B Wetland Functional Assessment

Wetland Functional Assessment

Hampshire Country Club Property

Cove Road
Village of Mamaroneck and
Town of Mamaroneck,
Westchester County,
New York

Prepared for: **Hampshire Recreation, LLC**
c.o. New World Realty Advisors
1500 Broadway, 15th Floor
New York, NY 10036

Prepared by:

50 Main Street, Suite 360
White Plains, New York 10606

July 2016

Table of Contents

List of Attachments

1.0
Introduction

This wetland functional assessment has been prepared by VHB Engineering, Surveying and Landscape Architecture, P.C. (VHB) for the 106.2-acre Hampshire County Club golf course property, located between East Boston Post Road and the Long Island Sound, in Westchester County, New York (the "Project Site," see Attachment A, Figure 1). The Village/Town of Mamaroneck municipal boundary line passes through the Project Site, creating a 98.9-acre portion located within the Village of Mamaroneck and a smaller 7.3-acre portion within the Town of Mamaroneck.

The Project Site is currently developed with fairways, greens, roughs, treed areas and water features that are part of an 18-hole golf course. The remainder of the Project Site is developed with recreational membership club facilities, including a 35,000 square-foot (sf) clubhouse, swimming pool, tennis courts, maintenance facilities and other support uses.

The golf course water features noted above include seven ponds and several ditches associated with the golf course drainage system, as well as two vegetated marshes. These features are regulated as "wetlands" by the Board of Trustees of the Village of Mamaroneck, pursuant to Village Code Chapter 192 (Freshwater Wetlands), and by the Town Board of the Town of Mamaroneck, pursuant to Town Code Chapter 114 (Wetlands and Watercourses).

Hampshire Recreation, LLC is proposing a new Planned Residential Development (PRD) consisting of 105 residential units, parking areas, seven tennis courts and approximately 36 acres of common open space at the Project Site. The existing golf course use would be downsized to a 9-hole golf course to to facilitate the development of the PRD, which would be built in its entirety within the portion of the Project Site located within the Village of Mamaroneck. No development is proposed within the Town of Mamaroneck. As such, the Planning Board of the Village of Mamaroneck is serving as the Lead Agency for the State Environmental Quality Review Act (SEQRA) review of the proposed PRD. Therefore, in accordance with the requirements of the Village Planning Board as Lead Agency, this report

provides a detailed description of the regulated wetlands at the Project Site and summarizes the results of a wetland functional assessment performed by VHB in May 2016.

2.0

Wetland Functional Assessment

2.1 Site and Wetland Overview

The Project Site is comprised of various habitats that are predominantly anthropogenic (i.e., created or altered by humans) in origin. Specifically, based upon field surveys conducted in May 2016, the Project Site supports the following ecological communities, as described in the New York Natural Heritage Program (NYNHP) publication *Ecological Communities of New York State*[1]

- Urban Structure Exterior
- Paved Road/Path
- Unpaved Road/Path
- Mowed Lawn
- Mowed Lawn with Trees
- Successional Southern Hardwoods
- Farm Pond/Artificial Pond
- Ditch/Artificial Intermittent Stream
- Common Reed Marsh

The latter three communities encompass the regulated wetlands at the Project Site, which include the ponds and ditches comprising the golf course drainage system, as well as an additional isolated wetland feature (see Attachment A, Figure 2). As described in detail in Section 2.3 below, the majority of the wetlands at the Project Site are anthropogenic features that were created or altered to provide drainage and irrigation for the golf course, and to serve as water hazards. The wetlands have been adversely impacted due to historic and current stormwater inputs and golf course management practices. The primary hydrological influences to the wetlands at the Project Site include stormwater and groundwater. Additionally, some of the site wetland features are tidally-influenced from the marine waters of Delancey Cove,

[1] Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero (editors). 2014. *Ecological Communities of New York State.* Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

located to the south of the Project Site. In general, the boundaries of the golf course wetlands are well-defined, due to the abrupt transitions (i.e., rock-lined or grass-lined banks) that have been constructed along the boundaries of these surface water features and the adjacent maintained turf areas of the golf course.

2.2 Methodology

The wetland functional assessment was conducted according to the methods developed by Denis W. Magee (with technical contributions from Garrett G. Hollands), as described in "*A Rapid Procedure for Assessing Wetland Functional Capacity based on Hydrogeomorphic (HGM) Classification*"[2] (the "Magee-Hollands Method"). According to the aforementioned resource, the Magee-Hollands Method was developed and is intended to be applied to six distinct wetland classes within "the glaciated Northeast-Midwest Region" (depressional, slope, lacustrine fringe, extensive peatlands, flats and riverine wetlands). In accordance with the Magee-Hollands Method, the functional capacity for each of eight principal wetland functions is assessed, based partially on review of "desktop" resources (e.g., aerial imagery, maps and other references), but primarily upon field observations of hydrological, geological and biological characteristics of the wetland and the surrounding watershed uses and land uses. The eight wetland functions are:

- Modification of Groundwater Discharge
- Modification of Groundwater Recharge
- Storm and Flood Water Storage
- Modification of Stream Flow
- Modification of Water Quality
- Export of Detritus
- Contribution to Abundance and Diversity of Wetland Vegetation
- Contribution to Abundance and Diversity of Wetland Fauna

During the assessment, relative value weights are assigned to assorted variables applying to each of the eight aforementioned wetland functions. The sum of the variable weights for each wetland function is then totaled and divided by the maximum potential score for that function, in order to derive a Functional Capacity Index (FCI) score. The FCI score is then compared to the FCI index range for other wetlands of the same wetland class (e.g., depressional wetlands, etc.) based upon data from over 1,000 assessments performed on wetlands in the glaciated Northeast-Midwest Region, within which the Magee-Hollands Method was developed.

Field data for the wetland functional assessment were collected at the Project Site on May 17-18, 2016, by VHB Project Scientist David Kennedy, MS (*Curriculum Vitae*

▼

[2] Magee, Denis W., with technical contributions by Garret G. Hollands. 1998. *A Rapid Procedure for Assessing Wetland Functional Capacity based on Hydrogeomorphic (HGM) Classification.* Normandeau Associates, Bedford Massachusetts.

included as Attachment E) and recorded on Magee-Hollands Method data forms (copies included as Attachment C). Additional information regarding the Project Site wetlands was collected during an interview with golf course superintendent Mr. Scott Olsen. Relevant information obtained from Mr. Olsen is included within the text of this report. Additionally, VHB reviewed the 2012 *Wetland Characterization Assessment* prepared by Nelson, Pope & Voorhis, LLC (NP&V) (copy included as Attachment D) to obtain additional background information regarding the wetlands at the Project Site.

Based upon field observations of surface water connections or other hydrological connections, the various wetland features at the Project Site were grouped as four distinct wetlands for the purpose of this wetland functional assessment (see Attachment A, Figure 2) . For consistency, the four wetlands have been identified primarily according to the naming conventions utilized in the aforementioned NP&V report, as amended by VHB based upon current site observations:

- Golf Course Drainage System 1 (Pond 13, Pond 16 and Drainage Ditch 1)
- Golf Course Drainage System 2 (Pond 5 and Pond 6)
- Golf Course Drainage System 3 (Pond 10, Pond 11, Pond 18, vegetated wetland and Drainage Ditch 2)
- Isolated Wetland A

Following the Magee-Hollands Method procedures, the four wetland groupings identified above were all classified under the depressional wetland class, due to the fact that they occur within topographic depressions and have either no outlets or intermittent outlets.

2.3 Results

The Magee-Hollands FCI Scores for each of the eight analyzed wetland functions within the four Project Site wetlands are presented in Table 1 below.

Table 1 – Summary of Magee-Hollands Wetland Functional Capacity Scores

Wetland Function	Golf Course Drainage System 1 (FCI Score)	Golf Course Drainage System 2 (FCI Score)	Golf Course Drainage System 3 (FCI Score)	Isolated Wetland A (FCI Score)
Modification of Groundwater Discharge (FCI Range = 0.19-1.0)	0.55	0.50	0.55	0.28
Modification of Groundwater Recharge (FCI Range = 0.19-1.0)	0.57	0.43	0.62	0.62
Storm and Flood Water Storage (FCI Range = 0.15-1.0)	0.55	1.0	0.52	1.0
Modification of Stream Flow (FCI Range = 0.11-1.0)	0.44	0.0	0.44	0.0
Modification of Water Quality (FCI Range = 0.22-1.0)	1.0	1.0	1.0	0.77
Export of Detritus (FCI Range = 0.27-1.0)	0.39	0.0	0.44	0.0
Contribution to Abundance and Diversity of Wetland Vegetation (FCI Range = 0.13-1.0)	0.20	0.13	0.46	0.60
Contribution to Abundance and Diversity of Wetland Fauna (FCI Range = 0.11-1.0)	0.39	0.36	0.55	0.44

The following provides a summary of the functional capacity of the four wetlands at the Project Site, based upon the Magee-Hollands FCI scores, site observations, the NP&V report and information provided by Mr. Olsen.

Golf Course Drainage System 1

This wetland system is comprised of Ponds 13 and 16, with associated drainage ditches and pipes. Pond 16 is an artificial structure located at and beyond the northwestern property boundary. The pond was constructed in 1982, in order to accommodate stormwater runoff from the adjoining condominium development, as well as to provide drainage for the golf course. Reportedly, Pond 16 has also been subject to illicit stormwater discharges from adjacent commercial uses. As stormwater is a primary hydrological source, Pond 16, contains high levels of algae, organic matter and sediment deposits. According to Mr. Olsen, the pond is periodically treated with herbicides and/or organic microbe applications. The plant community within the pond is dominated by submerged aquatic vegetation, with no emergent plants observed during the wetland assessment.

Water exits Pond 16 via a subgrade pipe that outfalls to a drainage ditch (Ditch 1) that connects to Pond 13. The ditch is largely unvegetated and contains a mineral substrate comprised primarily of gravels and clays. A similar pipe/ditch combination drains the northcentral portion of the golf course and also discharges to Pond 13.

Pond 13 was reportedly a naturally occurring pond that was modified and expanded between 1960 and 1976. With the exception of scattered patches of emergent vegetation, the majority of the pond is largely unvegetated. The pond contains algal deposits and has been impacted by both organic and mineral sediment deposits from stormwater runoff. Two large culvert openings with manually-operated gate valves occur within a concrete and fieldstone wall located at the terminus of the pond along the western property boundary near Hummocks Road. The culverts reportedly run under Hummocks Road to a subgrade vault located beneath the school athletic field, which in turn discharges via a culvert to the tidal wetlands of Delancey Cove to the south. The culvert gate valves were observed to be open at the time of the May 2016 wetland assessment. According to Mr. Olsen, the gate valves are left open continuously, and the water level within Pond 13 is therefore subject to a two-foot range as a result of tidal influence. As also observed during the wetland assessment, two smaller culvert openings occur within the fieldstone wall at the western terminus of Pond 13. The culverts appear to discharge stormwater from Hummocks Road to the pond.

