Table of Contents

Executive Summary

Under State of New Hampshire statute (RSA 482-A:15), communities like Hudson are permitted to designate wetlands of exceptional value within their borders as "prime wetlands." Once designated, these prime wetlands and their surrounding upland buffer are granted a higher level of protection, including greater scrutiny of applications for dredge and fill permits. This report provides a thorough and systematic study of all major wetland systems, which is a critical first step in identifying prime wetlands within Town of Hudson.

VHB/Vanasse Hangen Brustlin, Inc. was commissioned by the Hudson Conservation Commission to conduct a Prime Wetlands Assessment & Designation for the Town of Hudson in 2008. The Town of Hudson provided VHB with a GIS file containing 461 wetlands located within the community. Using GIS analytical software, VHB conducted a desktop analysis to screen the original 461 wetlands down to 41 potentially wetlands. The final study set was reduced to 28 wetlands by selecting wetlands that were 6 acres or larger in size or were known to be in close proximity to a NH Natural Heritage Bureau rare/threatened plant or animal occurrence. Through the process of obtaining land owner permission to access the wetlands, 5 of the 28 wetlands were excluded from the study set due to a lack of land owner permission. A team of wetland scientists completed the wetland field evaluations for this study during the summer/fall of 2008 using a standard evaluation process known as the *Method for Comparative Evaluation of Nontidal Wetlands in New Hampshire* (Ammann and Stone1991). The method is based on a functional evaluation of each wetland and provides a defensible scientific approach for evaluating wetlands at the local level (typically a town or watershed).

An overall comparison of the candidate prime wetlands resulted in three tiers of functional value scores. Wetlands 17A, 1B, 12A, 11, 12B, 5A, and 8 stood out as ranking highest among the group. Nine wetlands (18B, 20D, 23/24, 18A, 10, 20C, 14A, 20E, and 15A) had intermediate functional value scores. The lowest ranking sites included (17B, 21B, 2D, 15D, 14C, 14B, and 5B). Further attention should be given to lower ranking sites to ensure that important values that may not be expressed well in numerical rankings, such as rare species habitat, are properly considered.

1 Introduction

Under State of New Hampshire statute (RSA 482-A:15), communities like Hudson are permitted to designate wetlands of exceptional value within their borders as "prime wetlands." Once designated, these prime wetlands and their surrounding upland buffer are granted a higher level of protection, including greater scrutiny of applications for dredge and fill permits. This report provides a thorough and systematic study of all major wetland systems, which is a critical first step in identifying prime wetlands within Hudson.

This Prime Wetlands Study report provides information on the major wetland systems in Hudson, including a description of the geological and biological characteristics of each. Most importantly, this report provides quantitative data on the functional values performed by each wetland. The scores are for comparison only to other wetlands in Hudson and do not necessarily reflect the scores that similar wetlands in other towns might receive (*e.g.*, where all wetlands may be scarce and hence found to be of high value). A critical component of the present study was the creation of a prime wetlands map (attached separately), which follows the strict standards specified in both NH RSA 482-A and the NH Wetlands Administrative Rules (Wt 700) dealing with prime wetlands.

To conduct the evaluation of candidate prime wetlands, VHB utilized the *Method for Comparative Evaluation of Nontidal Wetlands in New Hampshire* (Ammann and Stone1991) that is recommended by the NH Department of Environmental Services (NHDES). This rigorous methodology focuses the evaluation on the most significant functions (from an ecosystem standpoint) and values (from a public benefit standpoint) provided by the wetlands.
To create the prime wetlands map, VHB used Geographic Information Systems (GIS) databases to identify important resource "layers," Global Positioning Systems (GPS) techniques to accurately locate features and boundaries on the ground, and aerial photo-interpretation to supplement this information. All of this information was then combined with extensive field investigations to produce a map of proposed prime wetlands. A formal Public Hearing and town-wide referendum will be necessary before these candidate wetlands are officially designated as prime.

2

Environmental Setting

Hudson lies in the southeastern portion of Hillsborough County, along the Massachusetts border. Landforms in the town are predominantly low hills throughout the central and east areas, with gently sloping to relatively level plains along the Merrimack River to the west. The highest point in town is Bush Hill along the eastern edge of town, with an elevation of 515 feet.

Most of the gently rolling hills north and west of Robinson Pond, in the northern part of town are underlain by a granitic formation that is part of the NH Plutonic Suite, with the bulk of the town underlain by metasedimentary rock of the Berwick formation.

The surficial geology of Hudson was formed during the late glacial period, approximately 14,000 to 10,000 years ago. At that time, a continental glacier up to a mile thick scraped and crushed the land, leaving behind "glacial till", an unsorted mixture of angular rock fragments and loamy or sandy sediments. Glacial till deposits in Hudson are predominantly of the Chatfield-Hollis complex or the Canton soil series. Chatfield-Hollis soils are loamy sediments that are well drained to somewhat excessively drained and are shallow to bedrock. Canton soils are deep well drained soils with loamy upper layers, but become sandier in the substratum.

As the glacier melted and retreated, the meltwaters sorted the sediments once carried by the glaciers and transported them along the Merrimack River Valley. In this area there are large "glacial outwash" deposits of well sorted sands and rounded gravel laid down in gently sloping hills, terraces, and plains. The glacial outwash deposits in Hudson are predominantly excessively drained sandy Windsor soils, but include large areas of excessively drained Hinckley sand and gravel deposits as well.

The most recent landforms and surficial deposits in town lie in a narrow band along the Merrimack River as part of the floodplain. Here are floodplain soils that were formed during major flooding events of the Merrimack. These areas are predominantly Occum soils, which are well drained alluvial sediments that are free of stones and have stratified layers of loamy and sandy textures.

Each of the predominant upland soil types formed from glacial till, glacial outwash, or recent floodplains include wetland soils formed from similar parent materials. Areas with glacial till and shallow bedrock tend to include many springs, seeps, and gently sloping wetlands in lower landscape positions. This is because infiltrating precipitation moving downward through the soil in these areas often encounters restrictive layers or bedrock causing it to travel laterally to discharge points. Upland glacial outwash deposits typically allow deep infiltration of precipitation and are particularly important as potential groundwater aquifers. Wetlands in these areas are often associated with groundwater discharge. Wetlands in floodplains tend to be sinuous secondary channels that flood often. Many of the most important wetlands in town lie at the interface of glacial till and glacial outwash.

3 Methodology

3.1 Existing Information Retrieval and Base Map Development

An appropriate base map for overlaying the boundaries of candidate prime wetlands was created using digital, high resolution orthophotography supplied by the Town of Hudson. Physical features, including public roads and watercourses, were added from the GRANIT GIS database maintained by the University of New Hampshire. Other information that was collected included:

- Wetland Boundaries (supplied by Hudson)
- Zoning and Tax Parcel Boundaries (supplied by Hudson)
- USGS Topographic Quadrangles covering Hudson (4 total – Nashua North, Nashua South, Windham, Lowell)
- NRCS Hydric Soils Mapping (GRANIT)
- Fish Stocking Information (NH Fish and Game Department)
- NH 305(b) Water Quality Report to Congress
- FEMA Floodplain Maps (GRANIT)
- National Wetlands Inventory (NWI) Maps (GRANIT)
- NHDES Well Inventory Data
- USGS Stratified Drift Aquifer Mapping (GRANIT)
- USGS Surficial Geology Mapping (GRANIT)
- Land Use Mapping (GRANIT)
- Conservation Lands (GRANIT)
- National Register of Historic Places
- NH Natural Heritage Inventory Data

The boundaries of all watersheds, including sub-watersheds, were determined using a combination of GRANIT information, ESRI ArcHydro Software, and visual inspection of the USGS-based topography

3.2 Field Investigations and Mapping

3.2.1 Initial Screening of Wetlands

A combination of GIS analysis and field inspections were used to screen wetland systems for evaluation.
The criteria developed for identifying candidate prime wetlands for detailed field investigation included:

1. All 6-acre or larger wetlands or wetland complexes mapped by the National Wetlands Inventory (US Fish & Wildlife Service).
2. Those 6-acre or larger NWI wetlands that are also dominated (*i.e.*, greater than 50 percent area) by very poorly drained soils.
3. Wetlands that are narrow and linear complexes were selected against for this study (*i.e.*, narrow riparian wetlands that occupy only the immediate vicinity of a stream channel). Instead, those riverine influenced wetlands with large expanses of associated marsh, scrub/shrub, and/or forested wetlands as detailed by NWI mapping or aerial photo interpretation were recognized as potentially prime wetlands.
4. Wetlands that were in close proximity to rare plants, wildlife and natural communities as mapped by the NH Natural Heritage Bureau.

3.2.2 Mapping/boundary Evaluations

The wetland base map and overlays were originally compiled into a GIS-based project. From the GIS software, background files (images) were created for each candidate prime wetland. The background files contained the wetland boundary, orthophotography, contour intervals, and hydrography. The background files were then loaded onto a ruggedized Tablet PC for field evaluations. Using Trimble TerraSync GPS software, the field crews were able to use the background files to navigate to, and evaluate each candidate prime wetland.

Prime wetland boundaries were validated directly in the field using the TerraSync software. As the field crew traversed the wetlands edge, they were able to verify the existing boundary and make modifications to the boundary when necessary.

3.3 Functions and Value Assessment

A total of 28 wetlands were selected for further evaluation for their prime wetland status. During the process of obtaining land owner permission, five wetlands were removed from the study set, resulting in a total of 23 candidate prime wetlands. All were evaluated using the procedures outlined in the *Method for the Comparative*

Evaluation of Nontidal Wetlands in New Hampshire, (The NH Method) (Ammann and Stone 1991). The NH Method provides a defensible scientific approach for evaluating wetlands at the local level (typically a town or watershed). This procedure requires that the wetlands be scored on a minimum of 14 functional values described as follows:

1. **Ecological Integrity –** Evaluates the overall health and function of the wetland ecosystem.

2. **Wetland Wildlife Habitat –** Evaluates the suitability of the wetland as habitat for those animals typically associated with wetlands and wetland edges. No single species is emphasized.

3. **Finfish Habitat –** Evaluates the suitability of watercourses, ponds, or lakes associated with the wetland for either warm water or cold water fish. No single species or group of species is emphasized.

4. **Educational Potential –** Evaluates the suitability of the wetland as a site for an "outdoor classroom."

5. **Visual Aesthetic Quality –** Evaluates the visual and aesthetic quality of the wetland.

6. **Water-based Recreation –** Evaluates the suitability of the wetland and associated watercourses for non-powered boating, fishing, and other similar recreational activities.

7. **Flood Control Potential –** evaluate the effectiveness of the wetland in storing floodwaters and reducing downstream flood peaks.

8. **Ground Water Use Potential –** Evaluates the potential use of the underlying aquifer as a drinking water supply.

9. **Sediment Trapping –** Evaluates the potential of the wetland to trap sediment in runoff water from surrounding upland.

10. **Nutrient Attenuation –** Evaluates the potential of the wetland to reduce the impacts of excess nutrients in runoff water on downstream lakes and streams.

11. **Shoreline Anchoring and Dissipation of Erosive Forces** - Evaluates the effectiveness of the wetland in preventing shoreline erosion.

12. **Urban Quality of Life** (as influenced by Wetland Wildlife Habitat, Educational Opportunity, Visual/Aesthetic Quality, and Water-based Recreation values) – Evaluates the potential for the wetland to enhance the

quality of urban life by providing wildlife habitat and other natural values in an urban setting.

13. **Historical Site Potential –** Evaluates for indications of use by early settlers.

14. **Noteworthiness –** Evaluates the wetland for certain special values such as critical habitat for endangered species, etc.

With the NH Method, scoring for each functional value (with one exception) is weighted based on the size of the wetland with the presumption that larger wetlands provide a greater value or benefit. The one exception, Noteworthiness, is intended to balance this bias and ensure that small wetlands that are of particular importance, such as bogs or small wetlands with rare species, are identified and considered for prime wetland designation.

Using the base map and data collected in the field, we completed a series of standard data sheets to calculate an average Functional Value Index (FVI) for each of the 14 functional values for the 23 wetlands. These data were then entered into a customized electronic spreadsheet that automatically calculated an average for each Functional Value and then multiplied them by wetland size (in acres), to provide a total number of Wetland Value Units (WVUs) for the particular wetland.

In order to provide a quick comparison among the candidate wetlands, we also calculated an average FVI and average WVU for each candidate wetland. Intuitively, these latter averages provide an index to both "quality" of the wetland as well as the "quantity" of its value.

4

Candidate for Wetlands

Wetland 1B – Chase Brook Swamp

Wetland 1B is a large wetland system (66.3 AC). It is located in northern Hudson in Litchfield Tributaries sub-watershed, north of Derry Road, extending west well beyond the Hudson/Litchfield town line. West Road is located to the east, and the northern wetland edge is bounded by an active landfill and Old Landfill Road. Wetland cover types are highly interspersed in the eastern half of the site. The western half of the site consists mainly of broad, emergent wetlands surrounding Chase Brook with a diffuse, meandering channel flowing west over the town line into Litchfield. Although public access is not available at the site, the wetland can viewed from Old Land Fill Road and portion of Route 102. An informal canoe launch, located downstream off of Pilgrim Drive in Litchfield, provides limited access to the wetland.

Both fingers of the eastern portion of the site contain high interspersion of forested, shrub and emergent wetlands with similar vegetative communities but shifting dominance of species. The northern finger contains PFO wetlands mainly at its center with red maples (*Acer rubrum*) in the over story white pines (*Pinus strobus*) on hummocks. The understory is fairly open but has light distribution of white oak (*Quercus alba*) saplings and American elm (*Ulmus americana*) saplings, with highbush blueberry (*Vaccinium corymbosum*), common winterberry (*Ilex verticillata*) and speckled alder (*Alnus incana ssp. rugosa*) in the shrub layer. Groundcover consists of cinnamon fern (*Osmunda cinnamomea*), sedges (*Carex* spp.) and *Sphagnum* moss. Interspersion of PEM/PSS cover types occurs mainly at the margins of the northern finger with patchy areas of tussock sedge (*Carex stricta*), broadleaf cattails (*Typha latifolia*) and standing water alternating with shrub areas of winterberry, grey-stem dogwood, red-osier dogwood, sensitive fern and arrowwood (*Viburnum dentatum*). Areas with less dense areal cover of red maples tend to be wetter and with a higher concentration of broadleaf cattails.

The southern finger has greater interspersion of PEM and PSS wetland cover types throughout the entire area and has fewer forested wetlands than the northern finger.

PFO wetlands, where they do occur, are dominated by red maple but frequently contain mature white pines on hummocks and with buttressed roots, especially at the easternmost wetland extent. This may be an indication of recent changes to the hydrology, causing increased flooding into upland areas. Broadleaf cattails are common in the wettest areas, but tussock sedge is more often dominant. Red maples are present in varying dominance throughout the wetland area; however, most often represent less than 30% of total cover. Patchy distribution of shrub wetlands contain highbush blueberry, speckled alder, meadow-sweet (*Spiraea alba var. latifolia*) and winterberry, and emergents include tussock sedge, purple loosestrife (*Lythrum salicaria*), sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*), swamp dewberry (*Rubus pubescens*), and flat-topped white aster (*Aster umbellatus*).

