-like honeysuckle species	Shrub	Upland fill area
<i>Lythrum salicaria</i>	Purple Loosestrife	Herbaceous	Tire-rut wetlands
<i>Parthenocissus quinquefolia</i>	Virginia creeper	Vine	Upland fill area
<i>Phragmites australis</i>	Common reed	Herbaceous	Wetland
<i>Phytolacca americana</i>	American pokeweed	Herbaceous	Upland fill area
<i>Polygonum cuspidatum</i>	Japanese knotweed	Herbaceous	Upland fill area
<i>Polygonum ramosissimum</i>	Bushy knotweed	Herbaceous	Tire-rut wetlands
<i>Populus tremuloides</i>	Quaking aspen	Tree	Wetland fringe
<i>Prunus</i> spp.	Cherry species	Tree or Shrub	Upland fill area
<i>Quercus alba</i>	White oak	Tree	Upland fill area
<i>Rhus typhina</i>	Staghorn sumac	Tree or Shrub	Upland fill area
<i>Rosa multiflora</i>	Multiflora rose	Vine or Subshrub	Upland fill area
<i>Rubus</i> spp.	Blackberry species	Subshrub	Upland fill area
<i>Salix discolor</i>	Pussy willow	Tree	Wetland fringe
<i>Salix</i> spp.	Willow species	Tree	Wetland fringe
<i>Setaria</i> spp.	Foxtail species	Herbaceous	Tire-rut wetlands
<i>Solanum dulcamara</i>	Bittersweet nightshade	Vine	Wetland fringe
<i>Solidago rugosa</i>	Rough-stemmed goldenrod	Herbaceous	Upland fill area
<i>Tanacetum vulgare</i>	Common tansy	Herbaceous	Upland fill area
<i>Toxicodendron radicans</i>	Eastern poison ivy	Herbaceous	Wetland fringe
<i>Urtica dioica</i>	Stinging nettle	Herbaceous	Wetland fringe
<i>Viburnum recognitum</i>	Northern arrowwood	Shrub	Wetland fringe
<i>Woodwardia areolata</i>	Netted chainfern	Herbaceous	Wetland

Bold = Invasive and Noxious Weed Species, according to USDA NRCS Plants Database, Weeds of the U.S., available: <http://plants.usda.gov/java/invasiveOne>.

¹ Growth Habits Codes and Definitions from USDA NRCS Plants website, available: http://plants.usda.gov/growth_habits_def.html

TABLE 2
WILDLIFE SPECIES OBSERVED IN PROJECT AREA
SITE 04, CODDINGTON COVE RUBBLE FILL AREA
NAVSTA NEWPORT, NEWPORT, RI

Scientific Name	Common Name
Birds	
<i>Cardinalis cardinalis</i>	Northern cardinal
<i>Carduelis tristis</i>	American goldfinch
<i>Cyanocitta cristata</i>	Blue jay
<i>Dumetella carolinensis</i>	Gray catbird
<i>Larus argentatus</i>	European herring gull ¹
<i>Melospiza melodia</i>	Song sparrow
<i>Picoides pubescens</i>	Downy woodpecker
<i>Turdus migratorius</i>	American robin
<i>Tyrannus tyrannus</i>	Eastern kingbird
<i>Zenaida macroura</i>	Mourning dove
Mammals	
<i>Procyon lotor</i>	Raccoon
<i>Ondatra zibethicus</i>	Muskrat (suspected)
<i>Sylvilagus floridanus</i>	Eastern cottontail
<i>Vulpes vulpes</i>	Red fox (potential, not observed)
Invertebrates	
<i>Apis</i> spp.	Honey bee
<i>Danaus plexippus</i>	Monarch butterfly

¹ – Fly over only

ATTACHMENT 3

HIGHWAY METHOD RATIONALE REFERENCE NUMBER DESCRIPTIONS

Attachment 3

Wetland evaluation supporting documentation; from USACE 1999.

Below is an example list of considerations that was used for a New Hampshire highway project. Considerations are flexible, based on best professional judgment and interdisciplinary team consensus. This example provides a comprehensive base, however, and may only need slight modifications for use in other projects.