Based on the Magee-Hollands assessment, the primary functions of Golf Course Drainage System 1 are Modification of Water Quality and Storm and Floodwater Storage, which are the functions that the ponds and ditches that comprise the system were created and/or modified for. It is important to note that as a result of providing these functions for the adjacent condominium development and the golf course,

water quality within the system itself is low. The system also provides a moderate degree of functionality with respect to Modification of Groundwater Recharge/Discharge functions to/from the underlying groundwater table, which appears to be located close to the ground surface through much of the low-lying portions of the golf course. Given the lack of a permanent outlet, the system offers limited functionality with respect to Export of Detritus. As the system does not support significant vegetative communities, Contribution to Abundance and Diversity of Wetland Vegetation functionality is low. Due to this factor, as well as low overall water quality, the system does not offer a significant degree of functionality with respect to Contribution to Abundance and Diversity of Wetland Fauna.

Golf Course Drainage System 2

This wetland system is comprised of Ponds 5 and 6, with associated subgrade drainage pipes located at the northeastern portion of the golf course. Ponds 5 and 6 are artificial structures that were constructed between 1960 and 1994 for irrigation and stormwater drainage purposes. According to Mr. Olsen, groundwater from two irrigation wells is pumped into Pond 5 from June to September, in order to supply the golf course irrigation system. Accordingly, water levels within the pond reportedly fluctuate by as much as four feet. Pond 6 receives overflow from Pond 5 via a 12-inch subgrade pipe, and water levels within this pond reportedly fluctuate by up to 18 inches. Although interconnected, the ponds do not have outlets to other wetlands or surface waters.

Both Ponds 5 and 6 also receive stormwater inputs via overland flow and via golf course drainage pipes. Additionally, Pond 6 receives stormwater inputs from the residential neighborhood to the north and east of the golf course via at least one culvert. As observed during the wetland assessment, both ponds support submerged aquatic vegetation and contain high levels of algae and organic sediments. The ponds are reportedly treated with herbicides and/or organic microbe applications, as needed.

The primary Magee-Hollands assessment functions of Golf Course Drainage System 2 are the Modification of Water Quality and Storm and Floodwater Storage functions provided by this artificially created system. The system also provides a moderate degree of functionality with respect to Modification of Groundwater Recharge/Discharge functions. However, it is important to note that groundwater discharge within the system is due primarily to pumping of groundwater to supply the golf course irrigation system, rather than natural discharge of groundwater. Due to the lack of an outlet, the system does not provide Modification of Stream Flow or Export of Detritus functions. The system provides limited Contribution to Abundance and Diversity of Wetland Vegetation functionality and very limited Contribution to Abundance and Diversity of Wetland Fauna functionality.

Golf Course Drainage System 3

This system is comprised of Ponds 10, 11, 18 and Drainage Ditch 2. Additionally, the system includes a vegetated emergent wetland located contiguous to Pond 10.

Drainage Ditch 2 and associated subgrade pipes provide drainage for the eastern and southern portions of the golf course. Portions of the ditch appear to have been a natural stream that was modified in association with the creation of the golf course. The uppermost (northern) reaches of the ditch are primarily stone- or gravel-lined and largely unvegetated, while further to the south the stream is characterized by finer-grained sediments and supports emergent vegetation communities.

An intermittent connection exists between Drainage Ditch 2 and Pond 18, which is located adjacent to the north of Eagle Knolls Road. Pond 18 is an anthropogenic structure that was created for stormwater storage and aesthetic purposes. The pond is comprised of two levels ("upper" and "lower") that are hydrologically connected. Water is transported by a recirculation pump from the lower level of the pond to the upper level, where it discharges through a fountain and flows back to the lower level via a stone spillway/waterfall. The pond receives stormwater drainage from paved areas located near the golf course clubhouse. The stormwater discharges to the upper level of Pond 18 via a culvert. An overflow located within the lower level of the pond discharges water to Ditch 2 during significant storm events. As such, Pond 18 and Ditch 2 are hydrologically linked via this intermittent connection. The lower level of Pond 18 was observed to contain significant algal growth at the time of the wetland assessment.

Beyond Pond 18, Ditch 2 crosses beneath Eagle Knolls Road and empties into Pond 10, located at the southern end of the golf course. Pond 10 is reportedly a natural feature that has been modified in association with the golf course. The pond is a shallow and largely unvegetated feature that appears to receive intermittent tidal water via three culvert outlets equipped with manually-operated gate valves. The culverts are set at different elevations within a concrete headwall located at the southeastern end of the pond. The gate valves were all observed to be in the open position at the time of the wetland assessment. The three culverts are connected to concrete control structures with tide gates set at different elevations within an embankment located along the shoreline of Delancey Cove. The control structures and tide gates appear to have been designed to allow for drainage from Pond 10 to Delancey Cove to occur during storm events, while preventing tidal waters from entering Pond 10. However, at the time of the wetland assessment, water was observed discharging to Pond 10 through two of the three culverts, and evidence of tidal wetland flora was observed within portions of the pond.

The western portion of Pond 10 is contiguous with and hydrologically connect to a densely vegetated emergent wetland that is dominated by common reed (*Phragmites australis*). Pond 10 also receives water from Pond 11 via a subgrade culvert. Pond 11 was reportedly constructed in 1998 to improve drainage at the southern portion of

the golf course. Scattered emergent vegetation, submergent vegetation, algal growth and organic matter were observed within the Pond 11 at the time of the wetland assessment.

Similar to the other two golf course drainage systems, the primary functions of Golf Course Drainage System 3 are Modification of Water Quality and Storm and Floodwater Storage. In particular, these functions are facilitated by the emergent wetland located to the west of Pond 10. As a result of providing these two functions, overall water quality within Golf Course Drainage System 3 is low. The system also provides a moderate degree of functionality with respect to the Modification of Groundwater Recharge/Discharge functions. Given the lack of a permanent outlet, the system offers limited functionality with respect to Export of Detritus. Due primarily to the emergent wetland to the west of Pond 10, as well as the vegetated lower reaches of Ditch 2, the system provides a higher level of functionality for the Diversity of Wetland Vegetation and Contribution to Abundance and Diversity of Wetland Fauna functions, as compared to the other two golf course drainage systems.

Isolated Wetland A

Isolated Wetland A is a common reed-dominated emergent marsh located along the northwestern property boundary with the adjacent residential development. Unlike the three golf course drainage systems, Isolated Wetland A was not constructed or altered for stormwater purposes, although the feature appears to receive overland flow from higher topography within the immediate surrounding area. No surface water was observed within the feature at the time of the wetland functional assessment, however saturated soils were observed several inches below the surface. Evidence of historic clearing was observed along the border of the wetland with the adjacent residential properties.

Based on the Magee-Hollands assessment, the chief functions performed by Isolated Wetland A are Storm and Floodwater Storage and Modification of Water Quality. These functions are due primarily to the fact that the wetland has no outlet, as well as the surficial soils and continuance vegetation cover within the wetland. The wetland also provides a relatively high degree of functionality with respect to Modification of Groundwater Recharge and Contribution to Abundance and Diversity of Wetland Vegetation. Wetland A offers limited functionality for Modification of Groundwater Discharge and Contribution to Abundance and Diversity of Wetland Fauna. Due to the lack of an outlet, Wetland A does not provide any functionality for Export of Detritus and Modification of Stream Flow.

3.0

Conclusions

The wetlands at the Project Site are primarily anthropogenic features that were created or altered to provide drainage and irrigation for the golf course, and to serve as water hazards. These features have been adversely impacted due to stormwater inputs from onsite and offsite sources, as well golf course management practices. The results of the Magee-Hollands wetland functional assessment indicate that the primary functions performed by the Project Site wetlands are the Modification of Groundwater Quality and Storm and Floodwater Storage functions that these features were created or historically altered to perform. As a result of performing these functions, water quality is impaired and bottom substrates within the wetlands have been impacted by mineral and organic sediments. The Project site wetlands as a whole also offer a moderate degree of functionality with respect to the Modification of Groundwater Recharge and Modification of Groundwater Discharge functions to/from the underlying groundwater table. Due to their disturbed condition, impaired water quality and siltation impacts, overall functionality is low for the Diversity of Wetland Vegetation and Contribution to Abundance and Diversity of Wetland Fauna functions. Similarly, due primarily to the lack of permanent outlets, overall functionality is low to non-existent for the Export of Detritus and Modification of Stream flow functions.

Based upon the foregoing results of the wetland functional assessment, the wetlands at the Project Site are currently best-suited for their intended functions as stormwater management features and golf course water hazards.

Attachment A

FIGURE 1 – EXCERPT OF USGS TOPOGRAPHIC MAP

SITE NAME: Hampshire Country Club
STREET ADDRESS: 1025 Cove Road Mamaroneck, NY 10543
BASE MAP SOURCE: United States Geological Survey Topographic Map – Mamaroneck, New York Quadrangle (2013)

