

MITIGATION MONITORING REPORT TRANSMITTAL AND SELF-CERTIFICATION

DEPARTMENT OF THE ARMY PERMIT NUMBER: NAE-2010-0930
PROJECT TITLE: Jonathan E. Reed Elementary School

PERMITTEE: City of Waterbury Board of Education
MAILING ADDRESS: 236 Grand St.
Waterbury, CT 06702

TELEPHONE: 203-574-8012

AUTHORIZED AGENT: LandTech Consultants
MAILING ADDRESS: 518 Riverside Ave.
Westport, CT 06880

TELEPHONE: 203-454-2110

ATTACHED MITIGATION REPORT

TITLE: Annual Monitoring of Wetland Mitigation Area, Jonathan Reed Middle School
Monitoring Report 1 of 5

PREPARERS: Christopher Allan, P.W.S., LandTech

DATE: December 2016

CERTIFICATION OF COMPLIANCE: I certify that the attached report is accurate and discloses that the mitigation required by the Department of the Army Permit is in full compliance with the terms and conditions of that permit.

CORRECTIVE ACTION: A need for corrective action is not identified in the attached report.

CONSULTATION: I do not request consultation with the Corps of Engineers to discuss a corrective strategy or permit modification.

CERTIFIED: _____

(Signature of permittee)

2/1/2017
Date

Annual Monitoring of Wetland Mitigation Area

**Jonathan E. Reed Elementary School
33 Griggs Street
Waterbury, Connecticut**



**Monitoring Report 1 of 5
End of 2016 Growing Season - Year 1**

December 2016

Army Corps of Engineers Permit No: CENAE-R-2010-0930

Prepared for City of Waterbury, Board of Education

PROJECT OVERVIEW FORM

Corps Permit No.: NAE-2010-0930

Mitigation Site Name: Jonathan E. Reed Elementary School

Monitoring Report : 1 of 5

Name and Contact Information for Permittee and Agent:

Shannon Sullivan, City of Waterbury Board of Education

236 Grand St.

Waterbury, CT 06702

Name of Party Responsible for Conducting the Monitoring:

LandTech

518 Riverside Ave.

Westport, CT 06880

Dates of Inspections: March 23, 2016, July 12, 2016

Project Summary:

- Remediate impacted soil/sediments within the project area via excavation and off-site disposal, and placement of clean fill cover.
- Restore approximately 0.73 acres of the project area to a palustrine broad-leaved deciduous wetland, and 0.09 acres as a riverine upper perennial watercourse.
- Removal of the existing dam and subsequent installation of a step-pool stream channel in order to create a more natural flow regime, allowing for aquatic life migration, and increased downstream export of nutrients.
- Restore and/or enhance wetland functions and values including, but not limited to: sediment and toxicant retention, sediment and shoreline stabilization, and wildlife habitat.

Location of and Directions to Mitigation Site:

The property is located in at 33 Griggs Street in north-central Waterbury and is bounded by North Main Street, Griggs Street, Noera Street, and Hope Street. Take exit 22 off Route 84, continue onto Brass Mill Drive, continue straight onto Welton St, turn right onto Walnut St, turn left onto North Walnut St, Turn left onto Griggs St.

Start and Completion Dates for Mitigation:

Start Date: May 6, 2015

Completion Date: September 25, 2015

Performance Standards **are** being met:

During the first growing season (2016) indicators of hydrology were present that indicate likelihood of future development of hydric soil conditions. The majority of planted trees and shrubs show good survival and seeded areas are becoming established with herbaceous vegetation. Invasive plant species are presently under control. Stream banks are stable and natural sediment bars are developing along stream bends.