GROUNDWATER RECHARGE/DISCHARGE— This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either.

CONSIDERATIONS/QUALIFIERS

1. Public or private wells occur downstream of the wetland.
2. Potential exists for public or private wells downstream of the wetland.
3. Wetland is underlain by stratified drift.
4. Gravel or sandy soils present in or adjacent to the wetland.
5. Fragipan does not occur in the wetland.
6. Fragipan, impervious soils, or bedrock does occur in the wetland.
7. Wetland is associated with a perennial or intermittent watercourse.
8. Signs of groundwater recharge are present or piezometer data demonstrates recharge.
9. Wetland is associated with a watercourse but lacks a defined outlet or contains a constricted outlet.
10. Wetland contains only an outlet, no inlet.
11. Groundwater quality of stratified drift aquifer within or downstream of wetland meets drinking water standards.
12. Quality of water associated with the wetland is high.
13. Signs of groundwater discharge are present (e.g., springs).
14. Water temperature suggests it is a discharge site.
15. Wetland shows signs of variable water levels.
16. Piezometer data demonstrates discharge.
17. Other



FLOODFLOW ALTERATION (Storage & Desynchronization) — This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas.

CONSIDERATIONS/QUALIFIERS

1. Area of this wetland is large relative to its watershed.
2. Wetland occurs in the upper portions of its watershed.
3. Effective flood storage is small or non-existent upslope of or above the wetland.
4. Wetland watershed contains a high percent of impervious surfaces.
5. Wetland contains hydric soils which are able to absorb and detain water.
6. Wetland exists in a relatively flat area that has flood storage potential.
7. Wetland has an intermittent outlet, ponded water, or signs are present of variable water level.
8. During flood events, this wetland can retain higher volumes of water than under normal or average rainfall conditions.
9. Wetland receives and retains overland or sheet flow runoff from surrounding uplands.
10. In the event of a large storm, this wetland may receive and detain excessive flood water from a nearby watercourse.
11. Valuable properties, structures, or resources are located in or near the floodplain downstream from the wetland.
12. The watershed has a history of economic loss due to flooding.
13. This wetland is associated with one or more watercourses.
14. This wetland watercourse is sinuous or diffuse.
15. This wetland outlet is constricted.
16. Channel flow velocity is affected by this wetland.
17. Land uses downstream are protected by this wetland.
18. This wetland contains a high density of vegetation.
19. Other

FISH AND SHELLFISH HABITAT (FRESHWATER) — This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat.



CONSIDERATIONS/QUALIFIERS

1. Forest land dominant in the watershed above this wetland.
2. Abundance of cover objects present.

STOP HERE IF THIS WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE

3. Size of this wetland is able to support large fish/shellfish populations.
4. Wetland is part of a larger, contiguous watercourse.
5. Wetland has sufficient size and depth in open water areas so as not to freeze solid and retain some open water during winter.
6. Stream width (bank to bank) is more than 50 feet.
7. Quality of the watercourse associated with this wetland is able to support healthy fish/shellfish populations.
8. Streamside vegetation provides shade for the watercourse.
9. Spawning areas are present (submerged vegetation or gravel beds).
10. Food is available to fish/shellfish populations within this wetland.
11. Barrier(s) to anadromous fish (such as dams, including beaver dams, waterfalls, road crossing) are absent from the stream reach associated with this wetland.
12. Evidence of fish is present.
13. Wetland is stocked with fish.
14. The watercourse is persistent.
15. Man-made streams are absent.
16. Water velocities are not too excessive for fish usage.
17. Defined stream channel is present.
18. Other

Although the above example refers to freshwater wetlands, it can also be adapted for marine ecosystems. The following is an example provided by the National Marine Fisheries Service (NMFS) of an adaptation for the fish and shellfish function.

FISH AND SHELLFISH HABITAT (MARINE) — This function considers the effectiveness of wetlands, embayments, tidal flats, vegetated shallows, and other environments in supporting marine resources such as fish, shellfish, marine mammals, and sea turtles.

