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NAS SOUTH WEYMOUTH
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LETTER REGARDING THE SPRING 2014 WETLAND INSPECTION WEST GATE LANDFILL
NAS SOUTH WEYMOUTH MA
08/04/2014
TETRA TECH



TETRA TECH

C-NAVY-08-14-5389W

August 4, 2014

Project Number G04642

Mr. Brian Helland, RPM
BRAC PMO, East
4911 South Broad Street
Philadelphia, Pennsylvania 19112

Reference: CLEAN Contract No. N62472-03-D-0057
Contract Task Order (CTO) No. 0166

Subject: West Gate Landfill – Spring 2014 Wetland Inspection
Former Naval Air Station South Weymouth, Weymouth, Massachusetts

Dear Mr. Helland:

This letter documents the results of the spring 2014 West Gate Landfill (WGL) post-restoration wetland inspection conducted by Tetra Tech, Inc. on June 10, 2014. The purpose of the spring site visit was to conduct an early growing-season assessment of the restored and created wetland areas, locate and count planted trees and shrubs, and assess water table levels across the wetland. Additionally, a New England District of the United States Army Corps of Engineers Highway Methodology Functions and Values Assessment (referred to here as the Functions and Values Assessment [FVA]) was completed to assess changes and improvements in the wetland over the last 5 years.

The spring 2014 wetland inspection was conducted as part of the monitoring program for the Site that includes spring and late summer/early fall wetland inspections. An annual wetland monitoring report, which will summarize the spring and fall inspections and the FVA and provide recommendations regarding the need for further monitoring, will be prepared upon completion of the late summer/early fall inspection. The spring 2014 wetland inspection was performed in accordance with the Final 100% Design Restoration Plan (Shaw, 2010) and Wetland Restoration Plan Addendum (Tetra Tech, 2012) and following procedures generally consistent with the post-restoration wetland inspections performed at Area of Concern (AOC) 55C, the Rubble Disposal Area, and AOC 8.

Selected photographs are provided in Attachment A; monitoring evaluation forms are provided in Attachment B; the FVA form is in Attachment C; and the FVA list of considerations explaining each potential function is provided in Attachment D. The methods used and findings of the spring 2014 inspection are summarized below.

Methods

A meandering survey was employed to: identify the presence of invasive species; identify and qualitatively assess the condition of the plant species present; and identify any other potential issues that could affect project success.

A soil test pit was dug at each plot location to determine depth to water. Soil texture and color were recorded as well.

The FVA was conducted according to the standards of the New England District of the United States Army Corps of Engineers Highway Methodology FVA. This is a qualitative review of the current vegetative and hydrologic conditions on site and potential ecological, scientific, or economic values of the wetland. These results were compared with the results of the 2009 Pre-Design Investigation FVA.

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wetland. These results were compared with the results of the 2009 Pre-Design Investigation FVA.

Findings

Herbaceous Vegetation: The cover of broadleaf cattail at WGL was similar to the previous survey period. The area of created and restored wetlands along the southwestern edge of WGL was effectively a dense monoculture of cattail. Trace amounts of beggartick and marsh bedstraw were observed in the cattail stands. A small area near the middle of WGL, near plot R2, appeared to have held standing water in the spring, with little to no cattail or other herbaceous vegetation growing.

The central to southeast extent of the wetland is almost entirely vegetated. The dominant herbaceous species observed included cattail, beggartick, spike rush, rice cutgrass, barnyard grass, and foxtail grass. Unlike the 2013 spring, this area of wetland was not inundated, with little evidence of flooding during the 2014 spring.

Woody Vegetation: Under the Navy's Remedial Action Contract (RAC), woody species were planted in May of 2013. As part of the spring 2014 inspection at WGL, the field team conducted a woody stem count to determine the number of woody species present within the wetland; the results of that count are presented below.

Scientific Name	Common Name	Number Observed
<i>Acer rubrum</i>	Red Maple	24
<i>Clethra alnifolia</i>	Sweet Pepper Bush	14
<i>Spiraea alba</i>	White Meadowsweet	33
<i>Spiraea latifolia</i>	Broadleaved Meadowsweet	8
<i>Populus tremuloides</i>	Quaking Aspen	11
<i>Quercus palustris</i>	Pin Oak	22
<i>Salix bebbiana</i>	Bebb's Willow	80
<i>Viburnum dentatum</i>	Southern Arrowwood	14
<i>Ulmus rubra</i>	Slippery Elm	5
<i>Catalpa speciosa</i>	Northern Catalpa	1