N

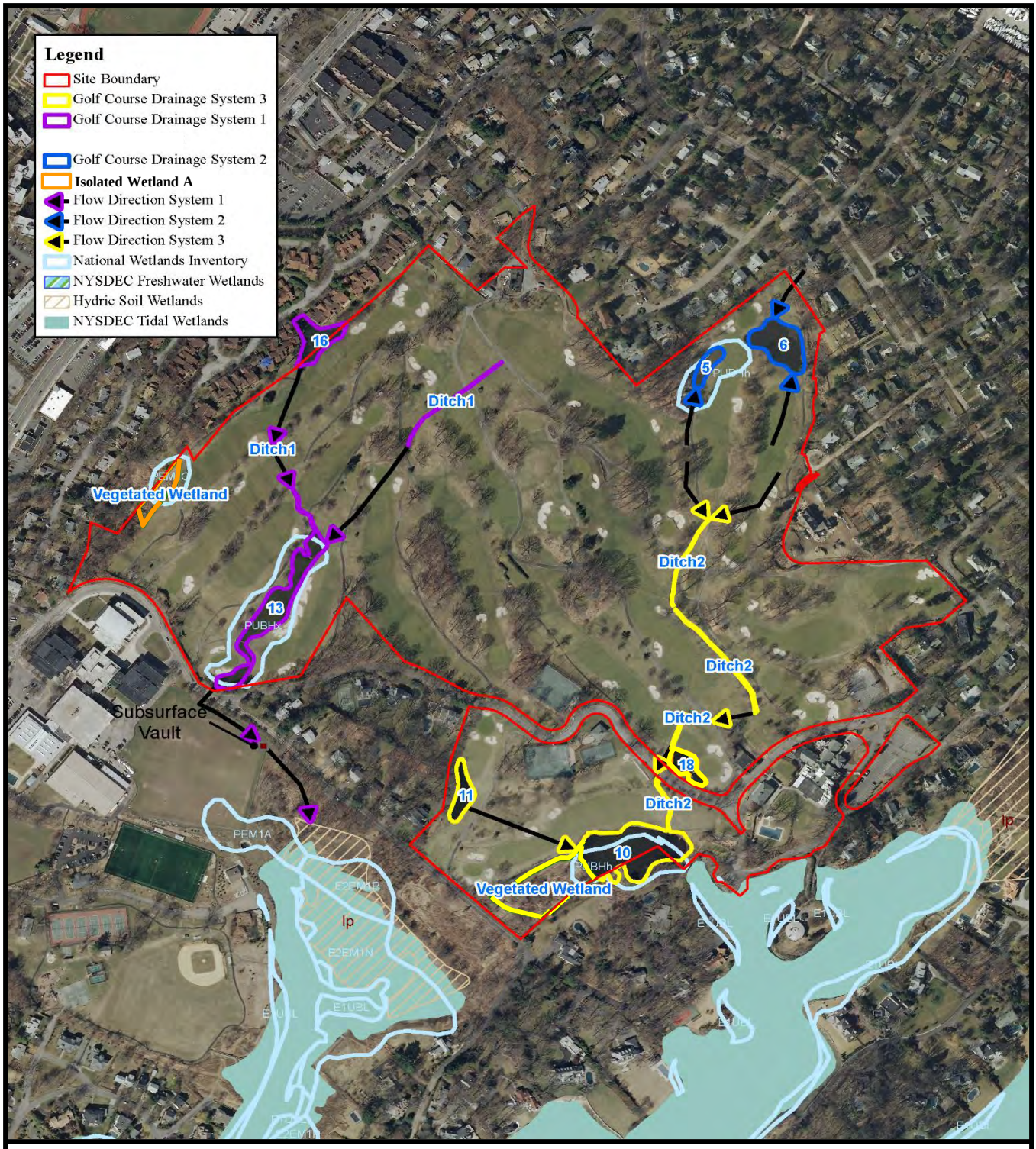


FIGURE 2 – DRAINAGE SYSTEM AND WETLAND MAP

SITE NAME: Hampshire Country Club
STREET ADDRESS: 1025 Cove Road Mamaroneck, NY 10543
BASE MAP SOURCE: *Wetland Characterization Assessment* - Figure 5, prepared by Nelson, Pope and Voorhis, LLC (September 17, 2012), as revised by VHB based on current conditions as observed on May 17-18, 2016

N

vhb

Attachment B

Photograph No. 1: Pond 16 of Golf Course Drainage System 1 (May 17, 2016).

Photograph No. 2: Ditch 1 of Golf Course Drainage System 1 (May 17, 2016).

Photograph No. 3: Pond 13 of Golf Course Drainage System 1 (May 17, 2016).

Photograph No. 4: Culverts with gate valves at the western end of Pond13, within Golf Course Drainage System 1 (May 17, 2016).

Photograph No. 5: Ditch 2 of Golf Course Drainage System 3 (May 18, 2016).

Photograph No. 6: Lower level (foreground) and upper level (background, with fountain) of Pond 18 of Golf Course Drainage System 3 (May 17, 2016).

Photograph No. 7: Gate valves at the southeastern end of Pond 10. of Golf Course Drainage System 3 (May 18, 2016).

Photograph No. 8: Concrete control structures located along the shoreline of Delancey Cove. The control structures allow intermittent tidal flow to Golf Course Drainage System 3 (May 18, 2016).

Photograph No. 9: Pond 10 (foreground) and contiguous vegetated wetland (background) of Golf Course Drainage System 3 (May 18, 2016).

Photograph No. 10: Pond 11 of Golf Course Drainage System 3 (May 18, 2016).

Photograph No. 11: Isolated Wetland A (May 17, 2016).

Photograph No. 12: Emergent wetland vegetation along the boundary of Isolated Wetland A (May 17, 2016).

Attachment C

WETLAND INVENTORY DATA - CHARACTERIZATION OF WETLAND

Project Name: Hampshire Country Club Date: 5/17/16

Field Investigators: David Kennedy, MS, Project Scientist, VHB

SURFACE WATER FLOW VECTORS

Golf Course Drainage System 1 (Pond #s 13 & 16, ditches)

- ☒ Depressional - 100% Percent/Acreage
- ☐ Slope - _____ Perecent/Acreage
- ☐ Extensive Peatland - ____ Percent/Acreage
- ☐ Lacustrine Fringe - ____ Percent/Acreage
- ☐ Riverine - _____ Percent/Acreage

VEGETATION TYPES

Forested Wetland

- ☐ Evergreen Needle-leaved - _____ Percent/Acreage
- ☐ Deciduous Broad-leaved - _____ Percent/Acreage
- ☐ Deciduous Needle-leaved - _____ Percent/Acreage

Scrub Shrub

- ☐ Evergreen Needle-leaved - _____ Percent/Acreage
- ☐ Evergreen Broad-leaved - _____ Percent/Acreage
- ☐ Deciduous Broad-leaved - _____ Percent/Acreage
- ☐ Deciduous Needle-leaved - _____ Percent/Acreage

Emergent Wetland

- ☒ Persistent - 3% Percent/Acreage
- ☒ Non-persistent - 2% Percent/acreage
- ☒ Aquatic Bed - 5% Percent/Acreage

Total - 10%

SOIL TYPES

Histosol:

- ☐ Fibric
- ☐ Hemic
- ☒ Sapric (ponds)

Mineral Hydric Soil:

- ☒ Gravelly
- ☐ Sandy
- ☐ Silty
- ☒ Clayey

(drainage ditches)

GEOLOGY

Surficial: glacial till

Bedrock: pelitic schists

Hampshire CC - Golf Course Drainage System 1

PRE-EMPTIVE STATUS

- ☐ Public Ownership
- ☐ Wildlife Management Area
- ☐ Fisheries Management Area
- ☐ Designated State or Federal Protected Wetland
- ☐ Documented Habitat for State or Federal Listed Species
- ☐ Regionally Scarce Wetland Category
- ☐ Historic/Archaeological Area

PLANT SPECIES

NAME	OW	FW	F	FU	DOM	C	S	TS	LS	H
Potamogeton Sp.	X				X					X
Iris Versicolor	X				X					X
Phragmites australis		X								X

OW-Obligate Wetland
FW- Facultative Wetland
F – Facultative
FU – Facultative Upland

Dom – Dominant
C- Canopy
S- Sapling
TS – Tall Shrub

LS- Low Shrub
H - Herb

Hampshire CC - Golf Course Drainage System 1

WETLAND INVENTORY DATA - CHARACTERIZATION OF MODEL VARIABLES

LANDSCAPE VARIABLES

Size:

- [X] Small (< 10 ACRES)
- [ ] Medium (10-100 ACRES)
- [ ] Large (> 100 ACRES)

Wetland Juxtaposition:

- [ ] Connected Upstream and Downstream
- [ ] Only Connected Above
- [X] Only Connected Below (culvert & tide gate to tidal wetland)
- [ ] Other wetlands Nearby But Not Connected
- [ ] Wetland Isolated

Fire Occurrence and Frequency:

- [ ] Natural; Predictable Frequency
- [ ] Natural; Sporadic Frequency
- [ ] Human-Caused; Predictable
- [ ] Human-Caused; Sporadic
- [ ] Rare Event
- [X] No Evidence

Regional Scarcity:

- [X] Not Scarce (> 5% of total wetland area of region)
- [ ] Scarce (< 5% of total wetland areas of region)

Watershed Land Use:

- [X] > 50% Urbanized
- [ ] 25-50% Urbanized
- [ ] 0-25% Urbanized

HYDROLOGICAL VARIABLES

Surface Water Level Fluctuation of Wetlands:

- [X] High Fluctuation Stormwater + Tidal influences
- [ ] Low Fluctuation
- [ ] Never Inundated

Frequency of Overbank Flooding:

- [X] Return Interval > 5 years
- [ ] Return Interval 2-5 Yeasts
- [ ] Return Interval 1-2 Years
- [ ] No Overbank Flooding

pH:

- [ ] Acid <5.5
- [ ] Circumneutral 5.5-7.4
- [X] Alkaline > 7.4 (7.5)
- [ ] No Water

Surficial Geologic Deposit Under Wetland:

- [ ] Low Permeability Stratified Deposits
- [ ] High Permeability Stratified Deposits
- [X] Glacial Till

Wetland Land Use:

- [X] High Intensity (i.e. agriculture) (Stormwater, fertilizer & chemical applications)
- [ ] Moderate Intensity (i.e. forestry)
- [ ] Low Intensity (i.e. open space)

Wetland Water Regime:

- [X] Wet: Permanently Flooded, Intermittently Exposed, Semi-Permanently Flooded
- [ ] Drier: Seasonally Flooded, Temporarily Flooded, Saturated

Basin Topographic Gradient:

- [ ] High Gradient > 2%
- [X] Low Gradient < 2%

Degree of Outlet Restriction:

- [X] Restricted Outflow (culverts & tide gates)
- [ ] Unrestricted Outflow
- [ ] No Outflow

Ratio of Wetland Area to Watershed Area:

- [ ] High > 10%
- [X] Low < 10%

Microrelief of Wetland Surface:

- [ ] Pronounced > 45 cm
- [ ] Well Developed 15-45 cm
- [X] Poorly Developed < 15 cm
- [ ] Absent

Inlet/Outlet Class:

- [ ] No Inlet/No Outlet
- [X] No Inlet/Intermittent Outlet culvert & tide gate
- [ ] No Inlet/Perennial Outlet
- [ ] Intermittent Inlet/No Outlet
- [ ] Intermittent Inlet/Intermittent Outlet
- [ ] Intermittent Outlet/Perennial Outlet
- [ ] Perennial Inlet/No Outlet
- [ ] Perennial Inlet/Intermittent Outlet
- [ ] Perennial Inlet/Perennial Outlet

Nested Piezometer Data:

- [ ] Recharge
- [ ] Discharge
- [ ] Horizontal Flow
- [X] Not Available

Relations of Wetlands' Substrate Elevation to Regional Piezometric Surface:

- [ ] Piezometer Surface Above or at Substrate Elevation
- [ ] Piezometer Surface Below Substrate Elevation
- [X] Not Available

Evidence of Sedimentation:

- [ ] No Evidence Observed
- [X] Sediment Observed on Wetland Substrate (stormwater sediment deposits)
- [ ] Fluvaquent Soils

Evidence of Seeps and Springs:

- [X] No Seeps or Springs
- [ ] Seeps Observed
- [ ] Perennial Spring
- [ ] Intermittent Spring

SOIL VARIABLES

Soil Lacking:

- [ ]

Histosol:

- [ ] Fibric
- [ ] Hemic
- [X] Sapric (ponds)

Hampshire CC - Golf Course Drainage System 1

Mineral Hydric Soil:

- [x] Gravelly
- [ ] Sandy
- [ ] Silty
- [x] Clayey

VEGETATION VARIABLES

Vegetation Lacking:

- [ ]

Dominant Wetland Type:

- [ ] Forested – Evergreen – Needle-leaved
- [ ] Forested – Deciduous – Broad-leaved
- [ ] Forested – Deciduous – Needle-leaved
- [ ] Scrub Shrub – Evergreen – Broad-leaved
- [ ] Scrub Shrub – Evergreen – Needle-leaved
- [ ] Scrub Shrub – Deciduous – Broad-leaved
- [ ] Scrub Shrub – Decisuous – Needle-leaved
- [x] Emergent – Persistent
- [ ] Emergent – Non-persistent
- [x] Aquatic Bed

