Riparian Habitat Assessment Report

Riparian Habitat Assessment Component of Mare Brook Watershed Assessment and Community Engagement Project

Prepared for:
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October 27, 2016

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1.0 INTRODUCTION

This report was prepared by Stantec Consulting Services Inc. (Stantec) as part of a reconnaissance-level riparian habitat assessment adjacent to and within the floodplain of Mare Brook and Merriconeag Stream in Brunswick, Maine. FB Environmental Associates (FB Environmental) is contracted to the Town of Brunswick, Maine (Town), to perform the Mare Brook Watershed Assessment and Community Engagement Project (Project). Stantec is performing the reconnaissance-level riparian habitat assessment as a subcontractor to FB Environmental as part of the Project.

2.0 METHODS

On August 15, 16, and 17, 2016, Stantec conducted a reconnaissance-level assessment of riparian habitat within the reach of Mare Brook from Baribeau Drive to tidewater and the reach of Merriconeag Stream from Beaver Pond Road to its confluence with Mare Brook. The assessment was based on observed conditions throughout the stream reaches and was limited to riparian resources within the immediate floodplain of Mare Brook and Merriconeag Stream. The stream reaches were assessed on foot to observe wetland resources and classify habitat and wetland types adjacent to and within the floodplains of the stream reaches.

2.1 WETLANDS

Observed wetlands were classified and mapped based generally on the technical criteria provided in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) (U.S. Army Corps of Engineers 2011). A formal wetland delineation was not conducted; rather, the reconnaissance-level survey represents an estimation of the location of wetland resources within the survey area. Wetland characterizations were conducted according to the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). Reconnaissance-level Global Positioning System (GPS) data was collected to estimate the size and extent of the wetland resources within the survey area. Aerial photographs and topographic data were also utilized to map the locations of the wetland resources after the field survey.

2.2 RIPARIAN HABITAT

Concurrent with the wetland survey, Stantec assessed the structure of the riparian habitat to evaluate the variety and quality of substrate, bank structure, and riparian vegetation using the criteria defined in U.S. Environmental Protection Agency's Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers (Barbour et al. 1999). As part of the riparian habitat assessment,

Stantec performed a visual-based habitat assessment as outlined in Barbour et al. (1999), focusing on those habitat features not evaluated as part of the reconnaissance-level assessment of geomorphic conditions of Mare Brook and Merriconeag Stream. To perform the riparian habitat assessment, Stantec evaluated the following physical and biological parameters:

- Epifaunal Substrate/Available Cover
- Bank Vegetative Protection
- Riparian Vegetative Zone Width

2.3 STREAM REACHES

The survey area was divided into 12 stream reaches to organize the survey results, as shown on Table 1 in Appendix A. Stream reaches along each waterway were defined by road crossings and the airport runway, with 10 reaches along Mare Brook and 2 reaches on Merriconeag Stream. The results of the wetland and riparian habitat surveys were summarized by stream reaches. The reaches provided in this report correspond to the reaches included in the geomorphic assessment of the survey area.

3.0 RESULTS

Stantec identified a variety of wetland resources within the survey area, including forested, scrub-shrub, emergent, and open water wetlands. Table 1 provides the dominant wetland community type found in each reach within the survey area (Appendix A). Stantec also identified small tributary streams and drainages and potential vernal pools. The results of the assessment are shown on Figures 1 – 7 in Appendix B. General descriptions of these resources are provided below. Representative photographs are provided in Appendix C.

3.1 FORESTED WETLANDS

Forested wetlands were the most common wetland type identified within the survey area and dominated the floodplains of Mare Brook and Merriconeag Stream (Photos 1 – 3). The canopies of the forested wetlands are generally dominated by red maple (*Acer rubrum*)[1], yellow birch (*Betula alleghaniensis*), eastern hemlock (*Tsuga canadensis*), gray birch (*Betula populifolia*), balsam fir (*Abies balsamea*), and willow (*Salix* sp.). Dominant shrub species in the forested wetlands include speckled alder (*Alnus incana*), common winterberry (*Ilex verticillata*), southern arrow-wood (*Viburnum dentatum*), and white meadowsweet (*Spiraea alba*), as well as the aforementioned tree species. The herbaceous layer of the forested wetlands was generally dominated by spotted touch-me-not (*Impatiens capensis*), cinnamon fern (*Osmundastrum*

[1] Vegetation nomenclature throughout this document follows: Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List*: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X. Available at: http://wetland_plants.usace.army.mil/

cinnamomeum), sensitive fern (*Onoclea sensibilis),* skunk-cabbage (*Symplocarpus foetidus*), melic manna grass (*Glyceria melicaria*), nodding sedge (*Carex gynandra*), and bluejoint (*Calamagrostis canadensis*).