TOTAL 212

Both planted and volunteer plants were observed. All willows counted were volunteer, and numbers presented here are approximate as the species was prevalent across the site. Slippery elm is also a volunteer species that appeared widely scattered across the southern end of the site. Numerous small red maple seedling volunteers were also present across the southern half of the wetland. Most of the maples on site appeared in good condition, with little to no defoliation or leaf damage from winter moths. The original design plan had a goal of planting 600 stems per acre [0.55 acres x 600 woody plants per acre = 330 woody plants], but the Wetland Restoration Plan Addendum completed in 2012 revised the goal of the monitoring to assure that there is a functioning wetland and not a forested wetland.

Invasive Species: Phragmites was observed at the northern edge and in the central portion of WGL in the fall of 2013 and was treated after the fall survey. During the spring 2014 inspection, *Phragmites* was still present in the central portion of the wetland, north of plot R3. No *Phragmites* was present along the northern edge of the wetland during the spring 2014 inspection. Sources of *Phragmites* are present in the surrounding landscape, including in the railroad right-of-way and ditches northwest of WGL.

Glossy buckthorn and Japanese knotweed are present in the immediate area surrounding the wetland, but were not observed in the wetland.

Water Levels: In contrast to the inundation present in 2013, little standing water was observed during the spring 2014 inspection. Only the northern-most soil test pit at R1 had standing water in the pit (1

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inch) after 10 minutes. Soil test pits R1 and R2 were saturated to 16 inches and R3 was saturated within the upper 5 inches. This was likely due to rainfall collection and infiltration, rather than any groundwater influence. R4, C1, and C2 on the southern half of WGL were not saturated. Standing water was present along the edge of the restored wetland in the northern half of WGL and was present near the stream corridor beyond the constructed wetland boundary along the southern portion of the wetland.

Functions and Values: The Highway Methodology Functions and Values rapid assessment method qualitatively rates the suitability of the wetland in regards to different ecological, cultural, and economic functions. Overall, WGL rated highly for 4 principal functions, including Groundwater Recharge/Discharge, Floodflow Alteration, Sediment/Toxicant Retention, and Wildlife Habitat. The wetland also met suitable characteristics for Educational/Scientific Value and Production Export.

These results are very similar to the results from the first FVA conducted for the Pre-Design Investigation in spring 2009. In 2009, the principle functions were Floodflow Alteration, Sediment/Toxicant Retention, and Wildlife Habitat. Groundwater Recharge/Discharge was added as a principle function in the 2014 evaluation because high water levels in the stream consistently impact flooding and water levels along the southwestern edge of WGL and the sandy soils present at the site meet three qualifiers for this function. The similarity in results between 2009 and 2014 indicates that the wetland continues to perform the same functions or values, but also has continued to develop wetland characteristics and vegetation structure over the last 5 years.

The Functions and Values forms and instructions are provided in Attachments C and D. Refer to the Wetland Evaluation: Supporting Documentation List of Considerations for a full description of each value.

If you have any questions regarding this information, please contact me at (978) 474-8434.

Very truly yours,



Stephen S. Parker
Project Manager

SSP

c: D. Barney, Navy (1)
C. Keating, EPA (1)
D. Chaffin, MassDEP (1)
P. Steinberg, Mabbett & Associates, Inc. (1)
P. Sortin, Abington (1)
M. Brennan, Weymouth (1)
M. Parsons, Rockland (1)
Tufts Library, Weymouth (1)
Public Library, Abington (1)
Public Library, Rockland (1)
Public Library, Hingham (1)
Chief Executive Officer, South Shore Tri-town Development Corp. (1)
RDM Data Manager (1 unbound, 1 CD)
J. Trepanowski, Tetra Tech (1)
G. Glenn, Tetra Tech (1)
File G04642-3.2 (1); G04642-8.0 (1)

Attachment A

Photographs

PHOTOGRAPHIC RECORD

Project: West Gate Landfill – Spring 2014 Wetland Inspection

Location: Formal Naval Air Station South Weymouth, Weymouth, Massachusetts



Photo No.: 1

Name: R1

Date: June 10, 2014

Photographer: K. Metcalf

Comments:

View of WGL looking south from Plot R1 on the north end of WGL. *Typha latifolia* dominated this end of the wetland.



Photo No.: 2

Name: R2

Date: June 10, 2014

Photographer: K. Metcalf

Comments:

Sparse vegetation cover at plot R2, result of high, standing water during spring.