Dates of Corrective or Maintenance Activities Conducted Since Last Report:

N/A

Recommendations for Additional Remedial Actions:

No Remedial Actions required at this time

REQUIREMENTS

Monitoring requirements and performance standards were included in Section 9.0 of the *Mitigation Report* prepared by HRP dated April 22, 2014. According to the *Mitigation Report*, the site is to be monitored and annual monitoring reports submitted for each of the first five (5) full growing seasons following construction of the mitigation site. Observations are to occur at least two (2) times during the growing season – in late spring/early summer and again in late summer/early fall. Each annual monitoring report, in the format provided in the New England District Compensatory Mitigation Guidance, will be submitted to the Corps Regulatory Division, Policy Analysis and Technical Support Branch.

The specific wetland mitigation success standards require:

- A minimum of ninety percent (90%) of the mitigation area shall possess the hydrology sufficient to support the palustrine broad-leaved deciduous wetland, as characterized in Table 10: Wetland hydrology indicators for the Northcentral and Northeast Region on page 82 of the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)*, 2011.
- At the end of the five year monitoring period, the mitigation area shall have a minimum of sixty percent (60%) cover by native species, including a fifteen percent (15%) cover by wooded species.
- Soils shall have documented evidence of redoxymorphic features developing by the third year after construction. Indicator of reduction in soils (IRIS) tubes will be installed within the wetland area during the third year of monitoring to assess soil reduction. Documentation of hydric soil indicators will also be conducted in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)*, 2012.

The mitigation site was inspected by LandTech in the spring and summer of 2016. As of the summer 2016 inspection, the mitigation site was evaluated as trending toward achievement of the three listed success standards. Specifically, indicators of wetland hydrology were documented, the majority of planted trees and shrubs were found to be surviving and native herbaceous plants were becoming established. Based on presence of wetland hydrology indicators, future development of soil redoxymorphic features is anticipated.

2016 SUMMARY DATA

In accordance with permit conditions and the Mitigation Report, monitoring of the mitigation wetland commenced in 2016. Two monitoring inspections were completed in 2016, on March 23 and July 12. The Performance Standards included in the *Mitigation Report* include an evaluation of wetland mitigation area hydrology, soils and vegetation.

a. Hydrology

According to the *Mitigation Report*, the restored wetland receives the majority of water source from overbank flow, with an additional groundwater discharge component. Four piezometers were installed (two on each side of the restored stream channel) to monitor water levels. Measurements of depth to groundwater in the piezometers during the 2016 monitoring inspections are shown below.

Piezometer Readings – Depth of water from ground surface (inches)

Date	P1	P2	P3	P4
3/23/2016	36	37	50	39
7/12/2016	41	38	dry	*

*Piezometer absent

According to the *Mitigation Report*, during the monitoring period, a minimum of ninety percent (90%) of the mitigation area shall possess the hydrology sufficient to support the palustrine broad-leaved deciduous wetland, as characterized in Table 10: Wetland hydrology indicators for the Northcentral and Northeast Region on page 82 of the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (Version 2.0), 2011. The table of hydrology indicators is replicated below with two columns added to the right to show which indicators were observed during the monitoring inspections.

Wetland hydrology indicators for the Northcentral and Northeast Region

Indicator	Category		Observed	
	Primary	Secondary	3/23/16	7/12/16
Group A – Observation of Surface Water or Saturated Soils				
A1 – Surface water	X		X	
A2 – High water table	X		X	X
A3 – Saturation	X		X	X
Group B – Evidence of Recent Inundation				
B1 – Water marks	X		X	X
B2 – Sediment deposits	X		X	X
B3 – Drift deposits	X		X	X
B4 – Algal mat or crust	X			
B5 – Iron deposits	X			
B7 – Inundation visible on aerial imagery	X			