At the time of the survey, commonly observed indicators of hydrology included areas of surface water, saturation at the soil surface, water marks, water-stained leaves, drift deposits, and drainage patterns.

3.2 SCRUB-SHRUB WETLANDS

Scrub-shrub wetlands were identified throughout the survey area, although they were not as common as forested wetlands. Scrub-shrub wetlands were often found as components of larger wetland systems that included both forested and emergent wetlands (Photos 4 and 5). Dominant shrub vegetation in the scrub-shrub wetlands included speckled alder, common winterberry, red maple, white meadowsweet, and willows (*Salix* sp.). Dominant herbaceous vegetation included spotted touch-me-not, nodding burr-marigold (*Bidens cernua*), common arrowhead (*Sagittaria latifolia*), and a variety of sedges (*Carex* sp.).

At the time of the survey, hydrologic indicators included areas of standing water, saturation at the soil surface, water-stained leaves, and drainage patterns.

3.3 EMERGENT WETLANDS

Emergent wetlands were observed in much of the survey area but were primarily located in impounded areas upstream from culverts, road crossings, and dams (Photos 6 and 7). These areas experience more prolonged standing water, which limits the growth of tree and shrub species. The emergent wetlands typically coincided with areas of slow moving water along the stream reaches. Smaller emergent wetland communities were also observed in the survey area as components of larger forested or scrub-shrub wetland types (Photos 8 – 10). Dominant vegetation in the emergent wetlands included cottongrass bulrush (*Scirpus cyperinus*), broad-leaf cat-tail (*Typha latifolia*), spotted touch-me-not, rice cut grass (*Leersia oryzoides*), bluejoint, lamp rush (*Juncus effusus*), Asiatic tearthumb (*Persicaria perfoliata*), shallow sedge (*Carex lurida*), Crawford's sedge (*Carex crawfordii*), reed canary grass (*Phalaris arundinacea*), and spike-rush (*Eleocharis* sp.). Hydrologic indicators in the emergent wetlands typically included standing water with saturated soils.

3.4 STREAMS AND TRIBUTARIES

Stantec identified several small streams and drainages that join with Mare Brook or Merriconeag Stream. These resources ranged in size from jurisdictional streams[2] with significant hydrologic and/or sediment inputs (Photo 11) to small, non-jurisdictional drainages (Photo 12) from hillside

[2] Jurisdictional streams are those streams that meet the definition of a "river, stream or brook" as provided in the Maine Natural Resources Protection Act.

seeps, roadside ditches, or other hydrologic sources. Jurisdictional streams entering the survey area were typically less than 3 feet wide with sand, silt, or gravel substrates. Non-jurisdictional drainages typically did not have a consistent, defined channel but provided diffuse, intermittent flow into the surveyed areas along Mare Brook and Merriconeag Stream.

3.5 POTENTIAL VERNAL POOLS

Stantec identified 7 potential vernal pools (PVPs) within the survey area (Photos 13 and 14). The PVPs were identified based on the physical characteristics of the area, typically a shallow depression within a wetland with the ability to hold standing water for several months in the spring and early summer. Given the time of year of the survey, it was not possible to determine whether these PVPs could be functioning vernal pools. Based on an assessment of the surrounding habitat, those PVPs located near large tracts of undeveloped upland habitat have the highest potential to be functioning vernal pools. A springtime survey would be required to determine if any of the PVPs are functioning as vernal pools.

3.6 INVASIVE PLANT SPECIES

Stantec identified invasive plant species in the survey area. Invasive plants are common throughout southern Maine, especially in developed and disturbed landscapes such as those adjacent to the survey area streams, and the presence of a wide variety and high density of invasive species is not unexpected. Invasive species were observed in both the wetlands and uplands in the survey area, and included multiflora rose (*Rosa multiflora*), Asian bittersweet (*Celastrus orbiculatus*), Morrow's honeysuckle (*Lonicera morrowii*), Japanese knotweed (*Fallopia japonica*), Japanese barberry (*Berberis thunbergii*), winged euonymous (*Euonymous alatus*), common buckthorn (*Rhamnus cathartica*), glossy buckthorn (*Frangula alnus*), black locust (*Robinia pseudoacacia*), Norway maple (*Acer platanoides*), and purple loosestrife (*Lythrum salicaria*).

3.7 STREAM HABITAT FEATURES

Stantec also evaluated the structure of stream habitat to evaluate the variety and quality of riparian habitat as part of the riparian habitat survey. This evaluation focused on those features that are not included in the geomorphic assessment of the stream channels.