The majority of the western half of Wetland 1B is dominated by a near monoculture of broadleaf cattail. Tussock sedge and soft rush (*Juncus effusus*) are also present but are never dominant. Narrow shrub wetlands infrequently border the upland forested edge, consisting of highbush blueberry and speckled alder.

Soils within this wetland system are characterized by NRCS as Greenwood Mucky Peat to the north, Ponded Borohemists to the south, nearly level Borohemists to the southwest, and a small area of Pipestone Loamy sand to the east. Greenwood soils are deep very poorly drained organic soils that are at least 51 inches thick. Borohemists are very poorly drained organic soils that are at least 16 inches thick over mineral sediments. Pipestone soils are poorly drained stratified sands formed in glacial outwash.

Wetland 2D – Boyd Swamp Complex

Wetland 2D is a moderate sized wetland (8.1 AC), located in the northern portion of Hudson, in the Litchfield Tributaries sub-watershed. It is bounded by Boyd Road to the west, east of the utility right-of-way and extends north over the town line between Hudson and Londonderry. A single, small pool occurs within the northeastern section of the wetland, which eventually drains southwesterly to Chase Brook in Londonderry. Wetland 2D is located within the headwaters of Chase Brook, and provides moderate buffer protection from adjacent development. A larger ponded area is located adjacent to the eastern boundary of the wetland, but it has been separated by a manmade berm and is no longer hydrologically connected. Evidence of historical ditching is present in central portions of the wetland by means of a small system of man-made channels.

The majority of Wetland 2D is forested. The western finger, extending toward the utility right-of-way, contains red maple and American elm as codominants in the canopy with dense shrub understory of American elm saplings, highbush blueberry and winterberry. Herbaceous vegetation includes sedges, reed canary grass (*Phalaris arundinacea*), *Sphagnum* moss and sensitive fern. To the east, forested wetlands maintain the red maple canopy cover, but American elm largely falls out. The

understory is also more open with cinnamon fern, royal fern, some sensitive fern, Sphagnum moss and tussock sedge, as well as sparse shrub vegetation primarily consisting of highbush blueberry. This forested wetland community type is the most common throughout Wetland 2D. Dense shrub wetlands do occur infrequently within this forested setting, again consisting primarily of highbush blueberry.

Emergent wetland cover is uncommon within this wetland system, and it is limited to two relatively small areas. The westernmost portion of the wetland extends slightly into the utility right-of-way. As this area is maintained, forested cover is not able to develop, and instead, a community of tussock sedge, cinnamon fern, *Sphagnum* moss, reed canary grass, raspberry (*Rubus* sp.) and broadleaf cattail proliferates. Speckled alder, highbush blueberry and grey-stem dogwood are sparsely interspersed, as well. The other area of emergent cover lies in the northeastern portion of Wetland 2D, surrounding a small pool feature. Vegetation includes reed canary grass, woolgrass (*Scirpus cyperinus*) and soft rush. Red maples are sparsely distributed and sporadic throughout the area.

Soils within this wetland system are characterized by NRCS as Chocorua Mucky Peat to the north, and a small area of Scarboro Stony Mucky Loamy Sand to the southwest. Both soil types are very poorly drained, with the Chocorua soils consisting of 16-51 inches of organic soils overlying sandy mineral deposits and the Scarboro soils having less than 16 inches of organic materials overlying the sand.

Wetland 5A – Robinson Pond Wetlands

Wetland 5A is a relatively large wetland (35.1 AC) adjacent to the northwestern shoreline of Robinson Pond, between Robinson Road and Stony Lane. Wetland 5A and Wetland 5B are both located in the Upper Beaver Brook watershed, which eventually drains to Beaver Brook in Pelham. Trail access to the wetland is provided at Woodcrest Drive, where off-street parking is available. Wetland cover types are moderately interspersed with densely vegetated PEM, PSS, and PFO wetland classes surrounding a larger, shallow open water/emergent marsh area. This more open area composes the majority of the southern and central portion of the wetland system fed by meandering channels and diffuse drainage from the north and west. Soils in this area are characterized by NRCS as Ponded Borohemists, a very poorly drained soil consisting deep organic material.

A finger of forested wetland extends southwest from the transitional emergent wetlands below the western drainage channel. Forested wetlands also border the upland fringe to the northwest, south of the northern drainage channel. Dominant overstory vegetation includes red maple and white oak with green ash (*Fraxinus pennsylvanica*) in the understory. Common shrubs include arrowwood and highbush blueberry, and the herbaceous layer consists of cinnamon fern (*Osmunda cinnamomea*), hellebore (*Veratrum veride*), soft rush (*Juncus effusus*), and sedges (*Carex* spp.).

Shrub wetlands most commonly occur in narrow fringes transitioning from forested wetland to emergent or open water wetland. Common species include speckled alder, arrowwood, and tartarian honeysuckle (*Lonicera tartarica*).

Emergent vegetated communities occur largely interspersed with open water habitat throughout the southern and north-central portions of the wetland system but occur more densely adjacent to these open water areas and along the two defined drainage channels. Vegetation associated with this habitat includes a quick transition from PFO to PEM and open water, frequently with highbush blueberry at the fringe and aquatic emergents and water lilies (*Nymphaea sp.*) in open water. The southernmost portion of the wetland consists of small islands of patchy bog vegetation with black spruce (*Picea mariana*) and American Larch (*Larix laricina*).

The northern drainage channel originates at a 15-inch steel culvert passing under Robinson Road. A portion of the channel, extending from the road appears to be channelized. The western channel meanders with somewhat diffuse drainage, in places, and braided morphology. Both channels are approximately 8-feet wide with low volume flows and dense emergent vegetation almost completely enclosing the channel. The vegetated communities consists largely of jewelweed (*Impatiens capensis*), broad-leaf cattail, sedges, sensitive fern, royal fern (*Osmunda regalis*), and hellebore (*Veratrum veride*).

Surrounding land use is largely rural/residential development along Robinson Road and Parker Drive to the east, with a relatively narrow upland buffer consisting of the back yards of house lots. The western wetland edge, toward Beechwood Road and Stony Lane, is located within the Parker Preserve Conservation Area, and has a larger upland buffer separating wetlands from residential lots by approximately 400 to 1,000 feet. Forested uplands consist mainly of white pines (*Pinus strobus*) in the canopy with interspersed red oak (*Quercus rubra*) and red maple.

Robinson Pond was named for the Family of Simeon Robinson. Robison purchased the land in 1763 and moved here with his family in 1767. The farmhouse is located on the east side of Robinson Road (near J. Preston homestead) located uphill from wetland, however the farm fields extended into the wetland area. Both the farmhouse and the J. Preston homestead are depicted on 1905 USGS maps. Historical records also indicate blueberry picking used to take place in the current wetland.

Wetland 5B – Robinson Pond Wetlands

Wetland 5B is a relatively small wetland system (1.7 AC) located northeast of the intersection of Robinson Road and Griffin Road, east of Robinson Pond. Over half of the wetland occurs within a managed utility right-of-way, with the other portion extending east into a forested area. Leicester-Walpole Complex Stony, which consists

of intermixed poorly drained loamy glacial till with poorly drained sandy glacial outwash.

The portion of the wetland within the utility right-of-way consists of emergent vegetation and contains some interspersion of flooded/ponded areas created by recent beaver activity. A beaver dam is located at the northwestern corner of the wetland. Common emergent vegetation includes tussock sedge, purple loosestrife, sensitive fern, broad-leaf cattail, poison ivy (*Toxicodendron radicans*), swamp dewberry, and raspberry (*Rubus* sp.).

The forested portion of the wetland is flooded, likely due to recent beaver activity, as ponded water extends above the previously mapped wetland boundary. An intermittent stream also contributes to the wetland, with an inlet channel at the northeastern corner of the wetland. Dominant vegetation in the forested wetland includes American elm (*Ulmus americana*) and red maple in the canopy with highbush blueberry in the shrub layer. Cinnamon fern (*Osmundastrum cinnameum*) and jewelweed make up the herbaceous layer. Adjacent uplands are forested with white pine and red maple with witch hazel, Virginia creeper (*Parthenocissus quinquefolia*) and club moss (*Lycopodiaceae sp*.) in the understory.

Wetland 8 – Glover Brook Marsh Complex

Wetland 8 is a large wetland system (35.01 AC) feeding the headwaters of Glover Brook, and is part of the Merrimack Mainstem-Nashua River to Concord River sub-watershed. It is located to the west of Robinson Pond and between Pinewood Drive and Hazelwood Road. Wetland classes for the majority of the system include PEM and PSS; however, PFO wetlands frequently occur at the outer fringe, adjacent to forested uplands. The system's inlet is located at the northwestern corner as a stream passes under Pinewood Drive and flows south to the open wetland area. The system's outlet is located at the southwestern corner, draining to an open water area before feeding into Ottarnic Pond via Glover Brook. Evidence of historical draining efforts can be found in the south central portion of the wetland, where a series of drainage lines run from east to west.

Shrub wetlands compose over half of the system, covering its northeastern portion and extending to the tree line at the back of the house lots on Pinewood Drive. Shrub vegetation is dominated by dense speckled alder and interspersed with red maple saplings, royal fern, jewelweed, broad leaf cattail and sedges, with multi-flora rose (*Rosa multiflora*) and highbush blueberry primarily at the margins. The transitional area between the system's northern PSS and southern PEM cover types has high interspersion of both types, with a lower density of speckled alder.

Emergent wetlands occur in the southern portion of the wetland system, draining to an open water area at the southwestern corner. Vegetation density is highest at the transition to shrub wetlands to the northeast and lowest as it approaches open water.

The lower extremities have interspersion with standing water, and provide valuable habitat to waterfowl. Dominant emergent wetland vegetation includes broad-leaf cattail, sedges, jewelweed, sensitive fern, royal fern and hellebore.

Marginal areas of the system's PEM wetlands extend beyond the tree line, providing some narrow areas of forested wetland and areas of interspersed emergent and shrub wetlands within a forest setting. Red maple is clearly dominant with some white oaks toward the upland edge. Speckled alder and highbush blueberry dominate the shrub layer in the understory alternating with dense patches of winterberry. Northern arrowwood and glossy buckthorn (*Frangula alnus*) are also present.

Soils within this wetland system are characterized by NRCS as nearly level Borohemists, Scarboro Stony Mucky Loam Sand, and Leicester-Walpole Complex Stony. Borohemists are very poorly drained organic soils that are at least 16 inches thick over mineral sediments. Scarboro soils having less than 16 inches of organic materials overlying the sand.

The entire wetland is protected as conservation land, but is essentially cut off from adjoining wetlands and undeveloped open space. Wetland 8 is almost completely surrounded by residential development along Pinewood Drive, Hazelwood Road and Oliver Road, and a sand and gravel operation to the west borders the ponded waters at the outlet. Public access to the wetland is possible using trails off of Hazelwood Road and Pinewood Drive.

Wetland 10 – Town Forest Red Maple Swamp

Wetland 10 is a large wetland (20.3 AC) located in the eastern portion of Hudson, south of Beaver Brook and near the border with Pelham. The wetland is part of the Merrimack Mainstem-Nashua River to Concord River sub-watershed. Greenfield Drive to the north, Clement Road to the west and Kimball Hill Road to the south, frame Wetland 10. The eastern edge of the wetland extends across and slightly beyond a utility right-of-way into the Hudson Town Forest Conservation Area. Informal parking is available from the Town Forest along Kimball Hill Road. The majority of the wetland is composed of red maple swamp with adjacent large open water areas and with emergent cover, upland islands and small pools interspersed, especially in the southern third of the wetland complex. Soils within this wetland system are characterized by NRCS as nearly level Borohemists, very poorly drained soils. Borohemists are very poorly drained organic soils that are at least 16 inches thick over mineral sediments.

The northern two-thirds of the complex are primarily forested with young red maples in the canopy (average 5" DBH). Dead snags are composed of larger trees in at the center of the PFO and the understory is seasonally or semi-permanently flooded in the hollows, with standing water at the time of the field visit (October 2008). Understory shrubs are somewhat sparse and consist primarily of highbush

blueberry. Herbaceous vegetation includes sedges, marsh fern, woolgrass, purple loosestrife and cinnamon fern. Dead white birch (*Betula alba*) and white pine (*Pinus strobus*) stems occur along the wetland margin, indicating recent changes leading to increased hydroperiod. Further evidence of the recent change includes a lack of woody wetland vegetation, while cinnamon fern, royal fern, purple loosestrife, and tussock sedge form the groundcover below large pines. Upland islands are scattered throughout this forested portion, dominated by large white pines and surrounded by dense highbush blueberry and speckled alder at the wetland edge.

Large permanently flooded open water areas occur along the edges of the wetland, to the south, east and west of the large northern red maple swamp. Water depth is between 1 and 3 feet. Aquatic bed vegetation includes water lilies with patchy mixed graminoid emergent vegetation closer to the edges. Adjacent PEM vegetation includes purple loosestrife, broadleaf cattail, woolgrass, marsh fern, tussock sedge, aster, sensitive fern, reed canary grass and bluejoint grass. Shrub wetlands near the upland edge are thin when present and consist mainly of glossy buckthorn, common winterberry and gray birch.

The southern and eastern portions of Wetland 10 have a high interspersion of the various wetland classes with a patchwork of PFO, PSS, PEM and open water cover types. Shrub vegetation largely exists as a thin transitional fringe between the forest edge and central PEM portions. Upland islands and dense cattail stands are sporadic throughout the southern portion, as well.

The eastern edge of Wetland 10 extends through a maintained utility right-of-way, which can be access from the Town Forest Conservation Area. This area mainly consists of permanently flooded open water areas approximately three feet deep. Emergent vegetation transitions to water lilies around the periphery. There is no aquatic bed vegetation toward the center. PEM vegetation is dominated by bluejoint grass but also includes purple loosestrife, tussock sedge, meadow-sweet, woolgrass, aster, marshfern and patchy broadleaf cattail stands.

The northeastern corner of the wetland is protected as conservation land, extending east into forested uplands. The remaining wetland periphery consists of developed house lots, and further development encroaching on Wetland 10 is unlikely. Although there is a relatively high level of residential development in the adjacent uplands, filling of the original wetland appears to be very minimal or nonexistent.

Wetland 11 – Little Ottarnic Pond Swamp

Wetland 11 is one of the larger wetlands included in this prime wetlands study (46.24 AC) found within the Litchfield Tributaries sub-watershed. It is located west of Ottarnic Pond and surrounds Little Ottarnic Pond, with Highland Street to the south, Lindsay Street and Vernon Street to the west, Ledge Road to the north, and Power Street to the east. The majority of the area is forested wetland, but an east-west,

shrub-dominated utility right-of-way, approximately 150 feet in width, bisects the system. Although no public trails exist, access to the wetland is possible from the Polish cemetery, located off of Ledge Road.