Number of Types & Relative Proportions:

Number of Types:

- [ ] Actual #
- [ ] 5
- [ ] 4
- [ ] 3
- [x] 2
- [ ] 1

Evenness of Distribution:

- [ ] Even Distribution
- [ ] Moderately Even Distribution
- [x] Highly Uneven Distribution

Vegetation Density/Dominance:

- [x] Sparce (0-20%)
- [ ] Low Density (20-40%)
- [ ] Medium Density (40-60%)
- [ ] High Density (60-80%)
- [ ] Very High Density (80-100%)

Vegetation Interspersion:

- [ ] High (small groupings, diverse and interspersed)
- [ ] Moderate (broken irregular rings)
- [x] Low (~~large~~ Small patches, Isolated ~~concentric rings~~)

Number of Layers and Percent Cover:

Number of Layers:

- [ ] 6 or > (actual #)
- [ ] 5
- [ ] 4
- [ ] 3
- [x] 2
- [ ] 1

Percent Cover:

- [x] Submergents: 5
- [ ] Floating:
- [ ] Moss-lichen:
- [ ] Short Herb:
- [x] Tall Herb: 5
- [ ] Dwarf shrub:
- [ ] Short shrub:
- [ ] Tall shrub:
- [ ] Sapling:
- [ ] Tree:

Plant Species Diversity:

- [x] Low 1-2 plots sampled
- [ ] Medium 3-4 plots sampled
- [ ] High 5 or more plots sampled

Proportion of Animal Plant Foods:

- [x] Low (5-25%)
- [ ] Medium (25-50%)
- [ ] High (> 50%)

Cover Distribution:

- [ ] Continuous Cover
- [ ] Small Scattered Patches
- [x] 1 or More Large Patches; Parts of Site Open
- [ ] Solitary, Scattered Stems

Dead Woody Material:

- [ ] Abundant (50% of wetland surface)
- [ ] Moderately Abundant (25-50% of surface)
- [x] Low Abundance (0-25% of surface)

Interspersion of Cover and Open Water:

- [x] < 25% Scattered or Peripheral
- [ ] 26-75 % Scattered or Peripheral
- [ ] > 75% Scattered or Peripheral
- [ ] 100% Cover or Open Water

Stream Sinuosity:

- [ ] Highly Convoluted (Index 1.50 or >)
- [ ] Moderately Convoluted (Index 1.25-1.50)
- [x] Straight/Slightly Irregular (Index 1.10-1.25) (ditches)

Presence of Islands:

- [ ] Several to Many
- [ ] One or Few
- [x] Absent

PROJECT NAME: Hampshire CC - Golf Course Drainage System 1

MODIFICATION OF GROUNDWATER DISCHARGE					
Wetland ID(s): Drainage System 1 HGM Type: D		**HGM TYPES:**			
VARIABLES	**CONDITIONS**	**(D)**	**S**	**R**	**F**
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of Disfunction					
Inlet/Outlet Class	perennial inlet/no outlet	0	0	0	0
Nested Piezometer Data	recharge	0	0	0	0
Relationship to Regional Piezometric Surface	wetland substrate elevation above piezometric surface	0	0	0	0
Direct Indicators of Function					
Presence of Springs and Seeps	evidence of perennial steeps or springs	18	15	15	18
Neated Piezometer Data	discharge condition	18	15	15	18
Relationship to Regional Piezometric Surface	wetland substrate elevation below piezometric surface	18	15	15	18
Inlet/Outlet Class	no inlet/perennial outlet	18	15	15	18
Primary Variables					
Microrelief of Wetland Surfaces	pronounced	3	3	3	3
	well developed	2	2	2	2
	poorly developed	(1)	1	1	1
	absent	0	0	0	0
Inlet/Outlet Class	perennial inlet/perennial outlet	3	3	0	3
	intermittent inlet/perennial outlet	2	2	0	2
	all other classes	(0)	0	0	0
pH	alkaline	(3)	3	3	3
	circumneutral	2	2	2	2
	acid	0	0	0	0
	no water present	0	0	0	0
Surficial Geologic Deposit Under Wetland	high permeability stratified deposits	3	3	3	3
	low permeability stratified deposits	2	2	2	2
	glacial till	(1)	1	1	1
Wetland water regime	wet; permanently flooded, intermittently exposed semipermanently, flooded	(3)	0	3	3
	drier; seasonally flooded, temporarily flooded, saturated	1	0	1	1
Soil Type	histosol (ponds)	3	3	3	3
	mineral hydric soil (ditches) both	1 (2)	1	1	1
	Total Score:	10/18			
	Functional Capacity Index:	0.55			
	Model Range	3-18	2-15	3-15	3-18
	Index Range:	.19-1.0	.16-1.0	.22-1.0	.19-1.0

PROJECT NAME: Hampshire CC Golf Course - Drainage System 1

MODIFICATION OF GROUNDWATER RECHARGE									
Wetland ID(s): Drainage System 1 HGM Type: D		HGM TYPES:							
VARIABLES	CONDITIONS	(D)		L		EP		R		F	
		Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr
Indicators of Disfunction											
Inlet/Outlet Class	no inlet/perennial outlet; intermittent inlet/perennial outlet	0								0	
Nested Piezometer Data:	discharge condtion	0		0		0		0		0	
Relationship to Regional Piezometric Surface	wetland substrate elevation above piezometric surface	0		0		0		0		0	
Presence of Seeps and Springs	presence of seeps or springs	0		0		0		0		0	
Direct Indicators of Function											
Inlet/Outlet Class	perennial inlet/no outlet	21								21	
Nested Piezometer Data	recharge condition	21								21	
Relationship to Regional Peizometeric Surface	wetland substrate elevation below piezometric surface	21								21	
Primary Variables											
Microrelief of Wetland Surface	poorly developed	(3)		3		1		3		3	
	absent	3		3		1		3		3	
	well developed	2		2		2		2		2	
	pronounced	1		1		3		1		1	
Inlet/Outlet Class	perennial inlet/intermittent outlet	3		0		0		0		3	
	all other classes	(0)		0		0		0		0	
pH	acid	3		3		3		3		3	
	circumneutral	2		2		2		2		2	
	alkaline	(1)		1		1		1		1	
	no water present	0		0		0		0		0	
Surficial Geologic Deposit Under Wetland	glacial till	(3)		1		1		1		3	
	low permeability stratified deposits	2		2		2		2		2	
	high permeability stratified deposits	1		3		3		3		1	
Surface Water Level Fluctuation of the Wetland	high fluctuation	(3)		3		0		3		3	
	low fluctuation	2		2		0		2		2	
	never inundated	1		1		0		1		1	

Hampshire CC Golf Course - Drainage System 1

Wetland ID(s): Drainage System 1 HGM Type: D		HGM TYPES:				
VARIABLES	**CONDITIONS**	**D**	**L**	**EP**	**R**	**F**
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Wetland Water Regime	drier; seasonally flooded, temporarily flooded, saturated	3	3	0	3	3
	wet; permanently flooded, intermittently exposed, semipermanently flooded	(1)	1	0	1	1
Soil Type	gravelly or sandy mineral hydric	3	3	0	3	3
	silty or clayey mineral hydric	2	2	0	2	2
	sapric histosol	(1)	1	0	1	1
	fibric or hemic histosol	0	0	3	0	0
	Total Score:	12/21				
	Model Score:	4-21	4-18	2-12	4-18	4-21
	Functional Capacity Index:	0.57				
	Index Range:	.19-1.0	.22-1.0	0.16-1.0	.22-1.0	.19-1.0

* This model should be applied to both year long and seasonal recharge wetlands
* If the wetland is seasonally fluctuating between recharge and discharge, then reduce the above score by one half (1/2), because the wetland only functions in a recharge mode for roughly half of the year

PROJECT NAME: Hampshire CC - Drainage System 1

STORM AND FLOOD-WATER STORAGE											
Wetland ID(s): 1) Drainage System 1 HGM Type: 1)		HGM TYPES:									
VARIABLES	CONDITIONS	(D)		S		L		EP		R		F	
		Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr
Indicators of disfunction	none												
Direct Indicators of Function	no outlet	27		21								30	
Primary Variables													
Inlet/Outlet Class	perennial inlet/intermittent outlet	3		3		0		0		0		3	
	intermittent inlet/intermittent outlet	2		2		0		0		0		2	
	non-inlet/intermittent outlet	(1)		1		0		0		0		1	
	non-inlet/perennial outlet	1		1		0		0		0		1	
	intermittent inlet/perennial outlet	1		1		0		0		0		1	
	perennial inlet/perennial outlet	1		1		0		0		0		1	
Degree of Outlet Restriction	restricted	(3)		0		0		0		0		3	
	unrestricted	0		0		0		0		0		0	
Basin Topographic Gradient	low gradient	(3)		3		0		3		3		3	
	high gradient	1		1		0		0		1		1	
Wetland Water Regime	drier: seasonally flooded, temporarily flooded, saturated	3		3		3		0		3		3	
	wet: permanently flooded, intermittently exposed, semipermanently flooded	(1)		1		1		0		1		1	
Surface Water Level Fluctuation of the Wetland	high fluctuation	(3)		0		3		0		3		3	
	low fluctuation	2		0		2		0		2		2	
	never inundated	0		0		0		0		0		0	
Ratio of Wetland Area to Watershed Area	large	3		3		3		0		3		3	
	small	(1)		1		1		0		1		1	
Microrelief of Wetland Surface	prounounced	3		3		3		3		3		3	
	well developed	2		2		2		2		2		2	
	poorly developed	(1)		1		1		1		1		1	
	absent	0		0		0		0		0		0	

Hampshire CC - Drainage System 1

STORM AND FLOOD-WATER STORAGE							
Wetland ID(s): Drainage System 1 HGM Type: D		HGM TYPES:					
VARIABLES	CONDITIONS	(D)	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Frequency of Overbank Flooding	overbank flooding absent	0	0	0	0	0	0
	return interval of >5 yrs.	(0)	0	1	0	1	1
	return interval of 2-5 yrs.	0	0	2	0	2	2
	return interval of 1-2 yrs.	0	0	3	0	3	3
Vegetation Density/Dominance	high/very high	3	3	3	3	3	3
	moderate	2	2	2	2	2	2
	sparse/low	(1)	1	1	1	1	1
	no vegetation	0	0	0	0	0	0
Dead Woody Material	abundant	3	3	3	3	3	3
	moderately abundant	2	2	2	2	2	2
	sparse	(1)	1	1	1	1	1
	absent	0	0	0	0	0	0
	Total Score:	15/27					
	Functional Capacity Index:	0.55					
	Model Range:	4-27	4-21	2-21	0-12	3-24	4-30
	Index Range:	0.15-1.0	0.19-1.0	0.09-1.0	0-1.0	0.12-1.0	0.13-1.0

PROJECT NAME: Hampshire CC - Drainage System 1

MODIFICATION OF STREAM FLOW (This model is identical for all HGM types)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Indicators of Disfunction	No Outlet	0
Direct Indicators of Function	None	

Primary Variables

Storm and Flood Water Storage Function Model Score X Modification of Groundwater Discharge Function Model Score — Total Score: 4

High*	3	X	High	3	=	9
Mod	2	X	High	3	=	6
Low	1	X	High	3	=	3
High	3	X	Mod	2	=	6
(Mod)	(2)	(X)	(Mod)	(2)	=	(4)
Low	1	X	Mod	2	=	2
High	3	X	Low	1	=	3
Mod	2	X	Low	1	=	2
Low	1	X	Low	1	=	1

Total Score: 4/9

Model Range: 1-9

Function Capacity Index: .44

Index Range:

*High = FCI of 0.67-1.0, Mod = FCI of 0.34-0.66, Low = FCI of 0-0.33 for the Storm and Flood Water Storage and Modification of Ground Water Discharge Function Model Scores.