3.7.1 Epifaunal Substrate/Available Cover

An evaluation of epifaunal substrate and available cover includes an assessment of the quantity and variety of natural structures that provide refugia, feeding sites, or sites for spawning and nursery functions of aquatic macrofauna (fish and macroinvertebrates). These structures can include cobble, large rocks, fallen trees, logs and branches, and undercut banks. Using the protocols outlined in Barbour et al. (1999), Stantec estimated the condition of epifaunal substrate and available cover within each stream reach in the survey area. The condition ranged from marginal to suboptimal, as shown in Appendix A, Table 1.

3.7.2 Bank Vegetative Protection

Bank vegetative protection is a measure of the protection to the stream bank provided by native vegetation. Root systems hold soil in place and reduce the likelihood of large-scale erosion concerns. Banks that have full, natural plant growth are better for fish and macroinvertebrates than are banks without vegetation or those that have been shored up with concrete or riprap. As part of the survey, Stantec estimated the condition of bank vegetative protection within each stream reach in the survey area. Generally, the banks of Mare Brook and Merriconeag Stream have good riparian vegetative cover, including trees, shrubs and herbaceous vegetation. The conditions of the stream reaches ranged from optimal to suboptimal (Appendix A, Table 1).

3.7.3 Riparian Vegetation Zone Width

This parameter measures the width of natural vegetation from the edge of the stream bank in the riparian zone. The riparian vegetation zone serves as a buffer to pollutants and sediment entering the stream, provides erosion control, and provides habitat and nutrient inputs to the stream. Increased development surrounding a stream reduces the size of these buffers and limits the ability of the buffer to support a functioning stream system. Within the survey area, the riparian vegetation zone width ranged from optimal (greater than 18 meters) in the lower portions of the watershed to marginal and suboptimal (between 6 and 18 meters) in the upper reaches of the watershed (Appendix A, Table 1).

4.0 CONCLUSIONS

Stantec identified a variety of habitat types and conditions as part of the reconnaissance-level assessment of riparian habitat within the Mare Brook and Merriconeag Stream riparian corridor. Wetland types ranged from forested wetlands to impounded open bodies of water, and riparian habitat varied from intact floodplain forest to areas heavily disturbed by human development. The majority of the stream corridors contain riparian vegetation that provides stability and protection to the systems, although the density and diversity of riparian vegetation is variable in the survey area.

5.0 REFERENCES

Barbour, M.T., J Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers; Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Government Printing Office, Washington D.C. GPO 024-010-00524-6. 103 pp.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

U.S. Army Corps of Engineers. 2011. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)*, ed. J.S. Wakeley, R.W. Lichvar, C.V. Noble, and J.F. Berkowitz, ERDC/EL TR-12, Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Appendix A RIPARIAN HABITAT SUMMARY TABLE

Appendix A Riparian Habitat Summary Table
October 27, 2016

Table 1. Riparian Habitat Summary Table

Stream	Reach	Dominant Wetland Community Type	Epifaunal Substrate/Available Cover	Bank Vegetative Protection	Riparian Vegetative Zone Width
Mare Brook					
	Baribeau Dr to Barrows St	PFO	Suboptimal	Optimal	Suboptimal - Marginal
	Barrows St to MacMillan Dr	PFO	Suboptimal	Suboptimal	Marginal
	MacMillan Dr to Maine St	PSS/PEM	Marginal	Optimal	Suboptimal - Marginal
	Maine St to Meadowbrook Rd	PFO	Suboptimal	Optimal	Optimal - Suboptimal
	Meadowbrook Rd to Harpswell Rd	PFO/PSS/PUB	Suboptimal - Poor	Optimal	Optimal - Suboptimal
	Harpswell Rd to Brunswick Naval Air Sta Rd	PFO/PSS/PEM	Suboptimal	Optimal	Optimal
	Brunswick Naval Air Sta Rd to Samuel Adams Dr	PFO/PSS/PEM	Marginal	Optimal	Optimal
	Samuel Adams Dr to Runway Culverts	PSS	Poor	Suboptimal	Suboptimal
	Runway Culverts to Major Pope Ave	PSS	Marginal	Optimal	Optimal - Suboptimal
	Major Pope Ave to Liberty Xing	PFO/PSS/PEM	Suboptimal - Marginal	Optimal	Optimal
Merriconeag Stream					
	Beaver Pond Rd to Purinton Rd	PFO/PSS/PEM/PUB	Suboptimal - Marginal	Optimal	Optimal
	Purinton Rd to Mare Brook Confluence	PFO	Suboptimal	Optimal	Optimal

Notes:

1. Dominant Wetland Community Type: PFO = palustrine forested, PSS = palustrine scrub-shrub, PEM = palustrine emergent, PUB = palustrine unconsolidated bottom (open water)
2. Epifaunal Substrate/Available Cover: Optimal = greater than 50% of substrate favorable for epifaunal colonization and fish cover, Suboptimal = 30–50% stable habitat, Marginal = 10–30% stable habitat, Poor = <10% stable habitat
3. Bank Vegetative Protection: Optimal = >90% of streambank surface covered by native vegetation, including trees, shrubs and herbaceous, Suboptimal = 70–90% cover by vegetation, Marginal = 50–70% cover by vegetation, Poor = <50% cover by vegetation
4. Riparian Vegetative Zone Width: Optimal = >18 meter width of riparian zone, Suboptimal = 12–18 meter width, Marginal = 6–12 meter width, Poor = <6 meter width

Appendix B RIPARIAN ASSESSMENT FIGURES

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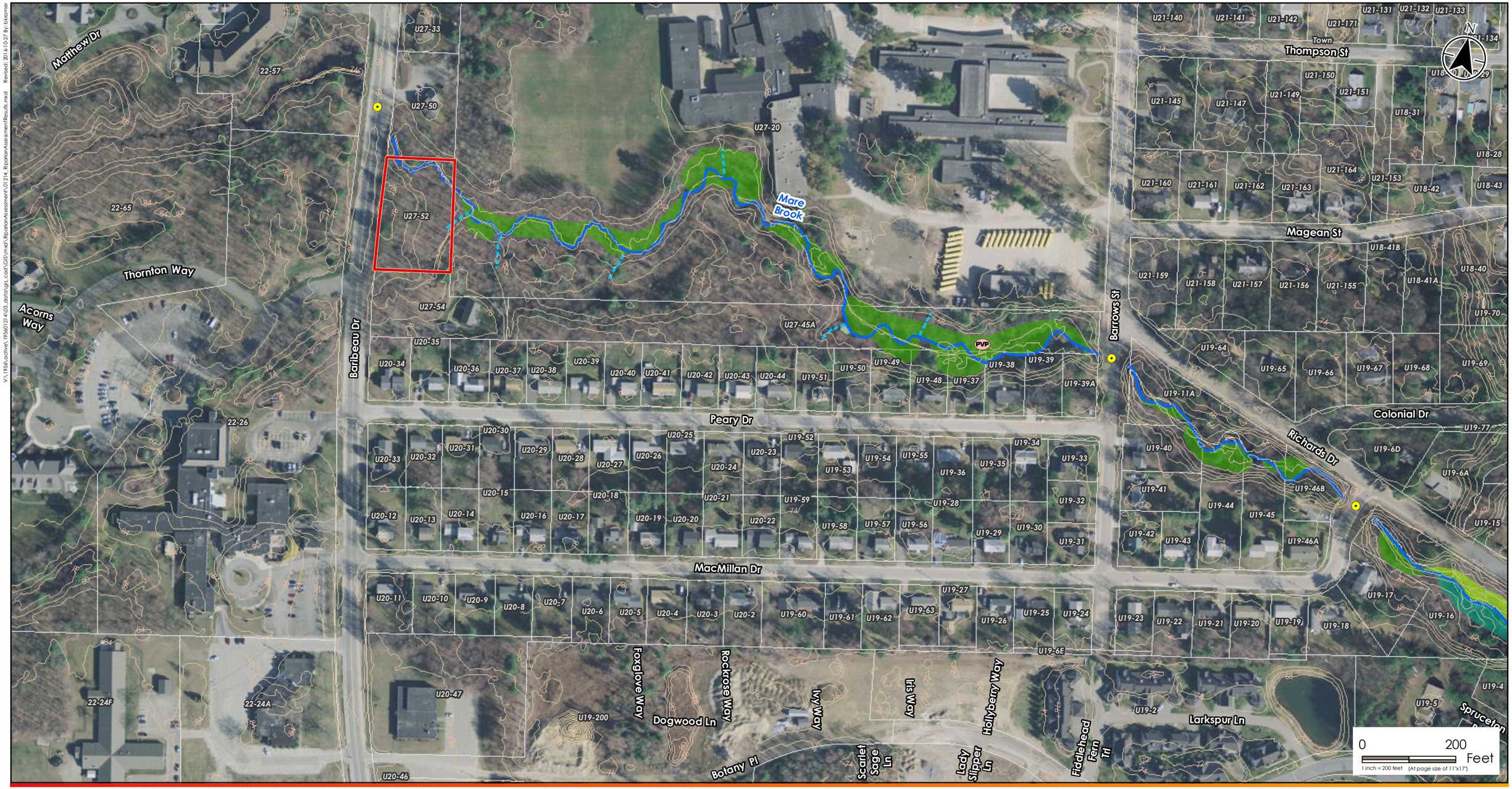