The majority of the wetland is forested with red maple dominant in the overstory along with some gray birch (*Betula populifolia*) and balsam fir (*Abies balsamea*). Common shrubs include highbush blueberry and glossy buckthorn. Cinnamon fern is common in the herbaceous layer.

A private road splits off of Power Street going west to Little Ottarnic Pond at the center of the wetland system. As the road enters the wetland boundary, an area of red maple swamp is visible to the north across the utility right-of-way. This swamp includes shallow areas of pooled water and contains standing dead snags. The understory is shrub-dominated by gray birch and red maple saplings, joe-pye weed (*Eupatorium pupureum*), giant goldenrod (*Solidago gigantea*), meadow-sweet (*Spiraea alba var. latifolia*) and broadleaf cattail.

The managed utility right-of-way bisecting the wetland system consists of dense shrub vegetation dominated by winterberry (*Ilex verticillata*) and highbush blueberry with scattered red maple saplings. Herbaceous vegetation includes a high density of woolgrass (*Scirpus cyperinus*), broadleaf cattail, meadowsweet, sensitive fern, purple loosestrife (*Lythrum salicaria*), sedges, marsh fern (*Thelypteris thelipteroides*), cinnamon fern, swamp dewberry (*Rubus pubescens*), and sphagnum moss (*Sphagnum* sp.).

Soils within this wetland system are characterized by NRCS as Water (less than 40 acres), Chocorua Mucky Peat, and Pipestone Loamy Sand. Chocorua Mucky Peat is a very poorly drained soil consisting of 16-51 inches of organic soils overlying sandy mineral deposits. Pipestone Loamy Sand is a poorly drained soil consisting of stratified sands formed in glacial outwash.

The majority of Wetland 11 is located on Town-owned property, but is not currently under protection as conservation land. Although the northeastern boundary is adjacent to a block of minimally fragmented upland forest, the surrounding land use effectively cuts off Wetland 11 from access to other nearby wetlands and eliminates access from wildlife travel routes. High density residential development occurs along Highland Street to the south and Vernon Street and Lindsay Street to the west.

Wetland 12A – Ottarnic Pond Marsh

Wetland 12A surrounds approximately 4,000 feet of channel on lower Glover Brook as it flows south and discharges at the northern edge of Ottarnic Pond. It is one of the larger wetlands included in this prime wetlands study (47.53 AC). Contiguous with the edge of the pond, Wetland 12A follows the northern bank for approximately 1,300 feet. Highland Street to the west and Greeley Street and Monroe Drive to the

east parallel the wetland edges. Historical records indicate several historical structures in this area, but none of which are located adjacent to the wetland.

Wetland 12A consists almost completely of emergent vegetation with a very distinct boundary extending to the upland forested edge. Dense emergent cover is highly interspersed with ponded/flooded areas of open water, which provide excellent habitat for waterfowl as well as flood control potential, as the wetland system is closely associated with and contiguous to Ottarnic Pond. The vegetated community is fairly uniform throughout the main body of the wetland with dominant tussock sedge (*Carex stricta*), purple loostrife, woolgrass and broadleaf cattails. Cinnamon fern and other sedges are also common. Fringe shrub wetlands, where they do occur, include red maple saplings, black willow (*Salix nigra*), black huckleberry (*Gaylussacia baccata*), sedges, sensitive fern and jewelweed. A lobe of dense vegetation consisting almost completely of broadleaf cattails and purple loosestrife occurs along the northwestern edge of Wetland 12A. This area extends as far as the utility right-of-way running southwest to northeast.

Adjacent forested uplands are dominated by white pines (*Pinus strobus*) and red oaks in the overstory. Several upland islands occur throughout the wetland system, particularly in the northern portion.

Beaver activity downstream has caused flooding, especially in the lower extremities of Wetland 12A, resulting in open water habitat creation over the past seven to eight years, according to landowners. These open water habitats are dominated by water lilies (), broadleaf arrowhead (*Sagittaria latifolia*) and other aquatic bed vegetation, with speckled alder, meadow sweet, glossy buckthorn and jewelweed on the slightly drier fringe.
Lower Glover Brook meanders through Wetland 12A with a poorly defined channel. Banks are not distinct and drainage is quite diffuse. Where a channel is discernable, substrate consists of fine silt and may be as deep as 1-5 feet in pools.

Soils within this wetland system are characterized by NRCS as Water (less than 40 acres), Chocorua Mucky Peat, and Pipestone Loamy Sand. Chocorua Mucky Peat is a very poorly drained soil consisting of 16-51 inches of organic soils overlying sandy mineral deposits. Pipestone Loamy Sand is a poorly drained soil consisting of stratified sands formed in glacial outwash.

Wetland 12B – Ottarnic Pond
Marsh - East

Wetland 12B is one of the larger wetlands included in this prime wetlands study (41.05 AC). Wetland 12B surrounds approximately 2,000 feet of lower Merrill Brook as it flows west and discharges at the western edge of Ottarnic Pond. Contiguous with the edge of the pond, Wetland 12B follows the eastern bank for approximately 1,000 feet. Wetland 12B is bordered on the north by Madison Drive, on the south by

Ferry Street, Burnham Road and Windham Road, and on the east by the Krystal Drive cul-de-sac.

Wetland 12B is very similar to Wetland 12A, consisting almost completely of emergent vegetation with a very distinct wetland boundary extending to the upland forested edge, but with less saturation and greater interspersion of wetland classes at the perimeters. There are also fewer ponded/flooded areas with open water, although those present provide habitat for waterfowl that may also utilize Ottarnic Pond. The close association with Ottarnic Pond also creates flood control potential. It is likely that Wetland 12A may have looked more like this wetland prior to the beaver damming in its lower reaches.

The vegetated community is moderately uniform throughout the main body of the wetland with dominant purple loostrife, broadleaf arrowhead, reed canary grass (*Phalaris arundinacea),* woolgrass, sedges and broadleaf cattails. Patchy areas of red maple saplings are infrequently scattered throughout the wetland. Sensitive fern, cinnamon fern and other sedges are more common along the fringe. Fringe shrub wetlands, where they do occur, include gray birch and red maple saplings, speckled alder, highbush blueberry, glossy buckthorn, multiflora rose, sedges, sensitive fern and jewelweed. Occasional areas of forested wetlands occur in thin marginal bands with red maple dominated canopy and white pines and red oaks in the adjacent uplands. Understory vegetation mainly includes highbush blueberry, sensitive fern and jewelweed.

Lower Merrill Brook, as it flows through Wetland 12B toward Ottarnic Pond, loses its defined channel and drainage is very diffuse. Many small side channels contribute throughout the central portion of the wetland. Substrate consists of fine silt and detritus in pooled areas, but there are no defined banks.

Soils within this wetland system are characterized by NRCS as Water (less than 40 acres), ponded Borohemists, and Greenwood Mucky Peat. Borohemists are very poorly drained organic soils that are at least 16 inches thick over mineral sediments. Greenwood soils are deep very poorly drained organic soils that are at least 51 inches thick.

ATV and hiking trails follow the perimeter of the wetland. In addition, the former Nashua Lawrence Electric Railroad bed used to run from Taylor's Falls Bridge across Wetland 12B and continuing east. Although, there is a fair bit of human activity in the adjacent uplands, there is very little direct human interaction with the wetland. The southwestern corner of Wetland 12B is protected as conservation land as it approaches a residential area along Marshmallow Path.

Wetland 14A – Merrill Brook Swamp

Wetland 14A is wetland complex of intermediate size within the Merrimack Mainstream-Nashua River to Concord River sub-watershed, located in the central portion of Hudson and is located on the property formerly known as Benson's Animal Farm. In 2009, the Town of Hudson purchased the property from NHDOT. Many of the Park's buildings remain in the uplands along with paved pathways, gates, stairways and other remnants of the park. These dilapidated remains do not extend into the wetlands; however, and the wetland system appears to have expanded in recent years, due to a high level of beaver activity. The area has also become naturalized due to restrictions of public access to the area.

Wetland 14A contains high interspersion of wetland classes. The complex contains PEM, PSS and PFO cover types of various vegetated communities, along with open water features scattered throughout the complex. Merrill Brook forms a defined channel flowing northwest from the central portion of the system. Merrill Brook enters Wetland 14A from the southeast via a culvert under the old Nashua Lawrence Electric Railroad bed, and takes drainage from the southwestern portion of the complex and from adjacent eastern wetlands cut off by a private road. Merrill Brook eventually drains to a culvert under Route 111 to Ottarnic Pond. Numerous adjacent wetland systems occur in the vicinity.

The northwestern finger of Wetland 14A consists of highly interspersed emergent and shrub wetland types. A large alder shrub thicket composes the westernmost portion of the finger, containing speckled alder, reed canary grass and sedges with some occurrences of broadleaf cattails in wetter areas. The eastern half of the finger alternates between smaller, patchy areas of alder shrub thicket and dense stands of cattails. These cattail areas also contain reed canary grass and lesser abundance of purple loosestrife and tussock sedge. In transition to the northern portion of the wetland, cattails become limited to the outer fringe and reed canary grass, sedges and purple loosestrife take dominance. Small pooled areas are scattered throughout this area, as well.

The northeastern portion of Wetland 14A includes a linear ditch, extending east from the perennial stream channel along its western boundary. The stream's western bank extends directly to grassy uplands. The channel is approximately 10 to 15 feet wide and 1 to 2 feet deep with muck bottom and open canopy. The stream is low gradient but has very little sinuosity. However, there appears to be no channelization. Banks are well-defined and overhung with tall emergent vegetation. Numerous beaver slides are present along the upland left bank. Infrequent red maple saplings line the wetland right bank. The adjacent wetland to the east consists of dense emergent vegetation including dominant reed canary grass interspersed with purple loosestrife and tussock sedge. Arrowwood and red maple saplings are scattered throughout the PEM cover type. A scrub-shrub fringe borders forested uplands on the eastern boundary with arrowwood, speckled alder, silky dogwood, highbush blueberry,

cinnamon fern and tussock sedge. Further south, along the channel, the emergent wetland transitions into a dense cattail stand with tussock sedge, other sedges, and soft rush mixed in.

Recent beaver activity in the south-central portion of the site has caused increased flooding, interconnecting pocket wetlands and adjacent systems. These connections, especially in the vicinity of the stream channel, have expanded the system across historic boundaries such as dirt roads and pathways. Interspersion of upland bars, peninsulas and islands are also the result of the joining of these wetland parts. Wetland cover types are predominantly emergent with scattered pool features and fringe shrubs at the edges of flooded roadways. These shrubs may include black willow (*Salix nigra*), white oak saplings and green ash saplings. Emergent vegetation consists of a mixed graminoid community with reed canary grass, tussock sedge, giant goldenrod (*Solidago gigantea*), multiflora rose (*Rosa multiflora*), purple loosestrife and softrush. Dense stands of broadleaf cattails occur predominantly toward the center of the wetland area. Forested wetlands are limited to a single depression in this south-central portion of the wetland. Canopy cover is dominated by red maple with an open understory and ground cover consisting of cinnamon fern, sensitive fern and reed canary grass. Adjacent uplands consist mainly of white pine and red oak communities, but some early successional areas are interspersed with white birch (*Betula alba*) and quaking aspen (*Populus tremuloides*), with larch in transitional wetland/upland areas.

The southern portion of the site consists of emergent wetlands surrounding ponded water features. Beaver activity has increased the saturation and flooding of this area over the past decade. Dominant vegetation consists of broadleaf cattails, reed canary grass, tussock sedge and other sedges.

Soils within this wetland system are characterized by NRCS as Scarboro Mucky Loam Sand, and Greenwood Mucky Peat. Both soil types are very poorly drained, with the Scarboro soils having less than 16 inches of organic materials overlying the sand. Greenwood soils are deep organic soils that are at least 51 inches thick.

Wetlands 14B & 14C – Benson's Vicinity Swamp Complex

Wetland 14B and 14C are small PFO/PSS wetlands located in the Merrimack Mainstem-Nashua River to Concord River sub-watershed, in the vicinity of the former Benson's Animal Farm property. They are located to the south of Wetland 14A but are not hydrologically connected. Both are surrounded by forested uplands east of Hilindale Drive.

Wetland 14B is located approximately 350 feet east of Wetland 14C and is approximately half the size (1.1 AC). Wetland cover mainly consists of dense PSS vegetation, with dominant highbush blueberry. Dense patches of winterberry are interspersed, and more open areas, often with standing water may be dominated by

buttonbush (*Cephalanthus occidentalis*). The wetland fringe is forested with red maple in the canopy and red oak and white pine in the adjacent uplands.

Wetland 14C is approximately 3.3 AC in size. Wetland cover types include PFO, PSS and open water (PUB). Over half of the wetland system is forested with young red maples in the overstory (averaging 5 in. DBH), composing >30% aerial cover. The understory is dominated by dense shrubs including highbush blueberry and common winterberry. White oaks occur along the forested fringe with red oak dominant in the uplands. Non-forested areas contain PSS wetlands with very dense highbush blueberry. These areas are also interspersed with small, pooled areas. The largest open water area is located at the southwestern corner of Wetland 14C. Field investigation showed the presence of secondary vernal pool indicators including *Phryganeidae* (giant casemaker caddis), *Dytiscidae* (predaceous diving beetle), *Gyrinidae* (whirligig beetle) and *Isopoda* (scuds). Although this potential vernal pool does have an outlet, it may not be permanent, as the stream is likely intermittent. Soils within this wetland system are characterized by NRCS as Water (less than 40 acres), and Scarboro Stony Mucky Loam Sand.

Although low density residential development occurs along Hilindale Drive to the west and along Belknap Road to the north, Wetlands 14B and 14C are distanced from these human disturbances by a substantial forested upland buffer (>500 feet) and large unfragmented habitat blocks to the east.

Wetland 15A – Bush Hill Swamp Complex

Wetland 15A is moderately sized wetland (12.48 AC) located in eastern Hudson within the Merrimack Mainstem-Nashua River to Concord River sub-watershed, south of Kimball Hill Road, east of Spear Road and north of Hawkview Road. Drainage flows east to another wetland system hydrologically connected via a narrow perennial stream channel. The channel outlets from the southeastern lobe of Wetland 15A, eventually converging with Second Brook further downstream.

The majority of Wetland 15A consists of emergent vegetation with a very distinct boundary extending to the upland forested edge. The northern wetland edge is marked just inside the tree line by a historic stone wall. At the tree line, red maples dominate the canopy with white pines just behind in the uplands. The red maple fringe quickly transitions to emergent wetland cover. Almost a monoculture, dense stands of *Phragmites* border the northwestern wetland boundary and the central portion of the eastern wetland boundary. Beyond the stands of *Phragmites*, the main body of the wetland is covered by a mixed graminoid community, dominated by purple loosestrife and including sedges and cattails toward the margins. Dead snags are scattered throughout the central portion of the wetland. Narrow areas of shrub wetlands occur infrequently around the periphery with common winterberry, red maple saplings/seedlings, highbush blueberry, meadow-sweet and jewelweed. In the vicinity of the stream outlet, vegetated cover is grass and sedge dominated

mainly with reed canary grass and woolgrass. Other emergents include purple loosestrife, broadleaf cattail and joe-pye weed. Shrubs toward the upland edge include highbush blueberry, red maple saplings, and meadow sweet.