CONSIDERATIONS/QUALIFIERS

1. Special aquatic sites (tidal marsh, mud flats, eelgrass beds) are present.
2. Suitable spawning habitat is present at the site or in the area.
3. Commercially or recreationally important species are present or suitable habitat exists.
4. The wetland/waterway supports prey for higher trophic level marine organisms.
5. The waterway provides migratory habitat for anadromous fish.
6. Essential fish habitat, as defined by the 1996 amendments to the Magnuson-Stevens Fishery & Conservation Act, is present (consultation with NMFS may be necessary).
7. Other



SEDIMENT/TOXICANT/PATHOGEN RETENTION — This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas.

CONSIDERATIONS/QUALIFIERS

1. Potential sources of excess sediment are in the watershed above the wetland.
2. Potential or known sources of toxicants are in the watershed above the wetland.
3. Opportunity for sediment trapping by slow moving water or deepwater habitat are present in this wetland.
4. Fine grained mineral or organic soils are present.
5. Long duration water retention time is present in this wetland.
6. Public or private water sources occur downstream.
7. The wetland edge is broad and intermittently aerobic.
8. The wetland is known to have existed for more than 50 years.
9. Drainage ditches have not been constructed in the wetland.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

10. Wetland is associated with an intermittent or perennial stream or a lake.
11. Channelized flows have visible velocity decreases in the wetland.
12. Effective floodwater storage in wetland is occurring. Areas of impounded open water are present.
13. No indicators of erosive forces are present. No high water velocities are present.
14. Diffuse water flows are present in the wetland.
15. Wetland has a high degree of water and vegetation interspersion.
16. Dense vegetation provides opportunity for sediment trapping and/or signs of sediment accumulation by dense vegetation is present.
17. Other



NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

CONSIDERATIONS/QUALIFIERS

1. Wetland is large relative to the size of its watershed.
2. Deep water or open water habitat exists.
3. Overall potential for sediment trapping exists in the wetland.

4. Potential sources of excess nutrients are present in the watershed above the wetland.
5. Wetland saturated for most of the season. Pondered water is present in the wetland.
6. Deep organic/sediment deposits are present.
7. Slowly drained fine grained mineral or organic soils are present.
8. Dense vegetation is present.
9. Emergent vegetation and/or dense woody stems are dominant.
10. Opportunity for nutrient attenuation exists.
11. Vegetation diversity/abundance sufficient to utilize nutrients.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

12. Waterflow through this wetland is diffuse.
13. Water retention/detention time in this wetland is increased by constricted outlet or thick vegetation.
14. Water moves slowly through this wetland.
15. Other

PRODUCTION EXPORT (Nutrient) — This function evaluates the effectiveness of the wetland to produce food or usable products for humans or other living organisms.



CONSIDERATIONS/QUALIFIERS

1. Wildlife food sources grow within this wetland.
2. Detritus development is present within this wetland.
3. Economically or commercially used products found in this wetland.
4. Evidence of wildlife use found within this wetland.
5. Higher trophic level consumers are utilizing this wetland.
6. Fish or shellfish develop or occur in this wetland.
7. High vegetation density is present.
8. Wetland exhibits high degree of plant community structure/species diversity.
9. High aquatic vegetative diversity/abundance is present.
10. Nutrients exported in wetland watercourses (permanent outlet present).
11. “Flushing” of relatively large amounts of organic plant material occurs from this wetland.
12. Wetland contains flowering plants that are used by nectar-gathering insects.
13. Indications of export are present.
14. High production levels occurring, however, no visible signs of export (assumes export is attenuated).
15. Other

SEDIMENT/ShORELINE STABILIZATION — This function considers the effectiveness of a wetland to stabilize streambanks and shorelines against erosion.