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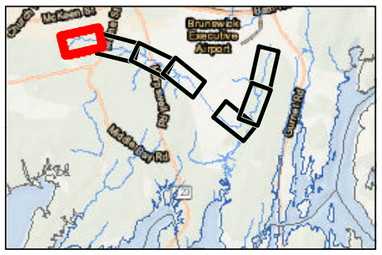

Legend

- PVP — Potential Vernal Pool Center Point
- Culverts/Dam
- 2' Contour
- No Access Parcel
- Perennial Stream (See Note1)
- Tributaries (See Note 1)
- Tax parcels

Recon Wetland Classification (See Notes)

- PEM
- PFO
- PFO/PEM
- PSS

Data Source

1. Aerial imagery provided by ArcGIS Online World Imagery Mapping Service (2015 NAIP) (http://server.arcgisonline.com/arcgis/services/World_Imagery/MapServer).
2. Town of Brunswick tax parcels provided by FB Environmental.
3. Contour data obtained from the Maine Office of GIS.

Note

1. The reconnaissance-level wetland survey was limited to the riparian area within the immediate floodplain of Mare Brook and Merriconeag Stream.
2. Wetland and associated stream mapping data was derived from a combination of field located GPS data, aerial photo interpretation, and the National Hydrograph Dataset (NHD) and should be considered approximate.
3. Wetland classifications per Cowardin et al. 1979: PFO = forested wetland, PSS = scrub-shrub wetland, PEM = emergent wetland.

Client/Project

Mare Brook Riparian Assessment
Brunswick, Maine

Figure No.
1 of 7

Title

Riparian Assessment Results

10/27/2016

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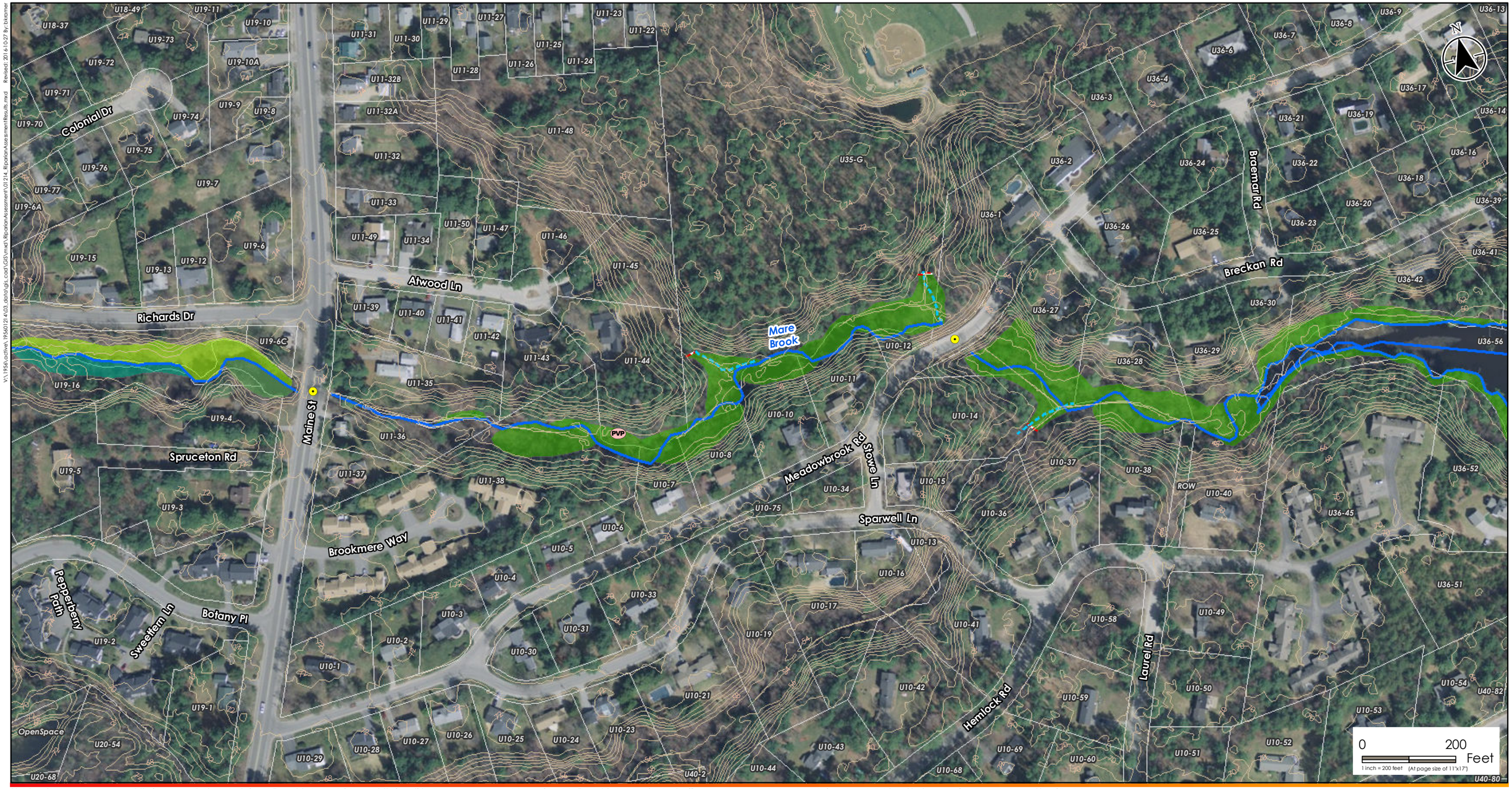