Soils within this wetland system are characterized by NRCS as ponded Borohemists, very poorly drained soils that are at least 16 inches thick over mineral sediments.

Wetland 15A is currently not under protection as conservation land. It is located in an area of low density residential development and is surrounded on three sides by rural roadways. Public access from the roadway is moderately available.

Wetland 15D – Bush Hill Beaver Ponds

Wetland 15D is located in a somewhat remote location at the headwaters of an unnamed perennial stream within the Merrimack Mainstem-Nashua River to Concord River sub-watershed. The wetland consists of a series of pool features due to recent beaver activity. The wetland system occurs almost completely within a managed utility right-of-way north of Bush Hill Road and west of Jeremy Hill Road on the town line between Hudson and Pelham. Surrounding land use consists of unfragmented forested uplands and other undeveloped open space.

The wetland is divided into three main segments, two of which are pools several feet deep with a beaver dam at each outlet. Two additional pools are located just east of Wetland 15D but have been separated by the access road running parallel to the eastern boundary and longitudinally bisecting the right-of-way. This separation is likely the result of filling wetlands.

The southernmost portion of Wetland 15D consists of mixed emergent vegetation including woolgrass, tussock sedge, purple loosestrife and marsh fern. Broadleaf cattails occur in the wettest portions, and meadow-sweet is infrequently scattered. Approaching the upland edge, vegetation includes swamp dewberry, gray birch and red maple seedlings and giant goldenrod.

The southern of the two pools contains an open water area with patchy water lilies and other aquatic bed vegetation. The shoreline around the open water feature is populated with dense woolgrass, tussock sedge and other sedges, sensitive fern, purple loosestrife and meadow-sweet. Vegetation approaching the upland edge includes swamp dewberry and red maple seedlings.

The northern pool is the largest; more than twice the size of the southern pool. It is the deepest pool, as well, reaching greater than five feet deep. The southern half of the pool is open water with little or no vegetation growing at or near the surface. The northern half; however, is dominated by water lilies. Sedges also grow in sparse patches in this area, and the western portion contains dead standing snags. These snags provide valuable perching habitat for predatory birds. Shoreline vegetation

includes tussock sedge, woolgrass, sensitive fern, meadow-sweet and broadleaf cattail. Approaching the upland edge, multiflora rose, swamp dewberry and red maple seedlings are common.

Soils within this wetland system are characterized by NRCS as Scarboro Stony Mucky Loam Sand, very poorly drained soils having less than 16 inches of organic materials overlying the sand.

Wetland 17A – Miles Swamp

Wetland 17A is the largest wetland in this prime wetlands study (107.9 AC). Both Wetland 17A and 17B are within the Merrimack Mainstem-Nashua River to Concord River sub-watershed. It is located at the confluence of the north and south branches of Second Brook, draining across Bush Hill Road and Wason Road, respectively. Pelham Road borders on the north, Glen Drive on the west and Wason Road and Bush Hill Road on the south and east. Wetland 17A drains westerly to an open water area, which outlets to the main stem of Second Brook. The wetland can be easily access from the cul-de-sac on Pasture Drive.

Wetland 17A contains high interspersion of wetland classes, vegetated communities and water features. Upland islands are also found distributed throughout the wetland system, particularly in the southeastern portion. The patchwork nature of this wetland system makes it valuable habitat to a wide variety of wildlife.

Forested wetlands occur mainly along the periphery; however, they occasionally extend in toward the wetland's center, especially along the northeastern portion, becoming less concentrated in the canopy and with lower density of understory vegetation toward the central, wetter portions. While the main body of the wetland is composed of emergent vegetation, fingers of forested wetlands extend from the southern half of the system. In these areas, the canopy is dominated by red maple with green ash, sedges, royal fern and reed canary grass in the understory. Broadleaf cattails occur in the wettest areas where the canopy is less dense. Forested wetlands at the periphery are bordered by white pines in the uplands, while those transitioning to emergent cover types at the center of the system contain dense stands of broadleaf cattails and purple loosestrife. Sedges and hellebore are also common where cattails are not near monoculture.

The scrub-shrub wetland cover type is located throughout the system in various forms. A narrow transitional shrub buffer at the forested edge surrounds the majority of the system. Common vegetation consists of arrowwood, speckled alder, green ash saplings, silky dogwood, reed canary grass, broadleaf cattail, tussock sedge and soft rush. Small shrub patches mainly consisting of speckled alder, arrowwood and dogwood are scattered throughout emergent portions of the wetland system, as well. Forested upland islands are also surrounded by shrub wetland communities in transition to emergent and pool areas.

Emergent cover within Wetland 17A may consist of mixed communities or may be near monoculture. PEM cover types generally compose the main body of the wetland but may also be adjacent to peripheral scrub-shrub cover types. A typical mixed community consists of jewelweed, broadleaf cattails, hellebore, sensitive fern, royal fern, sedges, purple loosestrife and giant goldenrod. Some areas toward the center of the system are dominated by reed canary grass with sedges, purple loosestrife, and cattails mixed in. Areas near the periphery may have a higher concentration of jewelweed, while other marginal strips or central patches may nearly be a monoculture of broadleaf cattail.

The north and south branches of Second Brook come to their confluence in Wetland 17A, draining toward a ponded area west of the wetland. Both branches are similar in morphology, meandering through emergent central portions of the wetland in narrow channels approximately 3 to 8 feet in width. A main channel is defined; however, banks are largely shaded by tall emergent vegetation. Diffuse drainage contributes throughout the wetland.

Wetland 17A is currently not under protection as conservation land; however, it is almost completely located on town-owned land. While houses do surround the wetland on nearly all sides, there appears to have been very little filling of the original wetland and back yards are typically forested, providing an upland buffer to the wetland.

Wetland 17B – Miles Swamp

Wetland 17B is a smaller wetland (7.1 AC) along the south branch of Second Brook, draining west under Wason Road into Wetland 17A. The stream reach at the center of this wetland system is second order, taking drainage from two other hydrologically connected wetland systems to the north and east. Aside from Wason Road running parallel to the western corner of the wetland, surrounding land use consists of unfragmented forested uplands and other undeveloped open space.

The majority of Wetland 17B consists of mixed forest and shrub vegetation. A typical forest community includes red maple dominant in the overstory, backed by white pine and red oak in the adjacent uplands. Understory vegetation in the wetland includes highbush blueberry, arrowwood, glossy buckthorn, red maple saplings, sedges, royal fern, marsh fern, sensitive fern, cinnamon fern and hellebore.

Scrub-shrub wetlands are interspersed, often within the forest setting, as dense alder shrub thickets. Sedges and sensitive fern are also common. The riparian area in the eastern portion of the wetland system consists of a shrub wetland, as well, with dominance by arrowwood, speckled alder, and red maple saplings. Associated ground cover includes hellebore, jewelweed, sensitive fern and sedges.

For the most part, emergent wetland cover occurs only along the banks of the stream channel and in a small area, just downstream of the confluence on the eastern end of

the wetland. Emergent vegetation includes a mixed community of sedges, joe-pye weed, bluejoint grass (*Calamagrostis canadensis*), tussock sedge, reed canary grass, jewelweed, purple loosestrife and sporadic occurrences of broadleaf cattail. An open water feature at the approximate center of the wetland system contains aquatic vegetation including water lilies and is surrounded by a broadleaf cattail emergent marsh and scrub-shrub wetlands dominated by red maple saplings/seedlings. Cover types are fairly well interspersed throughout the system.

Soils within this wetland system are characterized by NRCS as Water (less than 40 acres), and Greenwood Mucky Peat. Greenwood soils are deep very poorly drained organic soils that are at least 51 inches thick.

Wetland 18A – Limit Brook Swamp

Wetland 18A is part of a larger wetland complex when combined with Wetland 18B, both which are within the Merrimack Mainstem-Nashua River to Concord River sub-watershed. Alone, Wetland 18A is approximately 17.32 acres and is separated from Wetland 18B only by a large beaver dam along its southern edge. Wetland 18A is located south of Wason Road, North of Ridgecrest Drive, and west of Copper Brook Road. Access to the wetlands is available off of Wason Rd, with deeded access to the wetland available from Copper Brook Road. Additional access to the wetland is available via an ATV trail running along the northern and western portions of the wetland.

The western edge of Wetland 18A is surrounded by a forested fringe dominated by red maple, green ash and American elm in the overstory, with hellebore, sensitive fern, jewelweed and sedges as groundcover. Transitional shrub wetlands border these forested areas with speckled alder, gray stem dogwood and silky dogwood. The eastern edge of Wetland 18A is also fringed with narrow forested wetlands, dominated by red maple in the overstory. Arrowwood and speckled alder compose the understory. Bordering shrub wetlands include highbush blueberry, silky dogwood, red maple seedlings, reed canary grass and broadleaf cattails.

The northwestern portion of the wetland is primarily a reed canary grass-dominated PEM with highbush blueberry and red maple saplings scattered throughout. A channel inlets through a fringe PFO in this area, but drainage throughout the wetland system is very diffuse. The northeastern and southern portions of the wetland are a dense community of emergents, heavily dominated by broadleaf cattails. As drainage moves further south, vegetation becomes increasingly less dense and some small areas of open water are interspersed with dead snags and stumps. Tussock sedge, reed canary grass and woolgrass become more dominant. Only the southwestern tip of the wetland, directly above the beaver dam, contains deepwater habitat with water lilies and other aquatic bed vegetation. Water depth here is greater than 5 feet.

Soils within this wetland system are characterized by NRCS as Chocorua Mucky Peat, and Leicester-Walpole Stony Complex. Chocorua soils are very poorly drained, consisting of 16-51 inches of organic soils overlying sandy mineral deposit. Leicester-Walpole Complex Stony, consists of intermixed poorly drained loamy glacial till with poorly drained sandy glacial outwash.

Wetland 18A is bordered by residential development only on its northern side. Large blocks of unfragmented forested uplands surround the wetland, and other wetland systems in the vicinity are accessible to wildlife. These unfragmented blocks support active hunting, which was evidenced by discarded shotgun shells. In several locations the ATV trail is rutted, especially at stream crossings in the northwest portion of the wetland.

Wetland 18B – Limit Brook Swamp

Wetland 18B is located in southern Hudson, congruent with the southern boundary of Wetland 18A. The two systems are separated by a large beaver dam; however, they may be considered a single complex. Wetland 18B is largely composed of PEM and PFO wetland cover types surrounding the channel of Limit Brook, draining to the south. This wetland system has been heavily influenced by recent beaver activity, causing flooding into uplands. Access to the wetland is available from Copper Brook Road, and from the cul-de-sac on Ridgecrest Drive that turns into an ATV trail. As with Wetland 18A, the unfragmented blocks of land adjacent to the wetland support hunting activities.

The northern portion of Wetland 18B consists of a large broadleaf cattail stand, bordered by forested wetlands to the east. Drainage through the PEM area is diffuse or utilizes small interconnected accessory channels. The southern portion of this PEM area is divided from the rest of the wetland by a large beaver dam, which has caused ponding upstream. To the east, forested wetlands contain red maple and American elm as codominants in the canopy. Understory vegetation largely consists of American elm saplings; however, the understory is fairly open. The herbaceous layer consists of sparse cinnamon fern, sedges, reed canary grass and scattered broadleaf cattails. Extending further south along the eastern wetland edge, American elm drops out of the canopy and the shrub understory becomes more developed with arrowwood, highbush blueberry, tussock sedge and reed canary grass. Similar forested wetland cover occurs along the opposite wetland edge, north of the stream channel. Further south, forested wetlands again contain a red maple-dominated overstory with sparse understory. Vegetation includes red maple, glossy buckthorn, reed canary grass, sedges, meadow-sweet and silky dogwood.

High interspersion of emergent wetland communities throughout the central portion of the site border the channel of Limit Brook. A dense stand of *Phragmites* sp. covers an area of approximately an acre in the central portion of the system and is surrounded on both sides by dense cattail stands. Small pooled areas are scattered throughout these areas, as well. The only mixed emergent community within

Wetland 18B occurs at the southwestern end of the system, upstream of a manmade footbridge across the stream. Vegetation includes tussock sedge, *Sphagnum* moss, swamp dewberry, meadow-sweet, purple loosestrife, marsh fern, woolgrass, gray birch saplings and scattered cattails within deep organic soils.

Downstream of the bridge, beaver activity has caused Limit Brook to flood its banks and inundate the uplands. Transitional changes in the vegetation show the recent timescale. Large red oaks are surrounded by standing water and throughout the wetland area. Red maple saplings are beginning to occupy the understory and herbaceous vegetation is consistent with wetland conditions and includes cinnamon fern and sedges.

Soils within this wetland system are characterized by NRCS as Chocorua Mucky Peat, Scarboro Mucky Loam Sand, and Pipestone Loamy Sand Soils. Chocorua soils consist of 16-51 inches of organic soils overlying sandy mineral deposits. Greenwood soils are deep very poorly drained organic soils that are at least 51 inches thick. Pipestone soils are poorly drained stratified sands formed in glacial outwash.

Wetland 20C – Musquash Brook Swamp Complex

Wetland 20C is a moderately sized wetland (19.8 AC) located south of Bush Hill Road, just west of the boundary between the Town of Hudson and the Town of Pelham. A utility right-of-way runs parallel to the western edge of the wetland, and an unnamed perennial stream drains to its northern boundary, from Wetland 15D, under Bush Hill Road. Approximately 200 feet to the west, the headwater wetland associated with the southern branch of Second Brook takes some intermittent drainage from Wetland 20C. Most of the drainage from Wetland 20C; however, contributes to an open water area at its southern border. This ponded area is part of an interconnected system feeding Wetland 20D and eventually Musquash Brook further south. The Musquash Complex is part of the Merrimack Mainstem-Nashua River to Concord sub-watershed which drains from northeast to southwest.

The northeastern portion of Wetland 20C consists of a mixed graminoid emergent community in the vicinity of the stream inlet. Vegetation includes jewelweed, sensitive fern, reed canary grass, hellebore, sedges, broadleaf cattail and giant goldenrod extending up to the tree line. Speckled alder occurs in a narrow fringe along the upland tree line, dominated by mixed red maple, white pine and red oak in the overstory. The mixed graminoid community at the stream inlet is a small portion of the areal cover of the entire wetland.