B8 – Sparsely vegetated concave surface	X			
B9 – Water-stained leaves	X			
B13 – Aquatic fauna	X			
B15 – Marl deposits	X			
B6 – Surface soil cracks		X		
B10 – Drainage patterns		X	X	X
B16 – Moss trim lines		X		
Group C – Evidence of Current or Recent Soil Saturation				
C1 – Hydrogen sulfide odor	X			
C3 – Oxidized rhizospheres along living roots	X			
C4 – Presence of reduced iron	X			
C6 – Recent iron reduction in tilled soils	X			
C7 – Thin muck surface	X			
C2 – Dry-season water table		X		X
C8 – Crayfish burrows		X		
C9 – Saturation visible on aerial imagery		X		
Group D – Evidence from Other Site Conditions or Data				
D1 – Stunted or stressed plants		X		
D2 – Geomorphic position		X	X	X
D3 – Shallow aquitard		X		
D4 – Microtopographic relief		X	X	X
D5 – FAC-neutral test		X		

A total of six primary and four secondary wetland hydrology indicators were observed in 2016. Shallow ponding in depressions within the restored wetland were observed in the March inspection. Surface saturation and shallow groundwater conditions were observed in the March and July investigations. Water marks, sediment deposits and drift deposits were observed near the stream.

b. Vegetation

According to the *Mitigation Report*, measurement of vegetation structure, such as number of strata present, tree basal area, tree density, shrub density, and herbaceous vegetation cover will provide a means for monitoring the success of vegetation in the mitigation area. At the end of the five year monitoring period, the mitigation area shall have a minimum of sixty percent (60%) cover by native species, including a fifteen percent (15%) cover by wooded species. The relative abundance of individuals within each strata, compared to planted quantities, shall infer on strata success. Organic matter accumulation including leaf litter cover, snag density, small, medium, and large woody debris, and subsequent development of the O and A soil horizons shall be monitored in order to aid in determining vegetative production. Invasive versus native vegetation dominance will aid in effectiveness of the implementation of the invasive species control plan.

Since the mitigation area had undergone only one growing season, only plant survival and presence of invasive plant species were assessed in 2016. The number of observed plants is compared to the number of plants installed per the *Wetland Mitigation As-Built Report*. The number of observed plants should be considered a reasonable estimate of surviving plantings due to inherent errors in identifying and counting plants within the restoration area.

WETLAND SHRUBS

Common Name	Botanical Name	# Planted	# Observed 7/12/16
Red-Osier dogwood	<i>Cornus sericea</i>	25	22
Northern arrowwood	<i>Viburnum spp.</i>	10	10
Sweet pepperbush	<i>Clethra alnifolia</i>	20	7
Winterberry	<i>Ilex verticillata</i>	20	9
Elderberry	<i>Sambucus Canadensis</i>	35	24
Speckled alder	<i>Alnus incana</i>	10	4
Serviceberry	<i>Amelanchier Canadensis</i>	20	10
TOTAL		140	86

WETLAND TREES

Common Name	Botanical Name	# Planted	# Observed
River birch	<i>Betula nigra</i>	50	42
Sycamore	<i>Plantanus occidentalis</i>	40	22
Cottonwood	<i>Populus deltoids</i>	25	17
Swamp white oak	<i>Quercus bicolor</i>	50	50
Black willow	<i>Salix nigra</i>	55	52
Red maple	<i>Acer rubrum</i>	85	85
TOTAL		305	268

UPLAND SHRUBS

Common Name	Botanical Name	#	# Observed
Witch hazel	<i>Hamamelis virginiana</i>	12	6
Maple leaf viburnum	<i>Viburnum acerifolium</i>	10	7
Alternate-leaved	<i>Cornus alternifora</i>	10	3
Northern bayberry	<i>Morella pensylvanica</i>	20	13
Low-bush blueberry	<i>Vaccinium angustifolium</i>	22	0
TOTAL		74	29

UPLAND TREES

Common Name	Botanical Name	# Planted	# Observed
Sugar maple	<i>Acer saccharum</i>	22	15
Paper birch	<i>Betula papyrifera</i>	16	11

Quaking aspen	<i>Populus tremuloides</i>	20	16
Northern red cedar	<i>Juniperus virginiana</i>	18	11
Tulip tree	<i>Liriodendron tulipifera</i>	15	15
Pitch pine	<i>Pinus rigida</i>	22	22
Northern red oak	<i>Quercus rubra</i>	15	15
Eastern hemlock	<i>Tsuga canadensis</i>	20	19
TOTAL		148	124

In July 2016, the restored wetland and upland areas had a good cover of herbaceous vegetation with an estimated ground cover of 70 to 80 percent.