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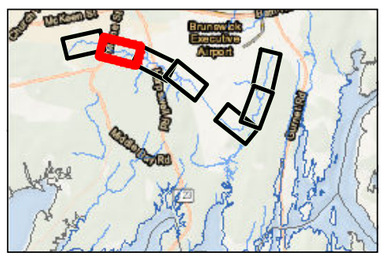

Legend

- Potential Vernal Pool Center Point (PVP)
- Culverts/Dam
- 2' Contour
- Perennial Stream (See Note1)
- Tributaries (See Note 1)
- Limit of Recon Survey
- Tax parcels
- Open Water (See Note 1)

Recon Wetland Classification (See Notes)

- PFO
- PFO/PEM
- PSS
- PSS/PEM

Data Source
1. Aerial imagery provided by ArcGIS Online World Imagery Mapping Service (2015 NAIP) (http://server.arcgisonline.com/arcgis/services/World_Imagery/MapServer).
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Client/Project
Mare Brook Riparian Assessment
Brunswick, Maine

Figure No.
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Title
Riparian Assessment Results

10/27/2016

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Coffin Pond Dam

Mare Brook

PVP

Harpswell Rd

Meadowbrook Rd

Hambleton Ave

Bickford Ave

Beckam Rd

Beech Dr

Baxter Ln

Hovey Ln

Jonathan St

N

0 200 Feet

1 inch = 200 feet (At page size of 11"x17")

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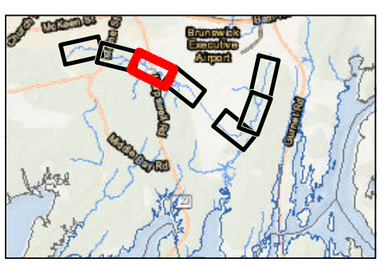

Legend

- Potential Vernal Pool Center Point
- Culverts/Dam
- 2' Contour
- Perennial Stream (See Note1)
- Tributaries (See Note 1)
- Limit of Recon Survey
- Tax parcels
- Open Water (See Note 1)

Recon Wetland Classification (See Notes)

- PFO
- PFO/PEM
- PFO/PEM/PSS
- PFO/PSS/PEM
- PSS/PFO

Data Source

1. Aerial imagery provided by ArcGIS Online World Imagery Mapping Service (2015 NAIP) (http://server.arcgisonline.com/arcgis/services/World_Imagery/MapServer).
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Mare Brook Riparian Assessment
Brunswick, Maine

Figure No.
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Title

Riparian Assessment Results

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Transmitter Dr
40-280
40-227
40-296
40-2
Runway
Culvert Inlet
Samuel Adams Dr
PVP
40-163
Mare
Brook
40-94
40-162
40-90
40-63
U01-31
40-517
Coast Guard Rd
40-0
N
0
200
Feet
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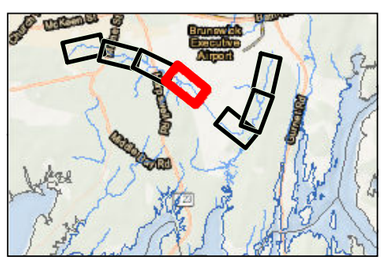

Legend

- Potential Vernal Pool Center Point
- Culverts/Dam
- 2' Contour
- Fence (approx.)
- Perennial Stream (See Note1)
- Tributaries (See Note 1)
- Limit of Recon Survey
- Tax parcels

Recon Wetland Classification (See Notes)
- PFO/PSS/PEM
- PSS
- PSS/PFO

Data Source
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Mare Brook Riparian Assessment
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Riparian Assessment Results