The remaining three-fourths of the northern portion of Wetland 20C is forested, extending south along the eastern boundary in a band approximately 200 feet wide. This community is composed of red maples in the overstory with white pines in the uplands and dead snags along the transition to PEM nearing the central portion of the system. Understory vegetation consists of silky dogwood, arrowwood, royal fern,

sensitive fern, cinnamon fern, tussock sedge and jewelweed. In the northern portion of the site green ash, highbush blueberry and cinnamon fern are included in the understory.

The majority of the wetland, encompassing the western edge and central portion, is composed of a dense, broadleaf cattail-dominated PEM cover type. Sedges, soft rush and joe-pye weed are interspersed but not prominent. Moving further south, the vegetated community becomes less dense with spotty areas of standing water, containing water lilies and other aquatic bed vegetation. Highbush blueberry and tussock sedge occur along the fringe with red and white pine, red oak and red maple in the adjacent uplands.

A single residence is closely adjacent to the eastern wetland edge. An excavated pool, functioning as a vernal pool, is located at the forested edge of a mowed back yard with fill material to the edge of the water. A narrow PSS wetland, composed mainly of highbush blueberry and royal fern, buffers the pool and transitions to the red maple-dominated PFO wetlands further west.

Soils within this wetland system are characterized by NRCS as Water (less than 40 acres), ponded Borohemists, and Greenwood Mucky Peat soils. Borohemists are very poorly drained organic soils that are at least 16 inches thick over mineral sediments. Greenwood soils are deep very poorly drained organic soils that are at least 51 inches thick.

Surrounding land use is mainly undeveloped and forested. Minimal residential development along Woodland Drive occurs closely adjacent to the northeastern edge, and a maintained utility right-of-way runs parallel to the western edge. Wetland 20C represents the northeast boundary of the Musquash Conservation Area, a town-owned property, associated with the Musquash Complex. The Musquash Complex is the largest track of undeveloped land in the area, which supports hunting and other recreational activities.

Wetland 20D – Musquash Brook Swamp Complex

Wetland 20D is a moderately sized wetland (19.2 AC) located just west of the town line between Hudson and Pelham, north of Bush Hill Road and east of the intersection of Beaver Path and Deer Run. The wetland continues east into Pelham, but the evaluation area for this study is contained solely within the Town of Hudson. Adjacent wetlands drain from the north and west via stream channels with forested riparian buffers. A beaver dam at the southwestern corner of the wetland creates a ponded area just upstream and slows discharge to the outlet channel eventually feeding Musquash Brook downstream.

The majority of Wetland 20D consists of dense emergent marsh. Dominant vegetation includes reed canary grass, woolgrass and sedges to the tree line. The

shrub fringe transitioning to forested cover types consists of glossy buckthorn, arrowwood, and highbush blueberry, with red maple in the overstory of adjacent uplands.

Forested wetlands comprise an approximate 100 to 400-foot band along the system's eastern wetland edge, extending upstream along the channel to the northeast and beyond the town line. The forested wetland community is a red maple swamp, with red maple dominant in the canopy and jewelweed, royal fern, cinnamon fern, jack-in-the-pulpit, hellebore, sedges and patchy ground cover of *Sphagnum* moss. Shrub wetlands occur both interspersed within the forested setting as well as at the transitional margins between PFO and PEM. Scrub-shrub vegetation includes highbush blueberry, American elm saplings and red maple saplings.

The southern portion of the wetland has been flooded by the presence of a beaver dam at the outlet. The large open water area contains very little vegetation at or near the surface and the transition to PEM upstream is gradual with submerged grasses and sedges filling in with sedges, reed canary grass and woolgrass. A narrow margin of emergent wetland also borders the open water with sedges and wetland grasses.

Soils within this wetland system are characterized by NRCS as Water (less than 40 acres), and Chocorua Mucky Peat soils consisting of 16-51 inches of organic soils overlying sand mineral deposits.

Access to the wetland is available from the Gumpas Pond Conservation Area located in the Town of Pelham. In addition, the western portion Wetland 20D is located in the Musquash Conservation area. As previously mentioned, this is the largest block of undeveloped land in the area and supports recreational activities such as hunting and fishing.

Wetland 20E – Musquash Pond Swamp

Wetland 20E is one of the smaller wetlands (8.4 AC) included in this Prime Wetlands Study. It is located along Musquash Brook as it flows west into Musquash Pond, west of Gowing Road and northeast of Chiswick Road. Streams inlet from the north and from the south. The southern inlet drains a wetland system on the town line between Hudson and Pelham and crosses under Gowing Road, via culvert, before entering Wetland 20E at its southeastern corner.

The western wetland edge borders Musquash Pond along its northern tip. This area transitions to open water, and the mouth of Musquash Brook becomes broad and braided toward the outlet. Aquatic bed vegetation, including water lilies, dominates where the wetland is semi-permanently flooded, extending north to a large beaver dam. Surrounding emergent areas contain a high density of tussock sedge with soft rush mixed in and patchy distribution of meadow-sweet, button bush, purple loosestrife, woolgrass and marsh fern. Flooded back areas contain small, sporadic

broadleaf cattail stands. Marginal areas, adjacent to forested uplands, include purple loosestrife, sensitive fern, speckled alder, reed canary grass and highbush blueberry with red maple saplings and red oak at the forest fringe. However, the scrub-shrub transition to forested upland is nearly nonexistent and patchy. Below the beaver dam, a red maple swamp occurs on the western edge.

The beaver dam has caused ponding upstream, creating open water habitat with water lilies and broadleaf cattails at the margins. Partially submerged stone walls provide evidence that beaver activity has caused recent expansion of the wetland into the adjacent uplands. This is further evidenced by the large red oaks being undercut along the wetland edge and falling into the wetland. Dense cattail stands extend along the bank to the east of the open water area. Purple loosestrife, softrush and reed canary grass are mixed in.

Forested wetland cover types occur in the southeastern portion of the wetland and in a short finger extending from the northern boundary. Red maple is dominant in the overstory. Speckled alder, winterberry and red maple saplings compose the understory shrubs with sedges, interrupted fern, royal fern, sensitive fern, purple loosestrife and skunk cabbage as herbaceous cover.

At the inlet, the channel of Musquash Brook is approximately 5-8 feet wide with a depth of approximately 6-8 inches. Banks are poorly defined with evidence of erosion/deposition. Dominant substrate consists of silt and sand. The low gradient stream has a high sinuosity as it meanders through the emergent portion of Wetland 20E. It is unlikely that this stream reach would support fish.

Soils within this wetland system are characterized by NRCS as Water (less than 40 acres), Chocorua Mucky Peat, Pipestone Loamy Sand, and Rippowam Fine Sandy Loam. Chocorua soils are very poorly drained, consisting of 16-51 inches of organic soils overlying sand mineral deposits. Pipestone soils are poorly drained stratified sands formed glacial outwash. Rippowam soils are frequently flooded, poorly drained soils of active floodplains bordering rivers and major streams. These soils are composed of relatively recently deposited stratified layers of loamy and sandy alluvial sediments.

Although no public access is available from Chiswick Road, the wetland can be accessed from the Musquash Conservation Area using the utility right-of-way corridor where it crosses Musquash Road. As with Wetlands 20C/20D, hunting is permitted in the upland conservation area.

Wetland 21B – Ayers Pond Swamp

Wetland 21B (6.9 AC) is located in southern Hudson with Musquash Brook flowing to its northern corner under Dracut Road. The system outlets along its southwestern corner, which is contiguous with the northern bank of Ayers Pond. Residential development nearly surrounds Wetland 21B with Sand Hill Road to the north,

Chestnut Street to the west, Robo Drive and Pine Road to the south and Dracut Road to the northeast. Wetland cover types mainly consist of highly interspersed PEM and PSS communities. The low gradient meandering channel diffuses into several PUB areas toward the lower extremities of the wetland system.

Draining from a small open water area at the northern tip of the wetland system, a low gradient stream channel meanders southwest toward Ayers Pond. The main channel is well defined throughout most of Wetland 21B; however, diffuse drainage and accessory channels contribute to its flow volume. Channel width is approximately 15 feet, and depth is approximately 1-2 feet. Banks are not well stabilized and there is evidence of erosion/deposition. Dominant substrate consists of fine silt, and the canopy cover is mostly open. The two pooled areas, where the channel becomes diffuse, contain aquatic bed vegetation including water lilies.

A small area of forested wetland cover occurs in the northern portion of the complex, adjacent to Dracut Road. Young red maples and American elms (average 5 inches DBH) are codominant in the overstory. A dense understory includes arrowwood and highbush blueberry with silky dogwood, royal fern and multiflora rose toward the upland fringe. Scrub-shrub wetlands of a similar community also occur within the forested setting where the canopy opens up.

Alder shrub thickets are the most common cover type throughout Wetland 21B. They are very dense and are dominated by speckled alder with highbush blueberry at the fringe and silky dogwood, tall flattop aster, reed canary grass, sensitive fern and purple loosestrife mixed in. Tartarian honeysuckle occurs sporadically along the stream banks.

Emergent cover types occur mainly in the central portion of the wetland complex, but are also found scattered along the wetter margins of the PSS areas. Vegetation includes dense areas of broadleaf cattails, softrush, reed canary grass, woolgrass, purple loosestrife and tussock sedge. Shrubs often band the forested edge with winterberry, arrowwood, speckled alder, and silky dogwood.

Soils within this wetland system are characterized by NRCS as Water (less than 40 acres), and Chocorua Mucky Peat, very poorly drained soils consisting of 16-51 inches of organic soils overlying sand mineral deposits.

Wetland 23/24 – Herron Pond
Marsh

Wetland 23/24 (18.6 AC) is located in the southeastern corner of Hudson, extending slightly over the Pelham town line. It drains north into Herron Pond, which in turn drains northwest to Wetland 20E. Richmond Road borders Wetland 23/24 to the northwest, running parallel to Herron Pond, and Slavin Drive is located to the southeast. Large blocks of undeveloped land occur to the northeast and southwest with adjacent wetland systems connected along stream corridors.

The southern portion of Wetland 23/24 is largely forested surrounding a PUB water feature with narrow PEM fringe. The overstory consists of red maples with dense patchy areas of highbush blueberry in the understory. Herbaceous vegetation includes sensitive fern and multiflora rose. The PEM fringe contains tussock sedge, sphagnum moss, fringed sedge (*Carex crinita*), tussock sedge, woolgrass and broadleaf cattail. Water lilies are the only aquatic bed vegetation within the open water area. Beaver activity is likely the main cause of flooding, with a large dam at the outlet. There is a secondary beaver dam further downstream, creating a shallower flooded area. This pool is located within a forest setting with red maples in the overstory and sedges.

Further north, the forested wetland transitions to scrub-shrub vegetation as the red maple overstory thins out (< 30%). Arrowwood is the dominant shrub with some highbush blueberry. Emergent groundcover includes sensitive fern and sphagnum moss. Tussock sedge becomes more prominent as the PSS cover transition to PEM further north, toward the center of the wetland complex. The northern two-thirds of Wetland 23/24 consist of dense broadleaf cattails with a high concentration of fringed sedge and shallow sedge (Carex lurida) at the margins. The forested edge surrounding the PEM contains red maple with arrowwood, common winterberry and speckled alder. The northern wetland edge transitions to aquatic bed vegetation, including water lilies before meeting Herron Pond.

Although there is no direct access to the wetland, the Bennie Eaton Hill Family Memorial Forest located at the northwest tip of Herron Pond, and conservation land located in the Town provided limited access to the wetland via skidder trails. The large unfragmented blocks adjacent to the wetland also provide suitable hunting areas.

Soils within this wetland system are characterized by NRCS as Water (less than 40 acres), and ponded Borohemists, very poorly drained soils organic soils that are at least 16 inches thick over mineral sediments.

5

Discussion and Summary

The findings of this Prime Wetlands Study are summarized in two ways in this section.

In section 5.1 we summarize the most important functions and values for each wetland. This discussion is based on the FVI scores so that the importance of key wetland features can be understood in the absence of the area multiplier used to compute WVU scores. By analyzing the data this way, important smaller wetlands can be highlighted. The relative size of a wetland is an important indicator of how much of a functional value it may provide, however, and was an important factor in selecting the top scoring candidate prime wetlands.

In Section 5.2, we discuss the wetlands using the 14 Functional Values. For each functional value, we identify which wetlands are noteworthy for that particular function based on the total number of WVUs provided. In some communities, a particular function, say flood control, may be of special importance or interest to the public. Similarly, a community may decide that the education potential of the wetlands within their town is of particular importance for providing "outdoor classrooms: for their middle-school's science curriculum. These types of determinations are appropriate as the relative importance of one function over another is largely related to habitat management goals.

In Section 5.3, an overall summary is providing by comparing the 23 wetlands using an "average" FVI score and a "total" WVU score. The average FVI for a wetland is calculated as the mean of all 14 FVI scores. In most cases, this average provides a sense of how effectively the wetland performed all 14 functions (*i.e.*, representing an "average grade"). A low average may reflect that a wetland does not perform any of the functions at an exceptional level, although the presence of very high or very low individual FVI score may go unnoticed unless accompanied by careful inspection or providing some sort of statistical measure of the spread of scores around the mean, like a standard deviation. In contrast, total WVUs is simply the sum of a wetland's individual WVUs scores for all 14 functions. This latter metric gives a sense of the magnitude of a wetland's contribution to the total ecological and societal needs of a community.

5.1 Wetland Functional Evaluation Summaries

Wetland 1B – Chase Brook Swamp

Chase Brook Swamp is a large wetland with multiple habitat types bordering Chase Brook, a major stream. This wetland rates high for ecological integrity because it is relatively undisturbed, and because there are relatively few permanent structures nearby. The size of the wetland, multiple habitat types, and high ecological integrity also make it valuable wildlife habitat. Chase Brook Swamp includes habitat for a locally rare (S3) reptile as reported by NHNB. The wetland also has a restricted outlet to the west in Litchfield and broad densely vegetated wetland expanse along most of the stream channel, making this wetland valuable for detaining floodwaters, as well as for sediment trapping and stream shoreline protection. The wetland also lies within a groundwater aquifer and wells used for drinking water, making it valuable for groundwater protection. Although finfish habitat is marginal, downstream from the wetland, Chase Brook is stocked annually with brook trout, providing recreational fishing activity in the area.

Table 5-1.
Chase Brook Swamp Summary (66.3 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.96	63.5
2. Wetland Wildlife Habitat	0.81	53.4
3. Finfish Habitat: Part A – Rivers and Streams	0.59	2.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.00	0.0
4. Educational Potential	0.65	3.3
5. Visual Aesthetic Quality	0.79	1.6
6. Water-based Recreation	0.66	43.9
7. Flood Control Potential	0.80	53.0
8. Ground Water Use Potential	0.88	58.0
9. Sediment Trapping: Part A	0.50	33.2
9. Sediment Trapping: Part B	0.76	50.4
9. Average	0.63	41.8
10. Nutrient Attention: Part A	0.30	19.9
10. Nutrient Attention: Part B	0.54	50.4
10. AVERAGE	0.42	35.2
11. Shoreline Anchoring and Dissipation of Erosive Forces	1.00	0.9
12. Urban Quality of Life: A. Presence of an Urban Setting	0.30	19.9
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.28	18.2
14. Noteworthiness	1.00	66.3

Wetland 2D – Boyd Swamp Complex

The Boyd Swamp Complex is a relatively small system that is predominantly forested. Perhaps the most important features of this wetland are that it forms the headwaters of Chase Brook and that it abuts conservation land along the brook in Londonderry. This wetland scores high for ecological integrity because it is relatively undisturbed. The wetland also lies upstream of a groundwater aquifer and near wells used for drinking water, making it valuable for groundwater protection. Historical value is marginal on this wetland, with a single known historical structure located on Boyd Rd.