Photo No.: 3

Name: R3

Date: June 10, 2014

Photographer: K. Metcalf

Comments:

View of plot R3, looking southwest.

PHOTOGRAPHIC RECORD

Project: West Gate Landfill – Spring 2014 Wetland Inspection

Location: Formal Naval Air Station South Weymouth, Weymouth, Massachusetts



Photo No.: 4
Name: R4
Date: June 10, 2014
Photographer: K. Metcalf
Comments:
View of plot R4 looking east.



Photo No.: 5
Name: C1
Date: June 10, 2014
Photographer: K. Metcalf
Comments:
View of C1 looking northwest from plot. Planted saplings and volunteer saplings thriving in area.



Photo No.: 6
Name: C1
Date: June 10, 2014
Photographer: K. Metcalf
Comments:
Plot C1 on the southeast end of the wetland. Immature grasses dominated the vegetation on this end of the wetland.

Attachment B

Evaluation Forms

**FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WESTGATE LANDFILL (WGL)
POST-REMEDIAL WETLANDS MONITORING**

Plot Number: R1

Investigator: K. Metcalf, D. Anderson

Date: 6/10/2014

VEGETATION

Plant Species	% Cover	Wetland Indicator Status
<i>Typha latifolia</i>	80%	OBL
<i>Bidens sp. frondosa</i>	17	FACW

* Dominant Species

Invasive Species

Total Percent Cover: 81%

% Cover by Non-invasives:

SOILS

Depth (in)	Horizon	Description	Matrix Color	Redox Features
0-10		Saturated sandy soil	10 YR 3/1	
10-16		silty loam U	10 YR 3/1	10 YR 2/1 (mottled)

Notes:

*include notes on hydrology, photo #s, % survival woody species, total veg cover

**presence, abundance, location of invasive species

Saturations all the way down pit,
standing water in bottom 1"

Plot is dominated by *Typha latifolia*, some small bare areas from standing water.

**FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WESTGATE LANDFILL (WGL)
POST-REMEDIAL WETLANDS MONITORING**

Plot Number: R2

Investigator: K. Metcalf, D. Anderson

Date: 6/10/2014

VEGETATION

Plant Species	% Cover	Wetland Indicator Status
<i>Bidens frondosa</i>	15%	FACW
<i>Lemna minor</i> (duckweed)	10%	OBL
<i>Typha latifolia</i>	5%	OBL

* Dominant Species
Invasive Species

Total Percent Cover: 30%
% Cover by Non-invasives:

SOILS

Depth (in)	Horizon	Description	Matrix Color	Redox Features
0-8		loamy sand	10YR 3/1	
8-16		loamy sand	10YR 2/1	10YR 6/3 (2%) redox concentrations

Notes: *include notes on hydrology, photo #s, % survival woody species, total veg cover
**presence, abundance, location of invasive species

Saturated to bottom of pit; no standing water.

Plot appears to have been flooded higher than is typical for spring. Sparse standing vegetation, ~ 60% typha. detritus in plot

**FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WESTGATE LANDFILL (WGL)
POST-REMEDIAL WETLANDS MONITORING**

Plot Number: R3

Investigator: K. Metcalf, D. Anderson

Date: 6/10/2014

VEGETATION

Plant Species	% Cover	Wetland Indicator Status
<i>Bidens frondosa</i>	30%	FACW
<i>Typha latifolia</i>	50%	OBL
<i>Lycopus uniflorus</i>	10%	OBL
<i>Lehna minor</i>	5%	OBL
Grass (<i>Echinochloa crus-galli</i> ?)	15%	FAC

* Dominant Species
Invasive Species

Total Percent Cover: 110%
% Cover by Non-invasives:

SOILS

Depth (in)	Horizon	Description	Matrix Color	Redox Features
0-5		loamy sand	10YR 3/2	
5-16		loamy sand	10YR 2/1	NONE

Notes: *include notes on hydrology, photo #s, % survival woody species, total veg cover
 **presence, abundance, location of invasive species
Surface saturation to 5" no saturation deeper. >100% vegetation cover, mix of young Typha & early summer grasses and herbs.

**FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WESTGATE LANDFILL (WGL)
POST-REMEDIAL WETLANDS MONITORING**

Plot Number: R4

Investigator: K. Metcalf, D. Anderson

Date: 6/10/2014

VEGETATION

Plant Species	% Cover	Wetland Indicator Status
<i>Typha latifolia</i>	50%	OBL
<i>Bidens frondosa</i>	10%	FACW
<i>Lemna minor</i>	10%	OBL
<i>Lycopus uniflorus</i>	15%	OBL

* Dominant Species
Invasive Species

Total Percent Cover: 85%
% Cover by Non-invasives:

SOILS

Depth (in)	Horizon	Description	Matrix Color	Redox Features
0-4		loamy sand	10YR 3/2	
		loamy sand	10YR 2/1	

Notes: *include notes on hydrology, photo #s, % survival woody species, total veg cover
**presence, abundance, location of invasive species
Saturated from top to 5", then not saturated to bottom of pit!

**FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WESTGATE LANDFILL (WGL)
POST-REMEDIAL WETLANDS MONITORING**

Plot Number: C2

Investigator: K. Metcalf, D. Anderson

Date: 6/10/2014

VEGETATION

Plant Species	% Cover	Wetland Indicator Status
<i>Bidens frondosa</i>	15%	FAcW
<i>Juncus effusus</i>	15%	OBL
<i>Clethra alnifolia</i>	5%	FAC
Rock - <i>Rumex crispus</i>	5%	FAC
Grass - (<i>Echinochloa crus-galli</i> ?)	40%	FAC
<i>Sernia minor</i>	5%	OBL
<i>Lycopus uniflorus</i>	10%	OBL
<i>Carex scaparia</i> (?)	5%	FACW

* Dominant Species
Invasive Species

Total Percent Cover: 100%
% Cover by Non-invasives:

SOILS

Depth (in)	Horizon	Description	Matrix Color	Redox Features
0-14		loamy sand, friable	10YR 2/2	

Notes: *include notes on hydrology, photo #s, % survival woody species, total veg cover
**presence, abundance, location of invasive species
No saturation friable soil. 100% vegetation cover by wetland species + grasses to young to be identified.

**FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WESTGATE LANDFILL (WGL)
POST-REMEDIAL WETLANDS MONITORING**

Plot Number: **C1**

Investigator: K. Metcalf, D. Anderson

Date: 6/10/2014

VEGETATION

Plant Species	% Cover	Wetland Indicator Status
<i>Bidens frondosa</i>	20%	FACW
<i>Clethra alnifolia</i>	15%	FAC
Grass - <i>Setaria pumila</i>	30%	FAC
<i>Polygonum pennsylvanicum</i>	10%	FACW
<i>Lycopus uniflorus</i>	5%	OBL
Dock - <i>Rumex crispus</i>	1%	FAC
<i>Ambrosia artemisiifolia</i> - ragweed	1%	FACU
<i>Polygonum persicaria</i>	5%	FAC

* Dominant Species
Invasive Species

Total Percent Cover: 87%
% Cover by Non-invasives:

SOILS

Depth (in)	Horizon	Description	Matrix Color	Redox Features
0-9		loamy sand	10 YR 2/2	
9-11		" "	10 YR 2/2	5YR 5/1
11-16		" "	5YR 5/1	

Notes: *include notes on hydrology, photo #s, % survival woody species, total veg cover
**presence, abundance, location of invasive species
No saturation soil is dry & friable. <100% vegetated, but will likely fill in w/ grasses by mid summer.

Attachment C

**Highway Methodology Functions and
Values Assessment Forms**

Wetland Function-Value Evaluation Form

Total area of wetland ~1.4ac Human made? Y Is wetland part of a wildlife corridor? N or a "habitat island"? N

Adjacent land use Landfill / forested Distance to nearest roadway or other development 200 ft

Dominant wetland systems present PFO 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? Adjacent to stream/floodplain

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland ID: WGL

Latitude _____ Longitude _____

Prepared by: KM Date: 6/10/14

Wetland Impact: Type Restoration 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		2, 4, 7, 8, 13, 15	X	Groundwater recharge area likely
Floodflow Alteration	X		6, 7, 8	X	Small area for excessive floodwater storage from stream
Fish and Shellfish Habitat		X	NA		
Sediment/Toxicant Retention	X		1, 2, 3, 4, 7, 10, 12	X	WGL has potential to trap sediments from the backfill + the stream to the southwest.
Nutrient Removal	X		3, 7, 8		Wetland is vegetated most of the season, positioned to trap sediment from WGL + roadway.
Production Export	X		1, 2, 4, 7,		Signs of use by deer, rabbits, various black birds, + amphibians through herbaceous veg. structure not very diverse
Sediment/Shoreline Stabilization		X	NA		
Wildlife Habitat	X		6, 7, 13, 17, 20	X	Evidence of breeding Am. Crows, some red-wing black birds nesting, deer tracks in area.
Recreation		X	12, 11		Wetland is close to housing/shopping area + Airtrak station
Educational/Scientific Value		X	11, 8, 10		Easy access to community nearby, little scientific opps. at site
Uniqueness/Heritage		X	2, 8, 9, 17		Restored/created wetland lacks uniqueness/heritage characteristics
Visual Quality/Aesthetics		X	3, 6, 9, 12		Wetland is easily viewed from the adjacent knoll, little community diversity in wetland
ES Endangered Species Habitat		X			WGL is not known to support any RTE species
Other					