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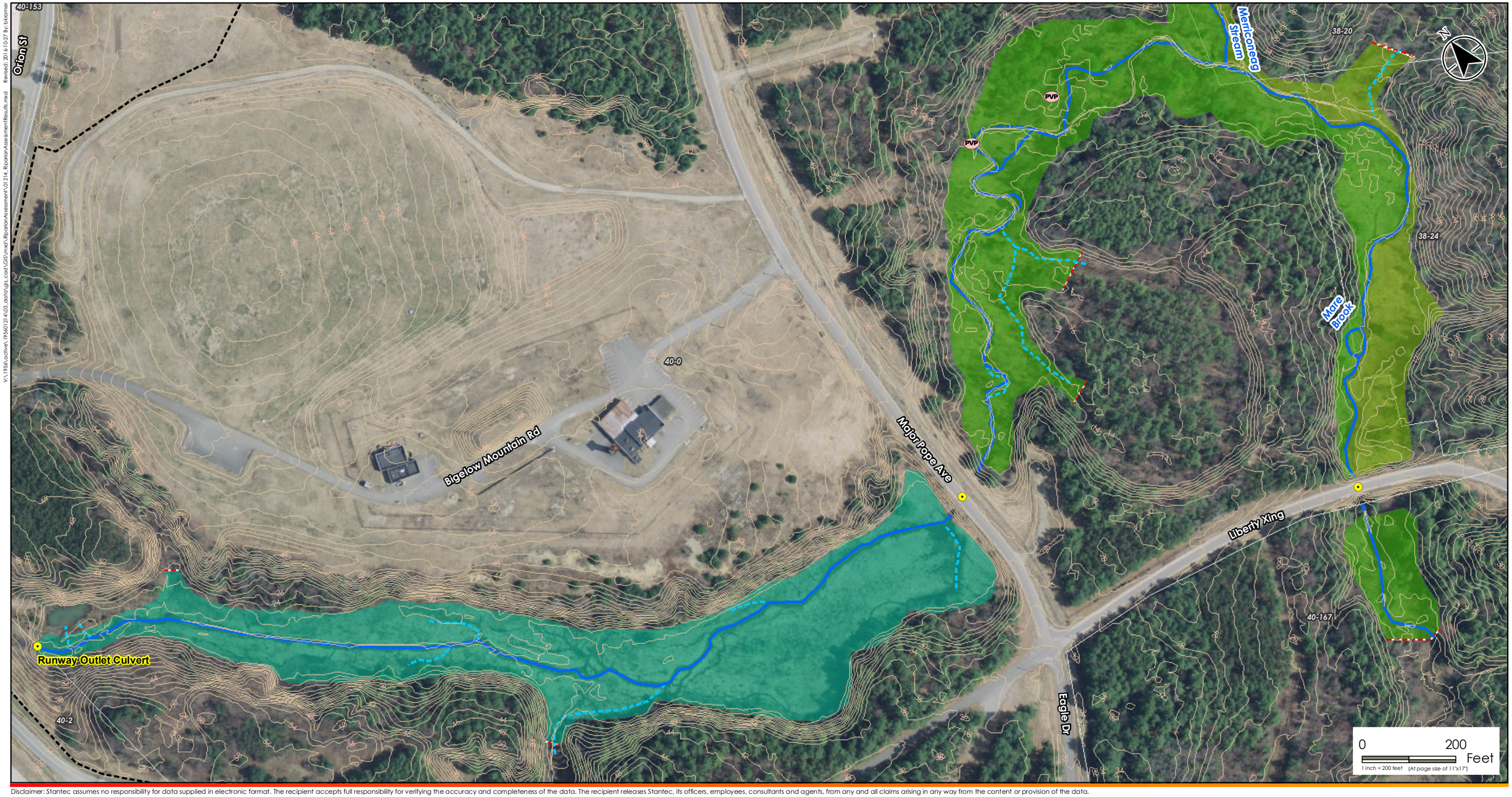

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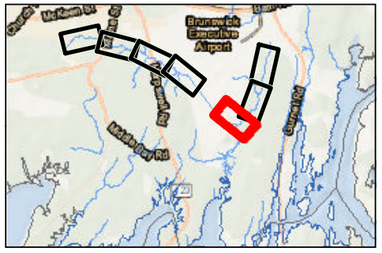

Legend

- PVP — Potential Vernal Pool Center Point
- Culverts/Dam
- 2' Contour
- Fence (approx.)
- Perennial Stream (See Note1)
- Abandoned Channel
- Tributaries (See Note 1)
- Limit of Recon Survey
- Tax parcels

Recon Wetland Classification (See Notes)