Table 5-2.
Wetland 2D-Boyd Swamp Complex (8.1 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.96	7.8
2. Wetland Wildlife Habitat	0.63	5.1
3. Finfish Habitat: Part A – Rivers and Streams	0.00	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.00	0.0
4. Educational Potential	0.46	0.7
5. Visual Aesthetic Quality	0.59	0.6
6. Water-based Recreation	0.39	3.2
7. Flood Control Potential	0.30	2.4
8. Ground Water Use Potential	0.88	7.1
9. Sediment Trapping: Part A	0.30	2.4
9. Sediment Trapping: Part B	0.18	1.5
9. Average	0.24	1.9
10. Nutrient Attention: Part A	0.65	5.3
10. Nutrient Attention: Part B	0.48	1.5
10. AVERAGE	0.57	3.4
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.53	0.0
12. Urban Quality of Life: A. Presence of an Urban Setting	0.30	2.4
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.53	4.3
14. Noteworthiness	0.14	0.0

Wetland 5A – Robinson Pond Wetlands

The Robinson Pond Wetlands that lie along the northern edge of Robinson Pond are important because they are relatively large and include a variety of wetland types and border both the pond and Parker Nature Reserve. The amount of development that has occurred in proximity to the wetland detracts from some functions. These

factors combine for moderately high ecological integrity and wildlife ratings. The proximity to Robinson pond and relatively open nature of this wetland contributes to its aesthetic importance as well as its finfish habitat. The presence of sediment sources, as well as open water, contribute to the wetland's ability to trap sediment and improve water quality. Robinson Pond includes a restricted outlet to the south, which contributes to the importance of both the pond and upstream wetlands for floodwater storage. The wetland also lies within a groundwater aquifer and near wells used for drinking water, making it valuable for groundwater protection.

Table 5-3.
Wetland 5A-Robinson Pond Wetlands Summary (35.1 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.83	29.3
2. Wetland Wildlife Habitat	0.84	29.6
3. Finfish Habitat: Part A – Rivers and Streams	0.00	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.92	32.2
4. Educational Potential	0.53	7.9
5. Visual Aesthetic Quality	0.93	2.8
6. Water-based Recreation	0.73	16.2
7. Flood Control Potential	0.90	31.6
8. Ground Water Use Potential	0.88	30.7
9. Sediment Trapping: Part A	0.30	10.5
9. Sediment Trapping: Part B	0.74	26.0
9. Average	0.52	18.3
10. Nutrient Attention: Part A	0.40	14.0
10. Nutrient Attention: Part B	0.55	26.0
10. AVERAGE	0.48	20.0
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.83	0.4
12. Urban Quality of Life: A. Presence of an Urban Setting	0.50	17.6
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.55	19.3
14. Noteworthiness	1.00	35.1

Wetland 5B – Robinson Pond Wetlands

This small wetland lies to the east of Robinson Pond, with Robinson Road falling between the wetland and the pond. Much of this wetland is highly disturbed and falls within a maintained power line right of way adjacent to a residential area. This area scored relatively low for all functional values except noteworthiness. The Robinson Pond Wetlands are noteworthy in that they include habitat for a locally rare (S3) reptile as reported by NHNB.

Table 5-4.
Wetland 5B-Robinson Pond Wetlands Summary (1.76 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.55	1.0
2. Wetland Wildlife Habitat	0.55	1.0
3. Finfish Habitat: Part A – Rivers and Streams	0.00	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.00	0.0
4. Educational Potential	0.42	0.7
5. Visual Aesthetic Quality	0.56	0.0
6. Water-based Recreation	0.28	0.5
7. Flood Control Potential	0.30	0.5
8. Ground Water Use Potential	0.65	1.1
9. Sediment Trapping: Part A	0.30	0.5
9. Sediment Trapping: Part B	0.34	0.6
9. Average	0.32	0.6
10. Nutrient Attention: Part A	0.20	0.4
10. Nutrient Attention: Part B	0.51	0.6
10. AVERAGE	0.36	0.5
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.00	0.0
12. Urban Quality of Life: A. Presence of an Urban Setting	0.50	0.9
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.05	0.1
14. Noteworthiness	1.00	1.8

Wetland 8 – Glover Brook Marsh Complex

Glover Brook Marsh is a relatively large wetland with vegetation that grades from scrub-shrub swamp at the northwestern end to open water at the southeastern end. Portions of the swamp appear to have been ditched in the past. This wetland is part of a conservation area, includes open water, and is a headwaters wetland with a restricted outlet to Glover Brook, giving this wetland relatively high value for wetland wildlife habitat, sediment trapping, and flood control potential. The wetland also lies upstream of a groundwater aquifer and near wells used for drinking water, making it valuable for groundwater protection. That it is completely surrounded by development detracts from its overall value.

Table 5-5.
Wetland 8-Glover Brook Marsh Complex Summary (35.01 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.79	27.7
2. Wetland Wildlife Habitat	0.93	32.5
3. Finfish Habitat: Part A – Rivers and Streams	0.06	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.62	4.3
4. Educational Potential	0.67	23.5
5. Visual Aesthetic Quality	0.84	0.0
6. Water-based Recreation	0.56	0.8
7. Flood Control Potential	0.90	31.5
8. Ground Water Use Potential	0.88	30.6
9. Sediment Trapping: Part A	0.30	10.5
9. Sediment Trapping: Part B	0.74	25.9
9. Average	0.52	18.2
10. Nutrient Attention: Part A	0.40	14.0
10. Nutrient Attention: Part B	0.66	25.9
10. AVERAGE	0.53	19.9
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.67	0.1
12. Urban Quality of Life: A. Presence of an Urban Setting	0.75	26.3
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.53	18.4
14. Noteworthiness	1.00	35.0

Wetland 10 – Town Forest Red Maple Swamp

The Town Forest Red Maple Swamp is of a moderate size and includes a number of wetland types, including open water, and is connected to the Town Forest Conservation Area. These features make it potentially valuable for wildlife. The wetland appears to be altered by heavy development along its margins, possibly resulting in an increased hydroperiod over time. These factors detract from the ecological integrity of the system. A restricted outlet provides some ability of this wetland to store flood waters and trap sediments.

Table 5-6.
Wetland 10-Town Forest Red Maple Swamp Summary (20.3 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.83	16.9
2. Wetland Wildlife Habitat	0.79	16.1
3. Finfish Habitat: Part A – Rivers and Streams	0.13	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.47	9.5
4. Educational Potential	0.60	12.2
5. Visual Aesthetic Quality	0.79	14.2
6. Water-based Recreation	0.66	13.4
7. Flood Control Potential	0.70	14.2
8. Ground Water Use Potential	0.75	15.2
9. Sediment Trapping: Part A	0.10	2.0
9. Sediment Trapping: Part B	0.56	11.4
9. Average	0.33	6.7
10. Nutrient Attention: Part A	0.30	6.1
10. Nutrient Attention: Part B	0.59	11.4
10. AVERAGE	0.45	8.8
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.83	0.5
12. Urban Quality of Life: A. Presence of an Urban Setting	0.30	6.1
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.05	1.0
14. Noteworthiness	0.0	0.0

Wetland 11 – Little Ottarnic Pond Swamp

Little Ottarnic Pond Swamp is a relatively large red maple swamp that includes a small boggy pond. The swamp is in a densely developed area and has been bisected by a power line right of way. A filled dirt driveway leads to the small pond. The surrounding development and disturbances within the wetland reduce its ecological integrity, though its size, varied habitats, and limited open water do provide value for wildlife habitat, sediment trapping, and flood control potential. This wetland is noteworthy because it is reported by NHNHB to contain a regionally rare (S2) plant species and plant community type as well as a locally rare (S3) insect. Little Ottarnic Pond Swamp also lies within a groundwater aquifer, making it valuable for groundwater protection. Although marginally valued, there is evidence of historical potential adjacent to the wetland along Highland Street, where two existing structures are depicted on 1905 USGS maps.

Table 5-7.
Wetland 11-Little Ottarnic Pond Swamp Summary (46.2 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.75	34.7
2. Wetland Wildlife Habitat	0.79	36.3
3. Finfish Habitat: Part A – Rivers and Streams	0.19	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.75	1.1
4. Educational Potential	0.55	25.4
5. Visual Aesthetic Quality	0.83	4.1
6. Water-based Recreation	0.54	0.8
7. Flood Control Potential	0.90	41.6
8. Ground Water Use Potential	0.75	34.7
9. Sediment Trapping: Part A	0.30	13.9
9. Sediment Trapping: Part B	0.74	34.2
9. Average	0.52	24.1
10. Nutrient Attention: Part A	0.65	30.0
10. Nutrient Attention: Part B	0.72	34.2
10. AVERAGE	0.69	32.1
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.83	0.2
12. Urban Quality of Life: A. Presence of an Urban Setting	0.75	34.7
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.55	25.4
14. Noteworthiness	1.00	46.2

Wetland 12A – Ottarnic Pond Marsh

The Ottarnic Pond Marsh is an extensive area of emergent marsh along Glover Brook, which empties into Ottarnic Pond from the north. This habitat includes beaver ponding which combined with the open water of Ottarnic Pond makes this important wildlife and waterfowl habitat. This wetland also provides valuable flood control, sediment trapping, and aesthetic quality due to its dense vegetation, adjacent open water, and restricted outlets. Extensive residential development that has occurred around the wetland detracts from some functions, particularly its ecological integrity. The wetland lies within a groundwater aquifer and near wells used for drinking water, making it valuable for groundwater protection.

Table 5-8.
Wetland 12A-Ottarnic Pond Marsh Summary (47.5 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.60	28.5
2. Wetland Wildlife Habitat	0.77	36.6
3. Finfish Habitat: Part A – Rivers and Streams	0.53	0.1
3. Finfish Habitat: Part B – Ponds and Lakes	0.00	0.0
4. Educational Potential	0.54	25.5
5. Visual Aesthetic Quality	0.78	0.0
6. Water-based Recreation	0.64	1.9
7. Flood Control Potential	1.00	47.5
8. Ground Water Use Potential	0.88	41.6
9. Sediment Trapping: Part A	0.50	23.8
9. Sediment Trapping: Part B	0.80	34.2
9. Average	0.65	29.0
10. Nutrient Attention: Part A	0.30	14.3
10. Nutrient Attention: Part B	0.78	34.2
10. AVERAGE	0.54	24.3
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.83	0.2
12. Urban Quality of Life: A. Presence of an Urban Setting	1.00	47.5
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.00
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.00
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.00
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.00
13. Historical Site Potential	0.28	13.1
14. Noteworthiness	1.00	47.5

Wetland 12B – Ottarnic Pond Marsh - East

The Ottarnic Pond Marsh along the eastern side of the pond provides similar functions to Wetland 12A to the north of the pond. It is an extensive area of emergent marsh along Merrill Brook, which empties into Ottarnic Pond from the east. This habitat, combined with the open water of Ottarnic Pond makes this important wildlife habitat, particularly for waterfowl and finfish. This wetland also provides valuable flood control, sediment trapping and aesthetic quality due to its dense vegetation, adjacent open water, and restricted outlet at the southern end of the pond. The town owned land at the southern end of this wetland provides parking and access to the wetland, making it potentially valuable as an outdoor classroom site. Extensive residential development that has occurred around the wetland detracts from some functions, particularly its ecological integrity. However, the wetland lies within a groundwater aquifer and near wells used for drinking water, making it valuable for groundwater protection.

Table 5-9.
Wetland 12B-Ottamic Pond Marsh - East (41.05 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.83	34.2
2. Wetland Wildlife Habitat	0.78	32.1
3. Finfish Habitat: Part A – Rivers and Streams	0.70	0.1
3. Finfish Habitat: Part B – Ponds and Lakes	0.00	0.0
4. Educational Potential	0.79	32.2
5. Visual Aesthetic Quality	0.78	15.6
6. Water-based Recreation	0.65	1.9
7. Flood Control Potential	0.55	41.0
8. Ground Water Use Potential	0.88	35.9
9. Sediment Trapping: Part A	0.75	30.8
9. Sediment Trapping: Part B	0.85	34.9
9. Average	0.80	32.9
10. Nutrient Attention: Part A	0.43	17.4
10. Nutrient Attention: Part B	0.69	34.9
10. AVERAGE	0.56	26.2
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.83	0.3
12. Urban Quality of Life: A. Presence of an Urban Setting	0.75	30.8
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.00
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.00
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.00
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.00
13. Historical Site Potential	0.28	11.3
14. Noteworthiness	1.00	41.0

Wetland 14A – Merrill Brook Swamp

Merill Brook Swamp is a moderately large wetland complex that includes the former Benson's Animal Farm. The wetland includes a number of habitat types, including open water, and lies partly within a large area of existing conservation land, which makes this wetland valuable as potential wildlife habitat. The open water, dense vegetation and restricted outlets provide valuable flood control along a tributary to Ottarnic Pond Marsh – East (Wetland 12B). The wetland also lies within a groundwater aquifer, making it valuable for groundwater protection.

Table 5-10.
Wetland 14A-Merrill Brook Swamp Summary (19.9 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.88	17.6
2. Wetland Wildlife Habitat	0.94	18.7
3. Finfish Habitat: Part A – Rivers and Streams	0.48	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.00	0.0
4. Educational Potential	0.68	13.5
5. Visual Aesthetic Quality	0.85	4.3
6. Water-based Recreation	0.62	0.0
7. Flood Control Potential	1.00	19.9
8. Ground Water Use Potential	0.75	14.9
9. Sediment Trapping: Part A	0.55	10.9
9. Sediment Trapping: Part B	0.55	10.9
9. Average	0.55	10.9
10. Nutrient Attention: Part A	0.33	6.5
10. Nutrient Attention: Part B	0.59	10.9
10. AVERAGE	0.46	8.7
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.83	0.3
12. Urban Quality of Life: A. Presence of an Urban Setting	0.10	2.0
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.28	5.5
14. Noteworthiness	0.00	0.0

Wetlands 14B & 14C – Benson's Vicinity Swamp Complex

Wetlands 14 B and 14 C are small forested and scrub-shrub wetlands. These small wetlands are relatively undisturbed and have a large undisturbed upland buffer around them, giving them high ecological integrity. Other wetland functional values, such as wildlife habitat and flood control, are provided at modest levels. These wetlands are noteworthy because they are reported by NHNHB to contain locally rare (S3) and regionally rare (S2) plant species.