Prior to restoration activities, six invasive species were identified on the site according to the *Mitigation Report*. These species included Japanese barberry (*Berberis thunbergii*), Japanese knotweed (*Fallopia japonica*), Winged euonymous (*Euonymous alatus*), Norway maple (*Acer platanoides*), and Oriental bittersweet (*Celastrus orbiculatus*). Only Japanese knotweed was observed at the restored site at the northern property boundary. It was noted in the *Mitigation Report* that “a vast monotypic stand of Japanese knotweed was noted off-site, up-gradient” and upstream of the mitigation site.” It is anticipated that future control of Japanese knotweed will be needed as it is likely to spread further into the restored area. No other widespread occurrences of invasive plant species was observed in 2016.

c. • Soils

According to the *Mitigation Report*, soils shall have documented evidence of redoxymorphic features developing by the third year after construction. No soils evaluations were conducted in 2016 due to the short time period since completion of the wetland restoration. Indicator of reduction in soils (IRIS) tubes will be installed within the wetland area during the third year of monitoring to assess soil reduction. Documentation of hydric soil indicators will also be conducted in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)*, 2012.

Streambanks appeared relatively stable during 2016 with some minor bank erosion and sediment bar deposition along stream bends. Five to six small rills were observed on graded slopes south and east of the restored wetland. These rills will be evaluated again in 2017 to evaluate the need for repair.

PLANS

As-Built plans of the restored wetland and adjacent upland areas are included in Appendix A.