- PFO
- PFO/PSS
- PSS

Data Source

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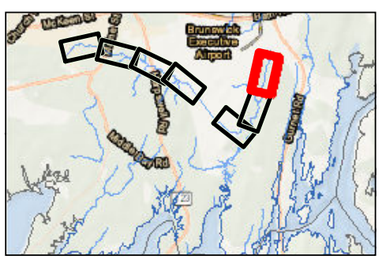

Legend

- Culverts/Dam
- 2' Contour
- Perennial Stream (See Note1)
- Tributaries (See Note 1)
- Limit of Recon Survey
- Tax parcels

Recon Wetland Classification (See Notes)
- PFO/PEM

Data Source

1. Aerial imagery provided by ArcGIS Online World Imagery Mapping Service (2015 NAIP) (http://server.arcgisonline.com/arcgis/services/World_Imagery/MapServer).
2. Town of Brunswick tax parcels provided by FB Environmental.
3. Contour data obtained from the Maine Office of GIS.

Note

1. The reconnaissance-level wetland survey was limited to the riparian area within the immediate floodplain of Mare Brook and Merriconeag Stream.
2. Wetland and associated stream mapping data was derived from a combination of field located GPS data, aerial photo interpretation, and the National Hydrograph Dataset (NHD) and should be considered approximate.
3. Wetland classifications per Cowardin et al. 1979: PFO = forested wetland, PSS = scrub-shrub wetland, PEM = emergent wetland.

Client/Project

Mare Brook Riparian Assessment
Brunswick, Maine

Figure No.
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Title

Riparian Assessment Results

10/27/2016

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195601214

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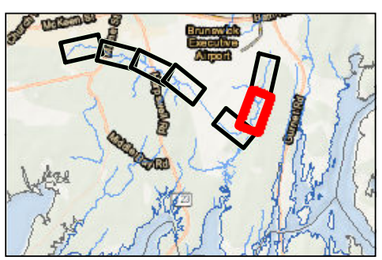
Prepared by EMK on 2016-09-14
Quality Review by KWH on 2016-09-29
Independent Review by BPE on 2016-09-26

01214_RiparianAssessmentResults.mxd



Legend

- Potential Vernal Pool Center Point
- Culverts/Dam
- 2' Contour
- Perennial Stream (See Note1)
- Abandoned Channel
- Tributaries (See Note 1)
- Limit of Recon Survey
- Tax parcels
- Open Water (See Note 1)

Recon Wetland Classification (See Notes)

- PFO
- PFO/PEM
- PFO/PSS

Data Source

1. Aerial imagery provided by ArcGIS Online World Imagery Mapping Service (2015 NAIP) (http://server.arcgisonline.com/arcgis/services/World_Imagery/MapServer).
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Client/Project
Mare Brook Riparian Assessment
Brunswick, Maine

Figure No.
7 of 7

Title
Riparian Assessment Results

10/27/2016

Appendix C REPRESENTATIVE PHOTOGRAPHS

Photo 1. Forested wetland along Mare Brook near Baribeau Drive. Stantec. August 15, 2016.

Photo 2. Forested wetland along Mare Brook near Major Pope Avenue. Stantec. August 17, 2016.

Photo 3. Forested wetland along Merriconeag Stream downstream of Beaver Pond Road. Stantec. August 17, 2016.

Photo 4. Scrub-shrub wetland along Mare Brook between Samual Adams Drive and the runway. Stantec. August 16, 2016.

Photo 5. Scrub-shrub wetland along Mare Brook below runway outlet culvert. Stantec. August 16, 2016.

Photo 6. Emergent wetland and impounded water along Mare Brook upstream of Maine Street. Stantec. August 15, 2016.

Photo 7. Emergent wetland along Merriconeag Stream upstream from Picnic Pond Dam. Stantec. August 17, 2016.

Photo 8. Emergent wetland community among forested and scrub-shrub habitat along Mare Brook downstream of Harpswell Road (Rt. 123). Stantec. August 16, 2016.

Photo 9. Emergent wetland along Mare Brook downstream of Brunswick Naval Air Station Road. Stantec. August 16, 2016.

Photo 10. Emergent wetland community amongst forested and scrub-shrub habitat along Merriconeag Stream downstream of Beaver Pond Road. Stantec. August 17, 2016.

Photo 11. Tributary stream entering Mare Brook between Baribeau Drive and Barrows Street. Note sand input into Mare Brook from tributary. Stantec. August 15, 2016.

Photo 12. Non-jurisdictional drainage in Mare Brook floodplain, downstream from runway culvert outlet. Stantec. August 16, 2016.

Photo 13. Potential vernal pool in Mare Brook floodplain downstream of Harpswell Road. Stantec. August 16, 2016.

Photo 14. Potential vernal pool in Mare Brook floodplain downstream of Major Pope Avenue. Stantec. August 17, 2016.