Table 5-11.
Wetland 14B-Benson's Vicinity Marsh Complex (1.1 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.93	1.0
2. Wetland Wildlife Habitat	0.58	0.6
3. Finfish Habitat: Part A – Rivers and Streams	0.24	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.25	0.0
4. Educational Potential	0.42	0.5
5. Visual Aesthetic Quality	0.68	2.2
6. Water-based Recreation	0.43	1.4
7. Flood Control Potential	0.40	0.4
8. Ground Water Use Potential	0.53	0.6
9. Sediment Trapping: Part A	0.30	0.3
9. Sediment Trapping: Part B	0.26	0.3
9. Average	0.28	0.3
10. Nutrient Attention: Part A	0.20	0.2
10. Nutrient Attention: Part B	0.39	0.3
10. AVERAGE	0.30	0.3
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.00	0.0
12. Urban Quality of Life: A. Presence of an Urban Setting	0.10	0.1
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.30	0.3
14. Noteworthiness	1.00	1.1

Table 5-12.
Wetland 14C-Benson's Vicinity Swamp Complex Summary (3.3 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.92	3.0
2. Wetland Wildlife Habitat	0.58	1.9
3. Finfish Habitat: Part A – Rivers and Streams	0.19	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.00	0.0
4. Educational Potential	0.42	1.4
5. Visual Aesthetic Quality	0.68	0.7
6. Water-based Recreation	0.43	0.5
7. Flood Control Potential	0.40	1.3
8. Ground Water Use Potential	0.63	2.1
9. Sediment Trapping: Part A	0.30	1.0
9. Sediment Trapping: Part B	0.26	0.9
9. Average	0.28	0.9
10. Nutrient Attention: Part A	0.20	0.7
10. Nutrient Attention: Part B	0.39	0.9
10. AVERAGE	0.30	0.8
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.00	0.0
12. Urban Quality of Life: A. Presence of an Urban Setting	0.10	0.3
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.30	1.0
14. Noteworthiness	1.00	3.3

Wetland 15A – Bush Hill Swamp Complex

Bush Hill Swamp is an open marsh that appears to be a drained beaver pond. The emergent marsh vegetation provides only a single wetland type. This wetland is valuable for wildlife habitat, but not as valuable as it would be if it contained an interspersion of multiple habitat types. The wetland is relatively undisturbed, giving it ecological integrity and aesthetic values. The restricted outlet of the pond means this area may provide valuable flood control. The wetland also has marginal historical potential as it is reported that the R. Moulton Farm is located on Kimball Hill Rd, adjacent to the wetland.

Table 5-13.
Wetland 15A-Bush Hill Swamp Complex Summary (12.5 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.83	10.4
2. Wetland Wildlife Habitat	0.66	8.3
3. Finfish Habitat: Part A – Rivers and Streams	0.19	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.53	6.7
4. Educational Potential	0.52	6.5
5. Visual Aesthetic Quality	0.78	9.7
6. Water-based Recreation	0.58	7.2
7. Flood Control Potential	0.70	8.8
8. Ground Water Use Potential	0.65	8.1
9. Sediment Trapping: Part A	0.30	3.8
9. Sediment Trapping: Part B	0.26	3.3
9. Average	0.28	3.6
10. Nutrient Attention: Part A	0.40	5.0
10. Nutrient Attention: Part B	0.54	3.3
10. AVERAGE	0.47	4.2
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.67	0.5
12. Urban Quality of Life: A. Presence of an Urban Setting	0.50	6.3
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.55	6.9
14. Noteworthiness	0.00	0.0

Wetland 15D – Bush Hill Beaver Ponds

The Bush Hill Beaver Ponds have active beaver flowages located within a maintained power line right of way. Apart from the power line, the wetland is relatively undisturbed and isolated by a broad upland buffer. This wetland has relatively high ecological integrity, wildlife habitat, and aesthetic value and is noteworthy because it is reported by NHNHB to contain a regionally rare (S2) plant species. Bush Hill Beaver Ponds also lie within a groundwater aquifer, making it valuable for groundwater protection.

Table 5-14.
Wetland 15D-Bush Hill Beaver Ponds Summary (2.8 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.92	2.6
2. Wetland Wildlife Habitat	0.72	2.0
3. Finfish Habitat: Part A – Rivers and Streams	0.25	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.40	1.1
4. Educational Potential	0.54	1.5
5. Visual Aesthetic Quality	0.78	2.2
6. Water-based Recreation	0.60	1.7
7. Flood Control Potential	0.10	0.3
8. Ground Water Use Potential	0.75	2.1
9. Sediment Trapping: Part A	0.55	1.5
9. Sediment Trapping: Part B	0.27	0.8
9. Average	0.41	1.2
10. Nutrient Attention: Part A	0.33	0.9
10. Nutrient Attention: Part B	1.20	0.8
10. AVERAGE	0.77	0.9
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.83	0.1
12. Urban Quality of Life: A. Presence of an Urban Setting	0.10	0.3
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.05	0.1
14. Noteworthiness	1.00	2.8

Wetland 17A – Miles Swamp

The portion of Miles Swamp that lies west of Wason Road is a very large wetland complex consisting of multiple interspersed habitat types, including open water and upland islands. The habitat interspersion makes it valuable for wildlife and the open water provides finfish habitat. The open water as well as dense marsh vegetation and restricted outlet also contribute to high functional values for flood control, sediment trapping, and nutrient attenuation. The wetland also lies within a groundwater aquifer and near wells used for drinking water, making it valuable for groundwater protection. Miles Swamp also has historical significance because it is reported to have been associated with an old dam and grist mill. Several historical structures also appear on 1905 USGS maps adjacent to the wetland.

Table 5-15.
Wetland 17A-Miles Swamp Wetland Summary (107.9 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.83	89.9
2. Wetland Wildlife Habitat	0.89	96.4
3. Finfish Habitat: Part A – Rivers and Streams	0.81	0.1
3. Finfish Habitat: Part B – Ponds and Lakes	0.45	17.9
4. Educational Potential	0.71	76.6
5. Visual Aesthetic Quality	0.99	4.9
6. Water-based Recreation	0.74	74.3
7. Flood Control Potential	1.00	107.9
8. Ground Water Use Potential	0.88	94.4
9. Sediment Trapping: Part A	0.50	54.0
9. Sediment Trapping: Part B	0.90	97.1
9. Average	0.70	75.6
10. Nutrient Attention: Part A	0.50	54.0
10. Nutrient Attention: Part B	0.85	97.1
10. AVERAGE	0.68	75.6
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.67	0.1
12. Urban Quality of Life: A. Presence of an Urban Setting	0.75	80.9
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.78	78.3
14. Noteworthiness	1.00	107.9

Wetland 17B – Miles Swamp

The portion of Miles Swamp east of Wason Road consists of old beaver influenced wetlands along the south branch of Second Brook. This wetland is relatively small, but includes multiple habitat types and a wide undisturbed upland buffer, providing ecological integrity as well as habitat both for wildlife and finfish. The dense vegetation and restricted outlet provide for a modest level of flood control and sediment trapping. The wetland also lies upstream of a groundwater aquifer and near wells used for drinking water, making it valuable for groundwater protection. As with 17A, historical significance should be noted do to the wetlands association with known historical resources in the surrounding area.

Table 5-16.
Wetland 17B-Miles Swamp Wetland Summary (7.1 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.83	5.9
2. Wetland Wildlife Habitat	0.70	5.0
3. Finfish Habitat: Part A – Rivers and Streams	0.88	0.1
3. Finfish Habitat: Part B – Ponds and Lakes	0.00	0.0
4. Educational Potential	0.56	4.0
5. Visual Aesthetic Quality	0.87	3.5
6. Water-based Recreation	0.43	3.1
7. Flood Control Potential	0.70	5.0
8. Ground Water Use Potential	0.88	6.2
9. Sediment Trapping: Part A	0.55	3.9
9. Sediment Trapping: Part B	0.75	5.3
9. Average	0.65	4.6
10. Nutrient Attention: Part A	0.53	3.7
10. Nutrient Attention: Part B	0.69	5.3
10. AVERAGE	0.61	4.5
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.83	0.0
12. Urban Quality of Life: A. Presence of an Urban Setting	0.30	2.1
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.78	5.5
14. Noteworthiness	0.00	0.0

Wetland 18A – Limit Brook Swamp

Wetland 18A consists of the northern portion of Limit Brook Swamp that lies above a large beaver dam. The wetland is relatively undisturbed, includes multiple habitat types, and has a relatively undeveloped upland buffer. These attributes indicate the wetland has high ecological integrity and wildlife value. The dense vegetation and restricted outlet in this wetland provide high flood control value, sediment trapping, and nutrient attenuation. Broad vistas across the open marsh vegetation also provide aesthetic value here. The wetland lies within a groundwater aquifer and near wells used for drinking water, making it valuable for groundwater protection. It is reported that this wetland was once part of the Henry Colson hen farm located along Colson Road to the west, providing some historic value.

Table 5-17.
Wetland 18A-Limit Brook Swamp Wetland Summary (17.3 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.88	15.1
2. Wetland Wildlife Habitat	0.89	15.4
3. Finfish Habitat: Part A – Rivers and Streams	0.25	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.62	0.3
4. Educational Potential	0.69	11.9
5. Visual Aesthetic Quality	0.85	8.5
6. Water-based Recreation	0.63	10.9
7. Flood Control Potential	0.95	16.4
8. Ground Water Use Potential	0.88	15.1
9. Sediment Trapping: Part A	0.30	5.2
9. Sediment Trapping: Part B	0.75	13.0
9. Average	0.53	9.1
10. Nutrient Attention: Part A	0.65	11.2
10. Nutrient Attention: Part B	0.63	13.0
10. AVERAGE	0.64	12.1
11. Shoreline Anchoring and Dissipation of Erosive Forces	1.00	0.1
12. Urban Quality of Life: A. Presence of an Urban Setting	0.5	8.7
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.53	9.1
14. Noteworthiness	0.00	0.0

Wetland 18B – Limit Brook Swamp

Wetland 18 includes of the southern portion of Limit Brook Swamp that lies downstream of a large beaver dam. The wetland is similar in both attributes and functional values to Wetland 18A described above. Ditching evident in this wetland provides additional evidence that this wetland was farmed in the distant past, possibly as part of the Henry Colson hen farm, providing some historic value to the area.

Table 5-18.
Wetland 18B- Limit Brook Swamp Wetland Summary (23.4 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.88	20.5
2. Wetland Wildlife Habitat	0.94	21.9
3. Finfish Habitat: Part A – Rivers and Streams	0.70	0.1
3. Finfish Habitat: Part B – Ponds and Lakes	0.33	0.0
4. Educational Potential	0.62	14.6
5. Visual Aesthetic Quality	0.85	10.2
6. Water-based Recreation	0.64	14.9
7. Flood Control Potential	0.98	22.9
8. Ground Water Use Potential	0.88	20.5
9. Sediment Trapping: Part A	0.30	7.0
9. Sediment Trapping: Part B	0.68	15.8
9. Average	0.49	11.4
10. Nutrient Attention: Part A	0.20	4.7
10. Nutrient Attention: Part B	0.49	15.8
10. AVERAGE	0.35	10.3
11. Shoreline Anchoring and Dissipation of Erosive Forces	1.00	0.1
12. Urban Quality of Life: A. Presence of an Urban Setting	0.30	7.0
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.78	18.1
14. Noteworthiness	0.00	0.0

Wetland 20C – Musquash Brook Swamp Complex

Wetland 20C forms the northern portion of the Musquash Brook Swamp Complex. This wetland is relatively undisturbed, includes multiple habitat types, and has a broad upland buffer, contributing to a high rating for this wetland in both ecological integrity and wildlife habitat values. It is also contained within the Musquash Conservation Area, providing further values for these attributes. Other important values of this wetland include aesthetic value associated with broad open wetlands as well as shoreline anchoring, which protects the shoreline from erosive forces associated with the stream.

Table 5-19.
Wetland 20C- Musquash Brook Swamp Complex Summary (19.8 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.88	17.3
2. Wetland Wildlife Habitat	0.71	14.0
3. Finfish Habitat: Part A – Rivers and Streams	0.55	0.1
3. Finfish Habitat: Part B – Ponds and Lakes	0.00	0.0
4. Educational Potential	0.57	11.2
5. Visual Aesthetic Quality	0.87	17.2
6. Water-based Recreation	0.50	9.8
7. Flood Control Potential	0.30	5.9
8. Ground Water Use Potential	0.75	14.9
9. Sediment Trapping: Part A	0.55	10.9
9. Sediment Trapping: Part B	0.59	11.7
9. Average	0.57	11.3
10. Nutrient Attention: Part A	0.53	10.4
10. Nutrient Attention: Part B	0.55	11.7
10. AVERAGE	0.54	11.1
11. Shoreline Anchoring and Dissipation of Erosive Forces	1.00	0.4
12. Urban Quality of Life: A. Presence of an Urban Setting	0.50	9.9
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.28	5.4
14. Noteworthiness	0.00	0.0

Wetland 20D – Musquash Brook Swamp Complex

Wetland 20D in the southern portion of the Musquash Brook Swamp Complex has similar features and functional values as those described for Wetland 20C in the northern portion of the complex. Unlike Wetland 20C; however, Wetland 20D includes a large ponded area that may provide finfish habitat.

Table 5-20.
Wetland 20D-Musquash Brook Swamp Complex Summary (19.2 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.84	16.2
2. Wetland Wildlife Habitat	0.75	14.5
3. Finfish Habitat: Part A – Rivers and Streams	0.25	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.83	15.0
4. Educational Potential	0.74	14.2
5. Visual Aesthetic Quality	0.98	16.6
6. Water-based Recreation	0.73	14.0
7. Flood Control Potential	0.40	7.7
8. Ground Water Use Potential	0.63	12.0
9. Sediment Trapping: Part A	0.55	10.6
9. Sediment Trapping: Part B	0.61	11.7
9. Average	0.58	11.2
10. Nutrient Attention: Part A	0.33	6.2
10. Nutrient Attention: Part B	0.73	11.7
10. AVERAGE	0.53	8.9
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.83	0.5
12. Urban Quality of Life: A. Presence of an Urban Setting	0.10	1.9
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.53	10.1
14. Noteworthiness	0.00	0.0

Wetland 20E – Musquash Pond Swamp

Musquash Pond Swamp includes a beaver pond and a number of other wetland habitat types along Musquash Brook as it flows into Musquash Pond. In addition, much of the area is part of the Musquash Conservation Area, with broad undeveloped buffers. These factors contribute to high values for ecological integrity, wildlife habitat value, aesthetic quality, and shoreline anchoring for the wetland. This wetland is noteworthy because it is reported by NHNHB to contain a locally rare (S3) fish species. Musquash Pond Swamp also lies within a groundwater aquifer and near wells used for drinking water, making it valuable for groundwater protection.