CONCLUSIONS

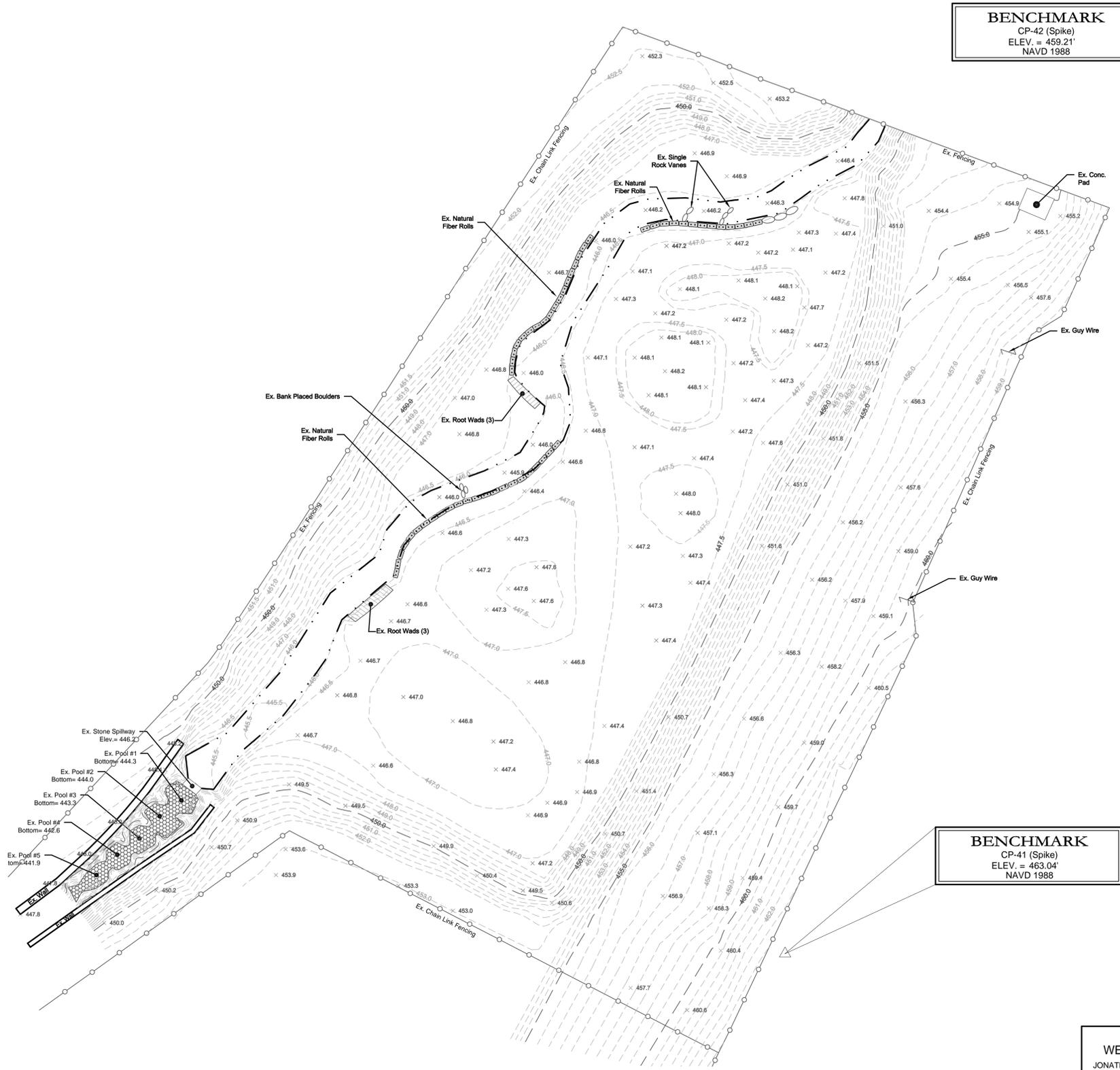
During the first growing season (2016) indicators of hydrology were present that indicate likelihood of future development of hydric soil conditions. The majority of planted trees and shrubs show good survival and seeded areas are becoming established with herbaceous vegetation. Invasive plant species are presently under control, but spread of Japanese knotweed (*Polygonum cuspidatum*) from monoculture stands north of the mitigation site are likely to encroach into the mitigation area. Stream banks are stable and natural sediment bars are developing along stream bends.

APPENDIX A

AS-BUILT PLAN

LEGEND

-  = Existing utility pole
-  = Existing light pole
-  = Existing fire hydrant
-  = Existing water valve
-  = Existing gas valve
-  = Existing underground pipe
-  = Existing edge of pavement
-  = Existing bituminous concrete lip curb
-  = Existing well
-  = Existing catch basin
-  = Existing drainage manhole
-  = Existing sanitary manhole
-  = Existing utility box
-  = Existing contour
-  = Existing spot elevation
-  = Existing iron pin
-  = Existing drill hole
-  = Existing monument



SURVEY NOTES:

1. This map has been prepared pursuant to the Regulation of Connecticut State Agencies Sections 20-300b-1 through 20-300b-20 and the "Standards for Surveys and Maps in the State of Connecticut" as adopted by the Connecticut Association of Land Surveyors, Inc. on September 26, 1996.
2. Type of survey performed: Topographic Survey - (As Built Remediation Area)
3. Boundary determination category: None Implied
4. Class of accuracy:
Horizontal: A-2
Vertical: T-2.
5. Total area: 405,108± sq. ft. / 9.3 acres
6. Owner: City of Waterbury
7. City of Waterbury Assessors Map #219 Lot #193
8. Contour interval is 0.5'.
9. Existing contours generated from field topography.
10. This survey does not include the location of any underground improvements or encroachments, subsurface utility lines or buried debris. Nor does it necessarily reflect the existence of any waste dumps or hazardous materials. The underground items depicted or noted are approximate and are not guaranteed. Notify "CALL BEFORE YOU DIG" 1-800-922-4455 prior to any excavation operations.