PROJECT NAME: Hampshire CC - Drainage System 1

MODIFICATION OF WATER QUALITY							
Wetland ID(s): Drainage System 1 HGM Type: 1)		HGM TYPES:					
VARIABLES	CONDITIONS	D	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of disfunction	None						
Direct Indicators of Function	Evidence of Sedimentation	18	15	12	12	12	18
Primary Variables Wetland Land Use	low intensity	3	3	3	3	3	3
	moderate intensity	2	2	2	2	2	2
	high intensity	1	1	1	1	1	1
Degree of Outlet Restriction	restricted outflow	3	0	0	0	0	3
	no outlet	2	0	0	0	0	2
	unrestricted outflow	1	0	0	0	0	1
Inlet/Outlet Type	no outlet	3	3	0	0	0	3
	intermittent outlet	2	2	0	0	0	2
	perennial outlet	1	1	0	0	0	1
Dominant Wetland Type	forested wetland	3	3	3	3	3	3
	scrub-shrub	2	2	2	2	2	2
	emergent wetland	2	2	2	2	2	2
	aquatic bed	1	0	0	0	0	0
	no vegetation	0	0	0	0	0	0
Cover Distribution	forming a continuous cover	3	3	3	3	3	3
	growing in small scattered patches	2	2	2	2	2	2
	one or more large patches	1	1	1	1	1	1
	solitary scattered stems	1	1	1	1	1	1
	no vegetation	0	0	0	0	0	0
Soil Type	histosol or clayey soil	3	3	3	3	3	3
	silty soil	2	2	2	0	2	2
	sandy or gravelly soil	1	1	1	0	1	1
	Total Score:	18/18					
	Functional Capacity Index:	1.0					
	Model Range:	4-18	3-15	2-12	1-12	2-12	4-18
	Index Range:	0.22-1.0	0.20-1.0	0.16-1.0	0.8-1.0	0.16-1.0	0.22-1.0

PROJECT NAME: Hampshire CC - Drainage System 1

EXPORT OF DETRITUS							
Wetland ID(s): Drainage System 1 HGM Type: D		HGM TYPES:					
VARIABLES	CONDITIONS	(D)	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of Disfunction	no outlet	0	0		0		0
Direct Indicators of Function	none						
Primary Variables							
Wetland Land Use	moderate intensity	3	3	3	3	3	3
	low intensity	2	2	2	2	2	2
	high intensity	(1)	1	1	1	1	1
Degree of Outlet Restriction	unrestricted outflow	3	0	0	0	0	3
	restricted outflow	(1)	0	0	0	0	1
Inlet/Outlet Class	perennial outlet	3	3	0	0	0	3
	intermittent outlet	(1)	1	0	0	0	1
Wetland Water Regime	drier; seasonally flooded, temporarily flooded, saturated	3	3	3	0	3	3
	wet; permanently flooded, intermittently exposed, semipermanently flooded	(1)	1	1	1	1	1
Vegetation Density/Dominance	high/very high	3	3	3	3	3	3
	medium	2	2	2	2	2	2
	sparse/low	(1)	1	1	1	1	1
	no vegetation	0	0	0	0	0	0
Soil type	mineral hydric soil	3	3	3	3	3	3
	histosol both	1 (2)	1	1	1	1	1
	Total Score:	7/18					
	Functional Capacity Index:	0.39					
	Model Range:	5-18	4-15	3-12	2-10	3-12	5-18
	Index Range:	0.27-1.0	0.26-1.0	0.25-1.0	0.20-1.0	0.25-1.0	0.27-1.0

PROJECT NAME: Hampshire CC - Drainage System 1

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND VEGETATION (This model is identical for all HGM types)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Indicators of Disfunction	No Vegetation	0
Direct Indicators of Function	None	
Primary Variables		Score:
Plant Species Diversity	high diversity 5 medium diversity 3 low diversity (1)	
Vegetation Density/Dominance	high/very high 5 medium 3 sparse/low (1)	
Wetland Juxtaposition	connected to upstream and 5 downstream connected above or below 3 other wetlands nearby but (1) not connected (400 m or closer) isolated 0 (culvert connection only)	
		Total Score: 3/15 Model Range: 2-15
		Functional Capacity Index: 0.20 Index Range: 0.13-1.0

s

PROJECT NAME: Hampshire CC - Drainage System 1

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND FAUNA (This model is identical for all HGM types except Slope Wetlands for which "Interspersion of Vegetation Cover and Open Water" does not apply)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Direct Indicators of Disfunction	None	
Direct Indicators of Function	None	
Primary Variables		
Watershed Land Use	low intensity (0-25% urbanized)	3
	moderate intensity (25-50% urbanized)	2
	high intensity (>50% urbanized)	(1)
Wetland Land Use	low intensity	3
	moderate intensity	2
	high intensity	(1)
Wetland Water Regime	wet: permanently flooded, intermittently exposed, semipermanently flooded	(3)
	drier: seasonally flooded, temporarily flooded, saturated	1
Microrelief of Wetland Surface	pronounced	3
	well developed	2
	poorly developed	(1)
	absent	0
Number of Wetland Types and Relative Proportions	5 or more types	3
	3-4 types	2
	1-2 types	(1)
	no vegetation	0
	even distribution	3
	moderately even distribution	2
	highly uneven distribution	(1)
	no vegetation	0
Vegetation Interspersion	high interspersion	3
	moderate interspersion	2
	low interspersion	(1)
	no vegetation	0

Hampshire CC - Drainage System 1

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND FAUNA (CONT'D)		
Variables	**Conditions**	**Weights**
Number of Layers and Percent Cover	5 or more layers	3
	3-4 layers	2
	1-2 layers	(1)
	no vegetation	0
	layers well developed (>50% cover)	3
	layers with moderate cover (26-50% cover)	2
	layers poorly distinguishible (<25% cover)	(1)
	no vegetation	0
Interspersion of Vegetation Cover and Open Water	26-75%scattered or peripheral	3
	>75% scattered or peripheral	2
	<25% scattered or peripheral	(1)
	100% cover or open water	1
	no vegetation	0
Size	large (>100 acres)	3
	medium (10-100 acres)	2
	small (<10 acres)	(1)
Wetland Juxtaposition	other wetlands within 400 m and connected above or below	3
	other wetlands within 400 m but not connected	(1)
	wetland isolated	0
Slope Wetlands:	All other HGM types:	
Model Range: 4-33	Total Score: 14/36	
Functional Capacity Index:	Model Range: 4-36	
Index Range: 0.12-1.0	Functional Capacity Index: 0.39	
	Index Range: 0.11-1.0	

WETLAND INVENTORY DATA - CHARACTERIZATION OF WETLAND

Project Name: Hampshire Country Club Date: 5/18/16

Field Investigators: David Kennedy, MS, Project Scientist, VHB

SURFACE WATER FLOW VECTORS

Golf Course Drainage System 2 (Pond #s 5+6 & subgrade culverts)

- ☒ Depressional - 100% Percent/Acreage
- ☐ Slope - _____Perecent/Acreage
- ☐ Extensive Peatland - ____Percent/Acreage
- ☐ Lacustrine Fringe - ____Percent/Acreage
- ☐ Riverine - _____Percent/Acreage

VEGETATION TYPES

Forested Wetland

- ☐ Evergreen Needle-leaved - _____Percent/Acreage
- ☐ Deciduous Broad-leaved - _____Percent/Acreage
- ☐ Deciduous Needle-leaved - _____Percent/Acreage

Scrub Shrub

- ☐ Evergreen Needle-leaved - _____Percent/Acreage
- ☐ Evergreen Broad-leaved - _____Percent/Acreage
- ☐ Deciduous Broad-leaved - _____Percent/Acreage
- ☐ Deciduous Needle-leaved - _____Percent/Acreage

Emergent Wetland

- ☒ Persistent - 1% Percent/Acreage
- ☐ Non-persistent - 10% Percent/acreage
- ☒ Aquatic Bed - 30% Percent/Acreage

Total - 41%

SOIL TYPES

Histosol:

- ☐ Fibric
- ☒ Hemic
- ☐ Sapric

Mineral Hydric Soil:

- ☐ Gravelly
- ☐ Sandy
- ☒ Silty
- ☒ Clayey

GEOLOGY

Surficial: glacial till

Bedrock: Pelitic Schists

Hampshire CC - Golf Course Drainage System 2

PRE-EMPTIVE STATUS

- ☐ Public Ownership
- ☐ Wildlife Management Area
- ☐ Fisheries Management Area
- ☐ Designated State or Federal Protected Wetland
- ☐ Documented Habitat for State or Federal Listed Species
- ☐ Regionally Scarce Wetland Category
- ☐ Historic/Archaeological Area

PLANT SPECIES

NAME	OW	FW	F	FU	DOM	C	S	TS	LS	H
Lemna minor	X									X
Potamogeton sp.	X				X					X
Iris versicolor	X									X

OW-Obligate Wetland
FW- Facultative Wetland
F – Facultative
FU – Facultative Upland

Dom – Dominant
C- Canopy
S- Sapling
TS – Tall Shrub

LS- Low Shrub
H - Herb

Hampshire CC - Golf Course Drainage System 2

WETLAND INVENTORY DATA - CHARACTERIZATION OF MODEL VARIABLES

LANDSCAPE VARIABLES

Size:

- [x] Small (< 10 ACRES)
- [ ] Medium (10-100 ACRES)
- [ ] Large (> 100 ACRES)

Wetland Juxtaposition:

- [ ] Connected Upstream and Downstream
- [ ] Only Connected Above
- [ ] Only Connected Below
- [x] Other wetlands Nearby But Not Connected
- [ ] Wetland Isolated

Fire Occurrence and Frequency:

- [ ] Natural; Predictable Frequency
- [ ] Natural; Sporadic Frequency
- [ ] Human-Caused; Predictable
- [ ] Human-Caused; Sporadic
- [ ] Rare Event
- [x] No Evidence

Regional Scarcity:

- [x] Not Scarce (> 5% of total wetland area of region)
- [ ] Scarce (< 5% of total wetland areas of region)

Watershed Land Use:

- [x] > 50% Urbanized
- [ ] 25-50% Urbanized
- [ ] 0-25% Urbanized

HYDROLOGICAL* VARIABLES

Surface Water Level Fluctuation of Wetlands:

- [x] High Fluctuation groundwater withdrawals for irrigation. Fluctuations up to 4'±
- [ ] Low Fluctuation
- [ ] Never Inundated

Frequency of Overbank Flooding:

- [x] Return Interval > 5 years
- [ ] Return Interval 2-5 Yeasts
- [ ] Return Interval 1-2 Years
- [ ] No Overbank Flooding

pH:

- [ ] Acid <5.5
- [ ] Circumneutral 5.5-7.4
- [x] Alkaline > 7.4 7.5
- [ ] No Water

Surficial Geologic Deposit Under Wetland:

- [ ] Low Permeability Stratified Deposits
- [ ] High Permeability Stratified Deposits
- [x] Glacial Till

Wetland Land Use:

- [x] High Intensity (i.e. agriculture) stormwater chemical & fertilizer application
- [ ] Moderate Intensity (i.e. forestry)
- [ ] Low Intensity (i.e. open space)

Wetland Water Regime:

- [x] Wet: Permanently Flooded, Intermittently Exposed, Semi-Permanently Flooded
- [ ] Drier: Seasonally Flooded, Temporarily Flooded, Saturated

Basin Topographic Gradient:

- [x] High Gradient > 2%
- [ ] Low Gradient < 2%

Degree of Outlet Restriction:

- [ ] Restricted Outflow
- [ ] Unrestricted Outflow
- [x] No Outflow

Ratio of Wetland Area to Watershed Area:

- [x] High > 10%
- [ ] Low < 10%

Microrelief of Wetland Surface:

- [ ] Pronounced > 45 cm
- [ ] Well Developed 15-45 cm
- [ ] Poorly Developed < 15 cm
- [x] Absent

Inlet/Outlet Class: Stormwater & groundwater only

- [x] No Inlet/No Outlet
- [ ] No Inlet/Intermittent Outlet
- [ ] No Inlet/Perennial Outlet
- [ ] Intermittent Inlet/No Outlet
- [ ] Intermittent Inlet/Intermittent Outlet
- [ ] Intermittent Outlet/Perennial Outlet
- [ ] Perennial Inlet/No Outlet
- [ ] Perennial Inlet/Intermittent Outlet
- [ ] Perennial Inlet/Perennial Outlet

Nested Piezometer Data:

- [ ] Recharge
- [ ] Discharge
- [ ] Horizontal Flow
- [x] Not Available

Relations of Wetlands' Substrate Elevation to Regional Piezometric Surface:

- [ ] Piezometer Surface Above or at Substrate Elevation
- [ ] Piezometer Surface Below Substrate Elevation
- [x] Not Available

Evidence of Sedimentation:

- [ ] No Evidence Observed
- [x] Sediment Observed on Wetland Substrate Stormwater sediment deposits
- [ ] Fluvaquent Soils

Evidence of Seeps and Springs:

- [x] No Seeps or Springs
- [ ] Seeps Observed
- [ ] Perennial Spring
- [ ] Intermittent Spring

SOIL VARIABLES

Soil Lacking:

- [ ]

Histosol:

- [ ] Fibric
- [x] Hemic
- [ ] Sapric

* The primary hydrological source for the two irrigation ponds is groundwater withdrawals from an adjacent well. Minor contributions from drainage culverts. The ponds are the primary irrigation source for the golf course

Hampshire CC - Golf Course Drainage System 2

Mineral Hydric Soil:

- ☐ Gravelly
- ☐ Sandy
- ☒ Silty
- ☒ Clayey

VEGETATION VARIABLES

Vegetation Lacking:

- ☐

Dominant Wetland Type:

- ☐ Forested – Evergreen – Needle-leaved
- ☐ Forested – Deciduous – Broad-leaved
- ☐ Forested – Deciduous – Needle-leaved
- ☐ Scrub Shrub – Evergreen – Broad-leaved
- ☐ Scrub Shrub – Evergreen – Needle-leaved
- ☐ Scrub Shrub – Deciduous – Broad-leaved
- ☐ Scrub Shrub – Decisuous – Needle-leaved
- ☒ Emergent – Persistent
- ☐ Emergent – Non-persistent
- ☒ Aquatic Bed

Number of Types & Relative Proportions:

Number of Types:

- ☐ Actual #
- ☐ 5
- ☐ 4
- ☐ 3
- ☒ 2
- ☐ 1

Evenness of Distribution:

- ☐ Even Distribution
- ☐ Moderately Even Distribution
- ☒ Highly Uneven Distribution

Vegetation Density/Dominance:

- ☐ Sparce (0-20%)
- ☒ Low Density (20-40%)
- ☐ Medium Density (40-60%)
- ☐ High Density (60-80%)
- ☐ Very High Density (80-100%)

Vegetation Interspersion:

- ☐ High (small groupings, diverse and interspersed)
- ☐ Moderate (broken irregular rings)
- ☒ Low (large patches, ~~concentric rings~~ small patches)

Number of Layers and Percent Cover:

Number of Layers:

- ☐ 6 or > (actual #)
- ☐ 5
- ☐ 4
- ☐ 3
- ☒ 2
- ☐ 1

Percent Cover:

- ☒ Submergents: 20
- ☒ Floating: 20
- ☐ Moss-lichen:
- ☐ Short Herb:
- ☒ Tall Herb: 1
- ☐ Dwarf shrub:
- ☐ Short shrub:
- ☐ Tall shrub:
- ☐ Sapling:
- ☐ Tree:

Plant Species Diversity:

- ☒ Low 1-2 plots sampled
- ☐ Medium 3-4 plots sampled
- ☐ High 5 or more plots sampled

Proportion of Animal Plant Foods:

- ☒ Low (5-25%)
- ☐ Medium (25-50%)
- ☐ High (> 50%)

Cover Distribution:

- ☐ Continuous Cover
- ☐ Small Scattered Patches
- ☒ 1 or More Large Patches; Parts of Site Open
- ☐ Solitary, Scattered Stems

Dead Woody Material:

- ☐ Abundant (50% of wetland surface)
- ☐ Moderately Abundant (25-50% of surface)
- ☒ Low Abundance (0-25% of surface)

Interspersion of Cover and Open Water:

- ☒ < 25% Scattered or Peripheral
- ☐ 26-75 % Scattered or Peripheral
- ☐ > 75% Scattered or Peripheral
- ☐ 100% Cover or Open Water

Stream Sinuosity: N/A

- ☐ Highly Convoluted (Index 1.50 or >)
- ☐ Moderately Convoluted (Index 1.25-1.50)
- ☐ Straight/Slightly Irregular (Index 1.10-1.25)

Presence of Islands:

- ☐ Several to Many
- ☐ One or Few
- ☒ Absent

PROJECT NAME: Hampshire CC - Golf Course Drainage System 2

MODIFICATION OF GROUNDWATER DISCHARGE					
Wetland ID(s): Drainage System 2 HGM Type: D		HGM TYPES:			
VARIABLES	CONDITIONS	(D)	S	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of Disfunction					
Inlet/Outlet Class	perennial inlet/no outlet	0	0	0	0
Nested Piezometer Data	recharge	0	0	0	0
Relationship to Regional Piezometric Surface	wetland substrate elevation above piezometric surface	0	0	0	0
Direct Indicators of Function					
Presence of Springs and Seeps	evidence of perennial steeps or springs	18	15	15	18
Neated Piezometer Data	discharge condition	18	15	15	18
Relationship to Regional Piezometric Surface	wetland substrate elevation below piezometric surface	18	15	15	18
Inlet/Outlet Class	no inlet/perennial outlet	18	15	15	18
Primary Variables					
Microrelief of Wetland Surfaces	pronounced	3	3	3	3
	well developed	2	2	2	2
	poorly developed	1	1	1	1
	absent	(0)	0	0	0
Inlet/Outlet Class	perennial inlet/perennial outlet	3	3	0	3
	intermittent inlet/perennial outlet	2	2	0	2
	all other classes	(0)	0	0	0
pH	alkaline	(3)	3	3	3
	circumneutral	2	2	2	2
	acid	0	0	0	0
	no water present	0	0	0	0
Surficial Geologic Deposit Under Wetland	high permeability stratified deposits	3	3	3	3
	low permeability stratified deposits	2	2	2	2
	glacial till	(1)	1	1	1
Wetland water regime	wet; permanently flooded, intermittently exposed semipermanently, flooded	(3)	0	3	3
	drier; seasonally flooded, temporarily flooded, saturated	1	0	1	1
Soil Type	histosol	3	3	3	3
	mineral hydric soil	1	1	1	1
	both	(2)			
	Total Score:	9/18			
	Functional Capacity Index:	0.50			
	Model Range	3-18	2-15	3-15	3-18
	Index Range:	.19-1.0	.16-1.0	.22-1.0	.19-1.0

PROJECT NAME: Hampshire CC - Golf Course Drainage System 2

MODIFICATION OF GROUNDWATER RECHARGE									
Wetland ID(s): Drainage System 2 HGM Type: D		HGM TYPES:							
VARIABLES	CONDITIONS	(D)		L		EP		R		F	
		Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr
Indicators of Disfunction											
Inlet/Outlet Class	no inlet/perennial outlet; intermittent inlet/perennial outlet	0								0	
Nested Piezometer Data:	discharge condtion	0		0		0		0		0	
Relationship to Regional Piezometric Surface	wetland substrate elevation above piezometric surface	0		0		0		0		0	
Presence of Seeps and Springs	presence of seeps or springs	0		0		0		0		0	
Direct Indicators of Function											
Inlet/Outlet Class	perennial inlet/no outlet	21								21	
Nested Piezometer Data	recharge condition	21								21	
Relationship to Regional Peizometeric Surface	wetland substrate elevation below piezometric surface	21								21	
Primary Variables											
Microrelief of Wetland Surface	poorly developed	3		3		1		3		3	
	absent	(3)		3		1		3		3	
	well developed	2		2		2		2		2	
	pronounced	1		1		3		1		1	
Inlet/Outlet Class	perennial inlet/intermittent outlet	3		0		0		0		3	
	all other classes	(0)		0		0		0		0	
pH	acid	3		3		3		3		3	
	circumneutral	2		2		2		2		2	
	alkaline	(1)		1		1		1		1	
	no water present	0		0		0		0		0	
Surficial Geologic Deposit Under Wetland	glacial till	(3)		1		1		1		3	
	low permeability stratified deposits	2		2		2		2		2	
	high permeability stratified deposits	1		3		3		3		1	
Surface Water Level Fluctuation of the Wetland	high fluctuation*	3		3		0		3		3	
	low fluctuation	2		2		0		2		2	
	never inundated	1		1		0		1		1	
	*artificially maintained from pumped groundwater										