CONSIDERATIONS/QUALIFIERS

1. Indications of erosion or siltation are present.
2. Topographical gradient is present in wetland.
3. Potential sediment sources are present up-slope.
4. Potential sediment sources are present upstream.
5. No distinct shoreline or bank is evident between the waterbody and the wetland or upland.
6. A distinct step between the open waterbody or stream and the adjacent land exists (i.e., sharp bank) with dense roots throughout.
7. Wide wetland (>10') borders watercourse, lake, or pond.
8. High flow velocities in the wetland.
9. The watershed is of sufficient size to produce channelized flow.
10. Open water fetch is present.
11. Boating activity is present.
12. Dense vegetation is bordering watercourse, lake, or pond.
13. High percentage of energy-absorbing emergents and/or shrubs border a watercourse, lake, or pond.
14. Vegetation is comprised of large trees and shrubs that withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).
15. Vegetation is comprised of a dense resilient herbaceous layer that stabilizes sediments and the shoreline on a small scale (inches) during minor flood events or potentially erosive events.
16. Other



WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.¹

CONSIDERATIONS/QUALIFIERS

1. Wetland is not degraded by human activity.
2. Water quality of the watercourse, pond, or lake associated with this wetland meets or exceeds Class A or B standards.
3. Wetland is not fragmented by development.
4. Upland surrounding this wetland is undeveloped.
5. More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g., brushland, woodland, active farmland, or idle land) at least 500 feet in width.
6. Wetland is contiguous with other wetland systems connected by a watercourse or lake.
7. Wildlife overland access to other wetlands is present.
8. Wildlife food sources are within this wetland or are nearby.
9. Wetland exhibits a high degree of interspersed vegetation classes and/or open water.
10. Two or more islands or inclusions of upland within the wetland are present.
11. Dominant wetland class includes deep or shallow marsh or wooded swamp.
12. More than three acres of shallow permanent open water (less than 6.6 feet deep), including streams in or adjacent to wetland, are present.
13. Density of the wetland vegetation is high.
14. Wetland exhibits a high degree of plant species diversity.
15. Wetland exhibits a high degree of diversity in plant community structure (e.g., tree/shrub/vine/grasses/mosses)
16. Plant/animal indicator species are present. (List species for project)
17. Animal signs observed (tracks, scats, nesting areas, etc.)
18. Seasonal uses vary for wildlife and wetland appears to support varied population diversity/abundance during different seasons.
19. Wetland contains or has potential to contain a high population of insects.
20. Wetland contains or has potential to contain large amphibian populations.
21. Wetland has a high avian utilization or its potential.
22. Indications of less disturbance-tolerant species are present.
23. Signs of wildlife habitat enhancement are present (birdhouses, nesting boxes, food sources, etc.).
24. Other

¹In March 1995, a rapid wildlife habitat assessment method was completed by a University of Massachusetts research team with funding and oversight provided by the New England Transportation Consortium. The method is called WEThings (wetland habitat indicators for non-game species). It produces a list of potential wetland-dependent mammal, reptile, and amphibian species that may be present in the wetland. The output is based on observable habitat characteristics documented on the field data form. This method may be used to generate the wildlife species list recommended as backup information to the wetland evaluation form and to augment the considerations. Use of this method should first be coordinated with the Corps project manager. A computer program is also available to expedite this process.

RECREATION (Consumptive and Non-Consumptive) — This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive opportunities do not consume or diminish these resources of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Wetland is part of a recreation area, park, forest, or refuge.
2. Fishing is available within or from the wetland.
3. Hunting is permitted in the wetland.
4. Hiking occurs or has potential to occur within the wetland.
5. Wetland is a valuable wildlife habitat.
6. The watercourse, pond, or lake associated with the wetland is unpolluted.
7. High visual/aesthetic quality of this potential recreation site.
8. Access to water is available at this potential recreation site for boating, canoeing, or fishing.
9. The watercourse associated with this wetland is wide and deep enough to accommodate canoeing and/or non-powered boating.
10. Off-road public parking available at the potential recreation site.
11. Accessibility and travel ease is present at this site.
12. The wetland is within a short drive or safe walk from highly populated public and private areas.
13. Other

EDUCATIONAL/SCIENTIFIC VALUE — This value considers the suitability of the wetland as a site for an “outdoor classroom” or as a location for scientific study or research.



CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened, rare, or endangered species.
2. Little or no disturbance is occurring in this wetland.
3. Potential educational site contains a diversity of wetland classes which are accessible or potentially accessible.
4. Potential educational site is undisturbed and natural.
5. Wetland is considered to be a valuable wildlife habitat.
6. Wetland is located within a nature preserve or wildlife management area.
7. Signs of wildlife habitat enhancement present (bird houses, nesting boxes, food sources, etc.).
8. Off-road parking at potential educational site suitable for school bus access in or near wetland.
9. Potential educational site is within safe walking distance or a short drive to schools.
10. Potential educational site is within safe walking distance to other plant communities.
11. Direct access to perennial stream at potential educational site is available.
12. Direct access to pond or lake at potential educational site is available.
13. No known safety hazards exist within the potential educational site.
14. Public access to the potential educational site is controlled.
15. Handicap accessibility is available.
16. Site is currently used for educational or scientific purposes.
17. Other

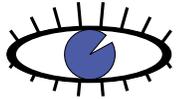


UNIQUENESS/HERITAGE — This value considers the effectiveness of the wetland or its associated waterbodies to provide certain special values. These may include archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location. These functions are clearly valuable wetland attributes relative to aspects of public health, recreation, and habitat diversity.

CONSIDERATIONS/QUALIFIERS

1. Upland surrounding wetland is primarily urban.
2. Upland surrounding wetland is developing rapidly.
3. More than 3 acres of shallow permanent open water (less than 6.6 feet deep), including streams, occur in wetlands.
4. Three or more wetland classes are present.
5. Deep and/or shallow marsh or wooded swamp dominate.
6. High degree of interspersion of vegetation and/or open water occur in this wetland.
7. Well-vegetated stream corridor (15 feet on each side of the stream) occurs in this wetland.
8. Potential educational site is within a short drive or a safe walk from schools.
9. Off-road parking at potential educational site is suitable for school buses.
10. No known safety hazards exist within this potential educational site.
11. Direct access to perennial stream or lake exists at potential educational site.
12. Two or more wetland classes are visible from primary viewing locations.
13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) are visible from primary viewing locations.
14. Half an acre of open water or 200 feet of stream is visible from the primary viewing locations.
15. Large area of wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
16. General appearance of the wetland visible from primary viewing locations is unpolluted and/or undisturbed.
17. Overall view of the wetland is available from the surrounding upland.
18. Quality of the water associated with the wetland is high.
19. Opportunities for wildlife observations are available.
20. Historical buildings are found within the wetland.
21. Presence of pond or pond site and remains of a dam occur within the wetland.
22. Wetland is within 50 yards of the nearest perennial watercourse.
23. Visible stone or earthen foundations, berms, dams, standing structures, or associated features occur within the wetland.
24. Wetland contains critical habitat for a state- or federally-listed threatened or endangered species.
25. Wetland is known to be a study site for scientific research.
26. Wetland is a natural landmark or recognized by the state natural heritage inventory authority as an exemplary natural community.
27. Wetland has local significance because it serves several functional values.
28. Wetland has local significance because it has biological, geological, or other features that are locally rare or unique.
29. Wetland is known to contain an important archaeological site.
30. Wetland is hydrologically connected to a state or federally designated scenic river.
31. Wetland is located in an area experiencing a high wetland loss rate.
32. Other

VISUAL QUALITY/AESTHETICS — This value considers the visual and aesthetic quality or usefulness of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Multiple wetland classes are visible from primary viewing locations.
2. Emergent marsh and/or open water are visible from primary viewing locations.
3. A diversity of vegetative species is visible from primary viewing locations.
4. Wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
5. Land use surrounding the wetland is undeveloped as seen from primary viewing locations.
6. Visible surrounding land use form contrasts with wetland.
7. Wetland views absent of trash, debris, and signs of disturbance.
8. Wetland is considered to be a valuable wildlife habitat.
9. Wetland is easily accessed.
10. Low noise level at primary viewing locations.
11. Unpleasant odors absent at primary viewing locations.
12. Relatively unobstructed sight line exists through wetland.
13. Other

ENDANGERED SPECIES HABITAT — This value considers the suitability of the wetland to support threatened or endangered species.

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CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened or endangered species.
2. Wetland contains critical habitat for a state or federally listed threatened or endangered species.