Notes:

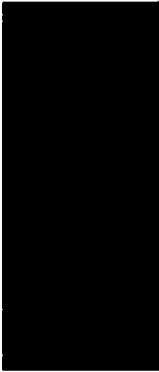
* Refer to backup list of numbered considerations.

Attachment D

New England District of the United States Army Corps of Engineers

Highway Methodology Functions and Values Assessment

Wetland Evaluation: Supporting Documentation List of Considerations



Appendix A

Wetland evaluation supporting documentation and reproducible forms.

Below is an example list of considerations that was used for a New Hampshire highway project. Considerations are flexible, based on best professional judgement 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.
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. Gravel or sandy soils present in or adjacent to wetland.
17. Piezometer data demonstrates discharge.
18. 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 degree 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 — This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat.¹

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 retains 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, water falls, road crossing, etc.) 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



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 erod-



ing 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. Mineral, fine grained, 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 is present by dense vegetation.
17. Other



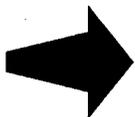
NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands, and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this 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 present in the watershed above the wetland.
5. Wetland saturated for most of the season. Poned water is present in the wetland.
6. Deep organic/sediment deposits are present.
7. Slowly drained mineral, fine grained, or organic soils, are present.
8. Dense vegetation is present.
9. Emergent vegetation and/or dense woody stems are dominant.
10. Aquatic diversity/abundance sufficient to utilize nutrients.
11. Opportunity for nutrient attenuation exists.
12. Vegetation diversity/abundance sufficient to utilize nutrients.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

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



PRODUCTION EXPORT (Nutrient) — This function evaluates the effectiveness of the wetland to produce food or usable products for man 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 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 which 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 stream banks and shorelines against erosion.



CONSIDERATIONS/QUALIFIERS

1. Indications of erosion, siltation present.
2. Topographical gradient is present in wetland.
3. Potential sediment sources are present up-slope.
4. No distinct shoreline or bank is evident between the waterbody and the wetland or upland.
5. A distinct step between the open waterbody or stream and the adjacent land exists (i.e. sharp bank) with dense roots throughout.
6. Wide wetland (>10') bordering watercourse, lake, or pond.
7. High flow velocities in the wetland.
8. Potential sediment sources present upstream.
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 bordering watercourse, lake or pond.
14. Vegetation comprised of large trees and shrubs which withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).
15. Vegetation comprised of dense resilient herbaceous layer which 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.²



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, wood land, active farmland, or idle land) at least 500 feet in width.
6. Wetland contiguous with other wetland systems connected by 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/etc.)
16. Plant/animal indicator species present.
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 present.
23. Signs of wildlife habitat enhancement present (birdhouses, nesting boxes, food sources, etc.).
24. Other



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 within safe walking distance to other plant communities.
11. Direct access to perennial stream at potential educational site available.
12. Direct access to pond or lake at potential educational site available.
13. No known safety hazards 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 primarily urban.
2. Upland surrounding wetland developing rapidly.
3. More than 3 acres of shallow permanent open water occur in wetlands (less than 6.6 feet deep) including streams .
4. Three or more wetland classes present.
5. Deep and/or shallow marsh, or wooded swamp dominate.
6. High degree of interspersion of vegetation and/or open water occurring 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 at potential educational site.
12. Two or more wetland classes visible from primary viewing locations.
13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) 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 which 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 occur within the wetland.
21. Presence of pond or pond site and remains of a dam occur within the wetland.
22. Wetland 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 which 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 visible from primary viewing locations.
2. Emergent marsh and/or open water visible from primary viewing locations.
3. Diversity of vegetation species visible from primary viewing locations.
4. Wetland dominated by flowering plants, or plants which 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

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

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.
3. Other

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

FISH AND SHELLFISH HABITAT — 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 (Marine)

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. Other
- 2 In 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 mammals, reptiles, 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.