Hampshire CC - Golf Course Drainage System 2

Wetland ID(s): Drainage System 2 HGM Type: D		HGM TYPES:				
VARIABLES	**CONDITIONS**	**D**	**L**	**EP**	**R**	**F**
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Wetland Water Regime	drier; seasonally flooded, temporarily flooded, saturated	3	3	0	3	3
	wet; permanently flooded, intermittently exposed, semipermanently flooded	1	1	0	1	1
Soil Type	gravelly or sandy mineral hydric	3	3	0	3	3
	silty or clayey mineral hydric	2	2	0	2	2
	sapric histosol	1	1	0	1	1
	fibric or hemic histosol	0	0	3	0	0
	Total Score:	9/21				
	Model Score:	4-21	4-18	2-12	4-18	4-21
	Functional Capacity Index:	0.43				
	Index Range:	.19-1.0	.22-1.0	0.16-1.0	.22-1.0	.19-1.0

* This model should be applied to both year long and seasonal recharge wetlands
* If the wetland is seasonally fluctuating between recharge and discharge, then reduce the above score by one half (1/2), because the wetland only functions in a recharge mode for roughly half of the year

PROJECT NAME: Hampshire CC - Golf Course Drainage System 2

STORM AND FLOOD-WATER STORAGE											
Wetland ID(s): Drainage System 2 HGM Type: D		HGM TYPES:									
VARIABLES	CONDITIONS	(D)		S		L		EP		R		F	
		Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr
Indicators of disfunction	none												
Direct Indicators of Function	no outlet		27		21								30
Primary Variables Inlet/Outlet Class	perennial inlet/intermittent outlet		3		3		0		0		0		3
	intermittent inlet/intermittent outlet		2		2		0		0		0		2
	non-inlet/intermittent outlet		1		1		0		0		0		1
	non-inlet/perennial outlet		1		1		0		0		0		1
	intermittent inlet/perennial outlet		1		1		0		0		0		1
	perennial inlet/perennial outlet		1		1		0		0		0		1
Degree of Outlet Restriction	restricted		3		0		0		0		0		3
	unrestricted		0		0		0		0		0		0
Basin Topographic Gradient	low gradient		3		3		0		3		3		3
	high gradient		1		1		0		0		1		1
Wetland Water Regime	drier: seasonally flooded, temporarily flooded, saturated		3		3		3		0		3		3
	wet: permanently flooded, intermittently exposed, semipermanently flooded		1		1		1		0		1		1
Surface Water Level Fluctuation of the Wetland	high fluctuation		3		0		3		0		3		3
	low fluctuation		2		0		2		0		2		2
	never inundated		0		0		0		0		0		0
Ratio of Wetland Area to Watershed Area	large		3		3		3		0		3		3
	small		1		1		1		0		1		1
Microrelief of Wetland Surface	prounounced		3		3		3		3		3		3
	well developed		2		2		2		2		2		2
	poorly developed		1		1		1		1		1		1
	absent		0		0		0		0		0		0

Hampshire CC - Golf Course Drainage System 2

STORM AND FLOOD-WATER STORAGE							
Wetland ID(s): Drainage System 2 HGM Type: D		HGM TYPES:					
VARIABLES	CONDITIONS	(D)	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Frequency of Overbank Flooding	overbank flooding absent	0	0	0	0	0	0
	return interval of >5 yrs.	0	0	1	0	1	1
	return interval of 2-5 yrs.	0	0	2	0	2	2
	return interval of 1-2 yrs.	0	0	3	0	3	3
Vegetation Density/Dominance	high/very high	3	3	3	3	3	3
	moderate	2	2	2	2	2	2
	sparse/low	1	1	1	1	1	1
	no vegetation	0	0	0	0	0	0
Dead Woody Material	abundant	3	3	3	3	3	3
	moderately abundant	2	2	2	2	2	2
	sparse	1	1	1	1	1	1
	absent	0	0	0	0	0	0
	Total Score:	27/27					
	Functional Capacity Index:	1.0					
	Model Range:	4-27	4-21	2-21	0-12	3-24	4-30
	Index Range:	0.15-1.0	0.19-1.0	0.09-1.0	0-1.0	0.12-1.0	0.13-1.0

PROJECT NAME: Hampshire CC - Golf Course Drainage System 2

MODIFICATION OF STREAM FLOW (This model is identical for all HGM types)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Indicators of Disfunction	No Outlet	0
Direct Indicators of Function	None	

Primary Variables

Storm and Flood Water Storage Function Model Score X Modification of Groundwater Discharge Function Model Score

Total Score:

High*	3	X	High	3	=	9
Mod	2	X	High	3	=	6
Low	1	X	High	3	=	3
High	3	X	Mod	2	=	6
Mod	2	X	Mod	2	=	4
Low	1	X	Mod	2	=	2
High	3	X	Low	1	=	3
Mod	2	X	Low	1	=	2
Low	1	X	Low	1	=	1

Total Score: 0/9

Model Range: 1-9

Function Capacity Index: 0.0

Index Range:

*High = FCI of 0.67-1.0, Mod = FCI of 0.34-0.66, Low = FCI of 0-0.33 for the Storm and Flood Water Storage and Modification of Ground Water Discharge Function Model Scores.

PROJECT NAME: Hampshire CC - Golf Course Drainage System 2

MODIFICATION OF WATER QUALITY							
Wetland ID(s): Drainage System 2 HGM Type: D		HGM TYPES:					
VARIABLES	CONDITIONS	(D)	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of disfunction	None						
Direct Indicators of Function	Evidence of Sedimentation	(18)	15	12	12	12	18
Primary Variables							
Wetland Land Use	low intensity	3	3	3	3	3	3
	moderate intensity	2	2	2	2	2	2
	high intensity	1	1	1	1	1	1
Degree of Outlet Restriction	restricted outflow	3	0	0	0	0	3
	no outlet	2	0	0	0	0	2
	unrestricted outflow	1	0	0	0	0	1
Inlet/Outlet Type	no outlet	3	3	0	0	0	3
	intermittent outlet	2	2	0	0	0	2
	perennial outlet	1	1	0	0	0	1
Dominant Wetland Type	forested wetland	3	3	3	3	3	3
	scrub-shrub	2	2	2	2	2	2
	emergent wetland	2	2	2	2	2	2
	aquatic bed	1	0	0	0	0	0
	no vegetation	0	0	0	0	0	0
Cover Distribution	forming a continuous cover	3	3	3	3	3	3
	growing in small scattered patches	2	2	2	2	2	2
	one or more large patches	1	1	1	1	1	1
	solitary scattered stems	1	1	1	1	1	1
	no vegetation	0	0	0	0	0	0
Soil Type	histosol or clayey soil	3	3	3	3	3	3
	silty soil	2	2	2	0	2	2
	sandy or gravelly soil	1	1	1	0	1	1
	Total Score:	18/18					
	Functional Capacity Index:	1.00					
	Model Range:	4-18	3-15	2-12	1-12	2-12	4-18
	Index Range:	0.22-1.0	0.20-1.0	0.16-1.0	0.8-1.0	0.16-1.0	0.22-1.0

PROJECT NAME: Hampshire Country Club - Golf Course Drainage System 2

EXPORT OF DETRITUS							
Wetland ID(s): Drainage System 2 HGM Type: D		HGM TYPES:					
VARIABLES	CONDITIONS	D	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of Disfunction	no outlet	0	0		0		0
Direct Indicators of Function	none						
Primary Variables							
Wetland Land Use	moderate intensity	3	3	3	3	3	3
	low intensity	2	2	2	2	2	2
	high intensity	1	1	1	1	1	1
Degree of Outlet Restriction	unrestricted outflow	3	0	0	0	0	3
	restricted outflow	1	0	0	0	0	1
Inlet/Outlet Class	perennial outlet	3	3	0	0	0	3
	intermittent outlet	1	1	0	0	0	1
Wetland Water Regime	drier; seasonally flooded, temporarily flooded, saturated	3	3	3	0	3	3
	wet; permanently flooded, intermittently exposed, semipermanently flooded	1	1	1	1	1	1
Vegetation Density/Dominance	high/very high	3	3	3	3	3	3
	medium	2	2	2	2	2	2
	sparse/low	1	1	1	1	1	1
	no vegetation	0	0	0	0	0	0
Soil type	mineral hydric soil	3	3	3	3	3	3
	histosol	1	1	1	1	1	1
	Total Score:	0/18					
	Functional Capacity Index:	0.0					
	Model Range:	5-18	4-15	3-12	2-10	3-12	5-18
	Index Range:	0.27-1.0	0.26-1.0	0.25-1.0	0.20-1.0	0.25-1.0	0.27-1.0

PROJECT NAME: Hampshire CC - Golf Course Drainage System 2

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND VEGETATION (This model is identical for all HGM types)			
VARIABLES	**CONDITIONS**		**WEIGHTS**
Indicators of Disfunction	No Vegetation		0
Direct Indicators of Function	None		
Primary Variables			Score:
Plant Species Diversity	high diversity	5	
	medium diversity	3	
	low diversity	(1)	
Vegetation Density/Dominance	high/very high	5	
	medium	3	
	sparse/low	(1)	
Wetland Juxtaposition	connected to upstream and downstream	5	
	connected above or below	3	
	other wetlands nearby but not connected (400 m or closer)	(1)	
	isolated	0	
			Total Score: 3/15 Model Range: 2-15
			Functional Capacity Index: 0.20 Index Range: 0.13-1.0

s

PROJECT NAME: Hampshire CC - Golf Course Drainage System 2

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND FAUNA (This model is identical for all HGM types except Slope Wetlands for which "Interspersion of Vegetation Cover and Open Water" does not apply)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Direct Indicators of Disfunction	None	
Direct Indicators of Function	None	
Primary Variables		
Watershed Land Use	low intensity (0-25% urbanized) moderate intensity (25-50% urbanized) high intensity (>50% urbanized)	3 2 (1)
Wetland Land Use	low intensity moderate intensity high intensity	3 2 (1)
Wetland Water Regime	wet: permanently flooded, intermittently exposed, semipermanently flooded drier: seasonally flooded, temporarily flooded, saturated	(3) 1
Microrelief of Wetland Surface	pronounced well developed poorly developed absent	3 2 1 (0)
Number of Wetland Types and Relative Proportions	5 or more types 3-4 types 1-2 types no vegetation	3 2 (1) 0
	even distribution moderately even distribution highly uneven distribution no vegetation	3 2 (1) 0
Vegetation Interspersion	high interspersion moderate interspersion low interspersion no vegetation	3 2 (1) 0

Hampshire CC - Golf Course Drainage System 2

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND FAUNA (CONT'D)		
Variables	**Conditions**	**Weights**
Number of Layers and Percent Cover	5 or more layers	3
	3-4 layers	2
	1-2 layers	(1)
	no vegetation	0
	layers well developed (>50% cover)	3
	layers with moderate cover (26-50% cover)	2
	layers poorly distinguishible (<25% cover)	(1)
	no vegetation	0
Interspersion of Vegetation Cover and Open Water	26-75%scattered or peripheral	3
	>75% scattered or peripheral	2
	<25% scattered or peripheral	(1)
	100% cover or open water	1
	no vegetation	0
Size	large (>100 acres)	3
	medium (10-100 acres)	2
	small (<10 acres)	(1)
Wetland Juxtaposition	other wetlands within 400 m and connected above or below	3
	other wetlands within 400 m but not connected	(1)
	wetland isolated	0
Slope Wetlands:	All other HGM types:	
Model Range: 4-33	Total Score: 13/36	
Functional Capacity Index:	Model Range: 4-36	
Index Range: 0.12-1.0	Functional Capacity Index: 0.36	
	Index Range: 0.11-1.0	