BENCHMARK
CP-41 (Spike)
ELEV. = 463.04'
NAVD 1988

BENCHMARK
CP-42 (Spike)
ELEV. = 459.21'
NAVD 1988

PHASE 5
WETLAND REMEDIATION
JONATHAN E. REED ELEMENTARY SCHOOL
33 GRIGGS STREET
WATERBURY, CONNECTICUT
STATE PROJECT NO. 151-0253N/PS

TOPOGRAPHIC SURVEY
AS BUILT FOR WETLANDS REMEDIATION AREA
Prepared For
CITY OF WATERBURY
33 Griggs Street
Waterbury, Connecticut

October 15, 2015 Scale: 1" = 20'
20' 10' 0 10' 20'

DATE	REVISION

To the best of my knowledge and belief, this map is substantially correct as noted hereon.

Stephen M. Giudice, L.S. Reg. No. #70145
NOT VALID UNLESS ENCOMPASSED SEAL OR STAMP IS AFFIXED HERETO

F.B. #: 480 PROJECT #: 1304

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APPENDIX B

OBSERVED VEGETATIVE SPECIES

RESTORED FLOODPLAIN WETLAND

Red-Osier dogwood	<i>Cornus sericea</i>
Northern arrowwood	<i>Viburnum dentatum.</i>
Sweet pepperbush	<i>Clethra alnifolia</i>
Winterberry	<i>Ilex verticillata</i>
Elderberry	<i>Sambucus canadensis</i>
Speckled alder	<i>Alnus incana</i>
Serviceberry	<i>Amelanchier canadensis</i>
River birch	<i>Betula nigra</i>
Sycamore	<i>Plantanus occidentalis</i>
Cottonwood	<i>Populus deltoides</i>
Swamp white oak	<i>Quercus bicolor</i>
Black willow	<i>Salix nigra</i>
Red maple	<i>Acer rubrum</i>
Sedge	<i>Carex spp.</i>
Blue vervain	<i>Verbena hastata</i>
Green bulrush	<i>Scirpus atrovirens</i>
Nodding bur marigold	<i>Bidens cernua</i>
Soft rush	<i>Juncus effusus</i>
Wool grass	<i>Scirpus cyperinus</i>
Boneset	<i>Eupatorium perfoliatum</i>
Purple stemmed aster	<i>Aster puniceus</i>

RESTORED UPLAND BUFFER

Witch hazel	<i>Hamamelis virginiana</i>
Maple leaf viburnum	<i>Viburnum acerifolium</i>
Alternate-leaved dogwood	<i>Cornus alternifora</i>
Northern bayberry	<i>Morella pensylvanica</i>
Sugar maple	<i>Acer saccharum</i>
Paper birch	<i>Betula papyrifera</i>
Quaking aspen	<i>Populus tremuloides</i>
Northern red cedar	<i>Juniperus virginiana</i>
Tulip tree	<i>Liriodendron tulipifera</i>
Pitch pine	<i>Pinus rigida</i>
Northern red oak	<i>Quercus rubra</i>
Eastern hemlock	<i>Tsuga canadensis</i>
Virginia wild rye	<i>Elymus virginicus</i>
Little bluestem	<i>Schizachyrium scoparium</i>
Big bluestem	<i>Andropogon gerardii</i>
Creeping red fescue	<i>Festuca rubra</i>
Switchgrass	<i>Panicum virgatum</i>
Partridge pea	<i>Chamaechaerista fasciculata</i>
Deer tongue	<i>Dichanthelium clandestinum</i>
Oxeye sunflower	<i>Heliopsis helianthoides</i>
Goldenrod	<i>Solidago spp.</i>
Blue vervain	<i>Verbena hastata</i>
Aster	<i>Aster spp.</i>

APPENDIX C
PHOTOS



March 23, 2016



March 23, 2016



March 23, 2016



March 23, 2016



March 23, 2016



July 12, 2016



July 12, 2016



July 12, 2016



July 12, 2016



July 12, 2016



July 12, 2016