Table 5-21.
Wetland 20E-Musquash Pond Swamp Summary (8.4 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.84	7.1
2. Wetland Wildlife Habitat	0.83	7.0
3. Finfish Habitat: Part A – Rivers and Streams	0.19	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.60	31.2
4. Educational Potential	0.68	5.7
5. Visual Aesthetic Quality	0.93	2.8
6. Water-based Recreation	0.57	3.7
7. Flood Control Potential	0.10	0.8
8. Ground Water Use Potential	0.88	7.4
9. Sediment Trapping: Part A	0.30	2.5
9. Sediment Trapping: Part B	0.48	4.0
9. Average	0.39	3.3
10. Nutrient Attention: Part A	0.40	3.4
10. Nutrient Attention: Part B	0.60	4.0
10. AVERAGE	0.50	3.7
11. Shoreline Anchoring and Dissipation of Erosive Forces	1.00	0.7
12. Urban Quality of Life: A. Presence of an Urban Setting	0.30	2.5
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.53	4.4
14. Noteworthiness	1.0	8.4

Wetland 21B – Ayers Pond Swamp

Ayers Pond Swamp is a small wetland bordering Musquash Brook. The swamp includes a number of habitat types, but is located in a highly developed area, so rates only moderately for ecological integrity and wildlife habitat values. The wetland does provide shoreline stabilization along the brook, as well as aesthetic qualities. The wetland also lies within a groundwater aquifer and near wells used for drinking water, making it valuable for groundwater protection. Historical significance is rated as marginal for this wetland, with a single structure indicated on 1935 USGS maps.

Table 5-22.
Wetland 21B-Ayers Pond Swamp Summary (6.9 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.76	5.2
2. Wetland Wildlife Habitat	0.60	4.1
3. Finfish Habitat: Part A – Rivers and Streams	0.65	0.1
3. Finfish Habitat: Part B – Ponds and Lakes	0.00	0.0
4. Educational Potential	0.54	3.7
5. Visual Aesthetic Quality	0.81	2.6
6. Water-based Recreation	0.48	3.3
7. Flood Control Potential	0.20	1.4
8. Ground Water Use Potential	0.88	6.0
9. Sediment Trapping: Part A	0.30	2.1
9. Sediment Trapping: Part B	0.60	4.1
9. Average	0.45	3.1
10. Nutrient Attention: Part A	0.20	1.4
10. Nutrient Attention: Part B	0.58	4.1
10. AVERAGE	0.39	2.8
11. Shoreline Anchoring and Dissipation of Erosive Forces	0.83	0.4
12. Urban Quality of Life: A. Presence of an Urban Setting	0.30	2.1
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.53	3.6
14. Noteworthiness	0.00	0.0

Wetland 23/24 – Herron Pond Marsh

Heron Pond Marsh is a moderately sized wetland at the southern end of Herron Pond. The wetland includes beaver flowages, multiple habitat types, and a broad upland buffer, which all contribute to ecological integrity and wildlife habitat values. The dense marsh vegetation and ponding that occur in this wetland contribute to a relatively high ability to trap sediment and attenuate nutrients, thereby contributing to improved water quality downstream. The wetland also lies upstream of a groundwater aquifer that is near wells used for drinking water, making it valuable for groundwater protection. The former farmhouse (foundation/stonewalls are all that remain today) located off of Gowing Road, contributes to the wetland's moderate historical potential.

Table 5-23.
Wetland 23/24 Heron Pond Marsh Summary (18.6 acres)

Wetland Functional Value	FVI	WVU
1. Ecological Integrity	0.88	16.4
2. Wetland Wildlife Habitat	0.89	16.5
3. Finfish Habitat: Part A – Rivers and Streams	0.13	0.0
3. Finfish Habitat: Part B – Ponds and Lakes	0.83	9.6
4. Educational Potential	0.61	11.4
5. Visual Aesthetic Quality	0.59	5.9
6. Water-based Recreation	0.58	10.9
7. Flood Control Potential	0.55	10.2
8. Ground Water Use Potential	0.88	16.3
9. Sediment Trapping: Part A	0.30	5.6
9. Sediment Trapping: Part B	0.77	14.3
9. Average	0.54	9.9
10. Nutrient Attention: Part A	0.65	12.1
10. Nutrient Attention: Part B	0.86	14.3
10. AVERAGE	0.76	13.2
11. Shoreline Anchoring and Dissipation of Erosive Forces	1.00	0.4
12. Urban Quality of Life: A. Presence of an Urban Setting	0.30	5.6
12. Urban Quality of Life: B. Wetland Wildlife Habitat	0.00	0.0
12. Urban Quality of Life: C. Educational Opportunity	0.00	0.0
12. Urban Quality of Life: D. Visual/Aesthetic Quality	0.00	0.0
12. Urban Quality of Life: E. Water-based Recreation	0.00	0.0
13. Historical Site Potential	0.78	14.4
14. Noteworthiness	0.00	0.0

5.2 Comparisons of Functional Value

In the discussions below, highlights of the comparisons of the 23 candidate wetlands are described for each functional value. The most important wetlands for each functional value are in bold text for quick interpretation by the reader.

5.2.1 Ecological Integrity

Wetland 1B-Chase Brook Swamp and **Wetland 17A-Miles Swamp** had the two highest average WVUs (63.5 and 89.9) for Ecological Integrity (**Table 5-1**). Four wetlands had WVUs for ecological integrity of 3 or less: Robinson Pond Wetlands, Benson's Vicinity-14B, Benson's Vicinity-14C, and Bush Hill Swamp Complex-15A.

5.2.2 Wetland Wildlife Habitat

Miles Swamp-17A, the largest wetland at 107.9 acres, had the most WVUs for the wildlife habitat function with 96.4 (**Table 5-2**). **Wetland 1B-Chase Brook Swamp** (second largest in size at 66.3 acres) followed with 53.4 WVUs. The relationship between size and WVUs is obvious for this function. Similarly, the two lowest scores were for the smallest wetlands: Wetland 5B-Robinson Pond (1.8 acres) and Wetland 14B-Bensons Vicinity (1.1 acres).

5.2.3 Finfish Habitat

Relative to finfish habitat as found in rivers and streams, none of the prime wetlands provide an appreciable amount of habitat worthy of noting (**Table 5-3**). **Wetland 5A-Robinson Pond Marsh** (102.7 WVUs) provides a substantially greater amount of finfish habitat in the form of ponds or lakes than any of the candidate prime wetlands (**Table 5-4**). Wetland 20E-Musquash Pond Swamp Complex (31.2 WVUs), Wetland 17A-Miles Swamp (17.9 WVUs), Wetland 20D- Musquash Brook Swamp Complex (15 WVUs) provide a moderate amount of pond and lake habitat for finfish.

5.2.4 Education Potential

By far the most important wetland for education potential (**Table 5-5**) was **Wetland 17A-Miles Swamp**. As the largest wetland complex, it provides 76.6 WVUs for this function and also contributed substantially to the wildlife habitat function and ecological integrity function. Its relatively easy public accessibility contributed to this wetland's educational potential. The remainder of wetlands made up an equal combination of wetlands with moderate potential (between 10 and 35 WVUs) and wetlands with very limited potential for educational value (less than 10 WVUs).

5.2.5 Visual Aesthetic Quality

Wetland 20C-Musquash Brook Swamp Complex (17.2), **Wetland 20D-Musquash Brook Swamp Complex** (16.6), **Wetland 12B-Ottamic Pond Marsh** (15.6), and **Wetland 10-Town Forest Red Maple Swamp** (14.2) provide the highest number of WVUs among the 23 candidate wetlands for visual quality (**Table 5-6**). With the exception of Wetland 18B-Limit Brook Swamp (10.2 WVUs), all the other wetlands provide less than 10 WVUs for this function.

5.2.6 Water-based Recreation

Wetland 17A-Miles Swamp with 74.3 WVUs ranks by far the highest of all candidate wetlands for water-based recreation (**Table 5-7**). This wetland's use for hunting and its potential recreational value, contribute to its high FVI for this function. Wetland

1B Chase Brook Swamp, Wetland 5A-Robinson Pond Marsh, Wetland 10-Town Forest Red Maple Swamp, Wetland 18B-Limit Brook Swamp, and Wetland 20D-Musquash Brook Swamp Complex are among the four wetlands that follow with scores ranging between 10 WVUs and 17 WVUs. All of the remaining wetlands provide less than 10 WVUs for water-based recreation, with five providing no opportunities for these types of activities.

5.2.7 Flood Control Potential

Wetland 17A-Miles Swamp, with a score of 107.9 WVUs, ranks significantly higher than all of the other wetlands in flood control potential (**Table 5-8**). A large storage capacity (due to its size) and location within the watershed greatly influenced its score. Wetland 1B-Chase Brook Swamp ranked second with 53 WVUs. Seven of the candidate wetlands provide minimal flood control values primarily because of their small size (e.g., Robinson Pond Wetlands-5B at 1.8 acres).

5.2.8 Ground-Water Use Potential

Wetland 17A-Miles Swamp, with a score of 94.4 WVUs, provided a substantially higher value for ground water use potential than the other candidate prime wetlands. Seven of the remaining candidate wetlands provide a value ranging between 20 and 58 WVUs (**Table 5-9**): Wetland 1B-Chase Brook Swamp (58 WVUs), Wetland 5A-Robinson Pond Marsh (30.7 WVUs), Wetland 8-Glover Brook Marsh Complex (30.6 WVUs), Wetland 11-Little Ottamic Pond Swamp (34.7 WVUs), Wetland 12A-Ottamic Pond Marsh (41.6 WVUs), Wetland 12B-Ottamic Pond Marsh (35.9 WVUs), and Wetland 18B-Limit Brook Swamp (20.5). Wetland size and position over stratified-drift aquifers account for a high ground water use potential value when measured in WVUs.

5.2.9 Sediment Trapping

Wetland17A-Miles Swamp (97.1 WVUs) provides a dramatically higher value for sediment trapping potential than the other candidate wetlands. **Wetland 1B-Chase Brook Swamp** (50.4 WVUs) ranked second for sediment trapping potential (**Table 5-10**). These wetlands rank high for this function due to factors such as size and location on the landscape, affording an opportunity to receive runoff from extensive areas of development surrounding them. The presence of persistent emergent vegetation also heightens their ability to trap sediments. In contrast, the smallest of the 23 wetlands provides little opportunity for sediment trapping because of their small size and the absence of development around them.

5.2.10 Nutrient Attenuation

The nutrient attenuation value of the candidate wetlands is highly correlated with the previous function, sediment trapping, since the same characteristics are important for both, *i.e.*, wetland size, presence of persistent vegetation and surrounding development. As a result, the graphs of total WVUs are almost identical for the two functions (compare **Table 5-11** with **Table 5-10**).

5.2.11 Shoreline Anchoring and Dissipation of Erosive Forces

Shoreline anchoring and dissipation of erosive waves or currents is an important function when the wetland immediately borders a large water body with a long fetch or a fast flowing stream. In addition, a high vegetation density in the wetland is also important to withstand these erosional forces. None of the 23 candidate wetlands (**Table 5-12**), even the largest ones, provide any substantial value for this function since the lengths of their shoreline, rather than simply their acreage, is factored into the calculation of WVUs. Wetlands 5A, 12A, 12B, and 20D are all adjacent to open water areas, but the lack of a defined shoreline of any significant length, hinders the wetlands from scoring high in this function.

5.2.12 Urban Quality of Life

The 23 prime wetland areas were not scored on their ability to enhance the urban quality of life.

5.2.13 Historical Site Potential

The presence of historic features, like old stonewalls, dams, foundations, dumps, etc., in association with the wetland, results in high FVI for this function. Nine of the 23 candidate wetlands provide more than 10 WVUs for this function (**Table 5-13**). **Wetland 17A-Miles Swamp** has the highest score with 78.3 WVUs because of its size and presence of structures such as stone or earthen foundations and berms. **Wetland 11-Little Ortarnic Pond Swamp** (25.4 WVUs) and **Wetland 5A-Robinson Pond Marsh** (19.3 WVUs) followed due to the same contributing factors.

5.2.14 Noteworthiness

Noteworthiness is the one function where the presence of one attribute or feature gives the wetland a high FVI. The presence of a rare species or an exemplary plant community, a documented scientific research site, or a known archaeological site, are all examples of features that will result in a high FVI. Of the 23 candidate wetlands, **Wetland 17A-Miles Swamp** and **Wetland 1B-Chase Brook Swamp** rank the highest with 107.9 and 66.3 WVUs for this function, respectively (**Table 5-14**).

5.3 Comparison Among Wetlands

5.3.1 Average Functional Value

The average Functional Value Index for each of the 23 wetlands is shown in Table 5-15. By inspection of the graph, it can be seen that Miles Swamp-17A had a substantially higher average than the others with a score of 0.82, followed by five wetlands with scores than between 0.70 and 0.73. Miles Swamp-17A had individual FVI scores exceeding 0.80 or ten of the 14 Functional Values. Eight out of the 17 remaining wetlands had average FVIs between 0.60 and 0.70, with the rest falling below 0.60. Robinson Pond Wetlands-5B had the lowest average FVI with 0.37. The absence of any finfish habitat, water-based recreation and shoreline protection value lowered the average FVI for this wetland.

5.3.2 Total Wetland Value Units

The total WVUs for each wetland are shown in Figure 5-16. Once again, Miles Swamp-17A had the highest total WVUs (942.8); not only because it was the largest wetland investigated (107.9 acres), but also because it had the highest average FVI (0.82). This wetland had a substantially greater value than the rest. Wetland 1B-Chase Brook exceeded a total of WVUs of 450.00: primarily because of its size (second to Miles Swamp-17A). Five of the total remaining wetlands (Wetlands 5A, 8, 11, 12A, and 12B) had high total WVUs (i.e., >250.00), again due to a combination of size and high average FVI values. Robinson Pond Wetland-5B (1.7 ac) and Benson's Vicinity-14B (1.1 ac) had the lowest total WVUs. These two wetlands were the smallest evaluated (< 2 acres) and among only four total wetlands that had FVI averages below 0.50.

5.3.3 Recommendations

An overall comparison of the candidate prime wetlands resulted in three tiers of functional value scores. Wetlands 17A, 1B, 12A, 11, 12B, 5A, and 8 stood out as ranking highest among the group. Nine wetlands (18B, 20D, 23/24, 18A, 10, 20C, 14A, 20E, and 15A) had intermediate functional value scores. The lowest ranking sites included (17B, 21B, 2D, 15D, 14C, 14B, and 5B). Further attention should be given to lower ranking sites to ensure that important values that may not be expressed well in numerical rankings, such as rare species habitat, are properly considered.

Appendix A
Wetland Tables & Figures

Appendix B
Site Photos

Appendix C
Watershed Map

Appendix D
Wetland Cover Type Maps

Appendix E
Prime Wetland Maps

Appendix F
Cowardin NWI
Wetland Classification