WETLAND INVENTORY DATA - CHARACTERIZATION OF WETLAND

Project Name: Hampshire Country Club Date: 5/13/16

Field Investigators: David Kennedy, MS, Project Scientist, VHB

SURFACE WATER FLOW VECTORS

Golf Course Drainage System 3 (Ponds 10, 11, 13, emergent wetland + ditches)

- ☒ Depressional - 100% Percent/Acreage
- ☐ Slope - _____ Perecent/Acreage
- ☐ Extensive Peatland - ____ Percent/Acreage
- ☐ Lacustrine Fringe - ____ Percent/Acreage
- ☐ Riverine - _____ Percent/Acreage

VEGETATION TYPES

Forested Wetland

- ☐ Evergreen Needle-leaved - _____ Percent/Acreage
- ☐ Deciduous Broad-leaved - _____ Percent/Acreage
- ☐ Deciduous Needle-leaved - _____ Percent/Acreage

Scrub Shrub

- ☐ Evergreen Needle-leaved - _____ Percent/Acreage
- ☐ Evergreen Broad-leaved - _____ Percent/Acreage
- ☐ Deciduous Broad-leaved - _____ Percent/Acreage
- ☐ Deciduous Needle-leaved - _____ Percent/Acreage

Emergent Wetland

- ☐ Persistent - 40% Percent/Acreage
- ☐ Non-persistent - _____ Percent/acreage
- ☐ Aquatic Bed - 25% Percent/Acreage

Total - 65%

SOIL TYPES

Histosol:

- ☐ Fibric
- ☒ Hemic
- ☐ Sapric

Mineral Hydric Soil:

- ☒ Gravelly
- ☐ Sandy
- ☐ Silty
- ☒ Clayey

GEOLOGY

Surficial: glacial till

Bedrock: pelitic schists

Hampshire CC - Golf Course Drainage System 3

PRE-EMPTIVE STATUS

- ☐ Public Ownership
- ☐ Wildlife Management Area
- ☐ Fisheries Management Area
- ☐ Designated State or Federal Protected Wetland
- ☐ Documented Habitat for State or Federal Listed Species
- ☐ Regionally Scarce Wetland Category
- ☐ Historic/Archaeological Area

PLANT SPECIES

NAME	OW	FW	F	FU	DOM	C	S	TS	LS	H
Iris versicolor	X				X					X
Rudbeckia laciniata		X								X
Phalaris arundinacea		X								X
Lemna minor	X				X					X
Phragmites australis		X			X					X
Potamogeton sp.	X				X					X
Polygonum cuspidatum										X
Spartina alterniflora	X									X

OW-Obligate Wetland
FW- Facultative Wetland
F – Facultative
FU – Facultative Upland

Dom – Dominant
C- Canopy
S- Sapling
TS – Tall Shrub

LS- Low Shrub
H - Herb

Hampshire CC - Golf Course Drainage System 3

WETLAND INVENTORY DATA - CHARACTERIZATION OF MODEL VARIABLES

LANDSCAPE VARIABLES

Size:

- [x] Small (< 10 ACRES)
- [ ] Medium (10-100 ACRES)
- [ ] Large (> 100 ACRES)

Wetland Juxtaposition:

- [ ] Connected Upstream and Downstream
- [ ] Only Connected Above
- [x] Only Connected Below culverts/ tide gates
- [ ] Other wetlands Nearby But Not Connected to tidal wetlands
- [ ] Wetland Isolated

Fire Occurrence and Frequency:

- [ ] Natural; Predictable Frequency
- [ ] Natural; Sporadic Frequency
- [ ] Human-Caused; Predictable
- [ ] Human-Caused; Sporadic
- [ ] Rare Event
- [x] No Evidence

Regional Scarcity:

- [x] Not Scarce (> 5% of total wetland area of region)
- [ ] Scarce (< 5% of total wetland areas of region)

Watershed Land Use:

- [x] > 50% Urbanized
- [ ] 25-50% Urbanized
- [ ] 0-25% Urbanized

HYDROLOGICAL VARIABLES

Surface Water Level Fluctuation of Wetlands:

- [x] High Fluctuation Pond 10 is tidally influenced
- [ ] Low Fluctuation
- [ ] Never Inundated

Frequency of Overbank Flooding:

- [ ] Return Interval > 5 years
- [ ] Return Interval 2-5 Yeasts
- [ ] Return Interval 1-2 Years
- [ ] No Overbank Flooding

pH:

- [ ] Acid <5.5
- [ ] Circumneutral 5.5-7.4
- [ ] Alkaline > 7.4
- [ ] No Water

Surficial Geologic Deposit Under Wetland:

- [ ] Low Permeability Stratified Deposits
- [ ] High Permeability Stratified Deposits
- [ ] Glacial Till

Wetland Land Use:

- [x] High Intensity (i.e. agriculture) stormwater chemical & fertilizer applications
- [ ] Moderate Intensity (i.e. forestry)
- [ ] Low Intensity (i.e. open space)

Wetland Water Regime:

- [x] Wet: Permanently Flooded, Intermittently Exposed, Semi-Permanently Flooded
- [ ] Drier: Seasonally Flooded, Temporarily Flooded, Saturated

Basin Topographic Gradient:

- [x] High Gradient > 2%
- [ ] Low Gradient < 2%

Degree of Outlet Restriction:

- [x] Restricted Outflow culverts & tide gates
- [ ] Unrestricted Outflow
- [ ] No Outflow

Ratio of Wetland Area to Watershed Area:

- [ ] High > 10%
- [x] Low < 10%

Microrelief of Wetland Surface:

- [ ] Pronounced > 45 cm
- [ ] Well Developed 15-45 cm
- [x] Poorly Developed < 15 cm
- [ ] Absent

Inlet/Outlet Class:

- [ ] No Inlet/No Outlet
- [x] No Inlet/Intermittent Outlet
- [ ] No Inlet/Perennial Outlet
- [ ] Intermittent Inlet/No Outlet
- [ ] Intermittent Inlet/Intermittent Outlet
- [ ] Intermittent Outlet/Perennial Outlet
- [ ] Perennial Inlet/No Outlet
- [ ] Perennial Inlet/Intermittent Outlet
- [ ] Perennial Inlet/Perennial Outlet

Nested Piezometer Data:

- [ ] Recharge
- [ ] Discharge
- [ ] Horizontal Flow
- [x] Not Available

Relations of Wetlands' Substrate Elevation to Regional Piezometric Surface:

- [ ] Piezometer Surface Above or at Substrate Elevation
- [ ] Piezometer Surface Below Substrate Elevation
- [x] Not Available

Evidence of Sedimentation:

- [ ] No Evidence Observed
- [x] Sediment Observed on Wetland Substrate stormwater deposits
- [ ] Fluvaquent Soils

Evidence of Seeps and Springs:

- [x] No Seeps or Springs
- [ ] Seeps Observed
- [ ] Perennial Spring
- [ ] Intermittent Spring

SOIL VARIABLES

Soil Lacking:

- [ ]

Histosol:

- [ ] Fibric
- [x] Hemic
- [ ] Sapric

Hampshire CC - Golf Course Drainage System 3

Mineral Hydric Soil:

- [x] Gravelly
- [ ] Sandy
- [ ] Silty
- [x] Clayey

VEGETATION VARIABLES

Vegetation Lacking:

- [ ]

Dominant Wetland Type:

- [ ] Forested – Evergreen – Needle-leaved
- [ ] Forested – Deciduous – Broad-leaved
- [ ] Forested – Deciduous – Needle-leaved
- [ ] Scrub Shrub – Evergreen – Broad-leaved
- [ ] Scrub Shrub – Evergreen – Needle-leaved
- [ ] Scrub Shrub – Deciduous – Broad-leaved
- [ ] Scrub Shrub – Decisuous – Needle-leaved
- [x] Emergent – Persistent
- [ ] Emergent – Non-persistent
- [x] Aquatic Bed

Number of Types & Relative Proportions:

Number of Types:

- [ ] Actual #
- [ ] 5
- [ ] 4
- [ ] 3
- [x] 2
- [ ] 1

Evenness of Distribution:

- [ ] Even Distribution
- [x] Moderately Even Distribution
- [ ] Highly Uneven Distribution

Vegetation Density/Dominance:

- [ ] Sparce (0-20%)
- [ ] Low Density (20-40%)
- [x] Medium Density (40-60%)
- [ ] High Density (60-80%)
- [ ] Very High Density (80-100%)

Vegetation Interspersion:

- [ ] High (small groupings, diverse and interspersed)
- [x] Moderate (broken irregular rings)
- [ ] Low (large patches, concentric rings)

Number of Layers and Percent Cover:

Number of Layers:

- [ ] 6 or > (actual #)
- [ ] 5
- [x] 4
- [ ] 3
- [ ] 2
- [ ] 1

Percent Cover:

- [x] Submergents: 25
- [x] Floating: 5
- [ ] Moss-lichen:
- [x] Short Herb: 5
- [x] Tall Herb: 40
- [ ] Dwarf shrub:
- [ ] Short shrub:
- [ ] Tall shrub:
- [ ] Sapling:
- [ ] Tree:

Plant Species Diversity:

- [ ] Low 1-2 plots sampled
- [x] Medium 3-4 plots sampled
- [ ] High 5 or more plots sampled

Proportion of Animal Plant Foods:

- [ ] Low (5-25%)
- [x] Medium (25-50%)
- [ ] High (> 50%)

Cover Distribution:

- [ ] Continuous Cover
- [ ] Small Scattered Patches
- [x] 1 or More Large Patches; Parts of Site Open
- [ ] Solitary, Scattered Stems

Dead Woody Material:

- [ ] Abundant (50% of wetland surface)
- [ ] Moderately Abundant (25-50% of surface)
- [x] Low Abundance (0-25% of surface)

Interspersion of Cover and Open Water:

- [ ] < 25% Scattered or Peripheral
- [x] 26-75 % Scattered or Peripheral
- [ ] > 75% Scattered or Peripheral
- [ ] 100% Cover or Open Water

Stream Sinuosity:

- [ ] Highly Convoluted (Index 1.50 or >)
- [ ] Moderately Convoluted (Index 1.25-1.50)
- [x] Straight/Slightly Irregular (Index 1.10-1.25)

Presence of Islands:

- [ ] Several to Many
- [ ] One or Few
- [x] Absent

PROJECT NAME: Hampshire CC - Golf Course Drainage System 3

MODIFICATION OF GROUNDWATER DISCHARGE					
Wetland ID(s): 1) Drainage System 3 HGM Type: 1)		HGM TYPES:			
VARIABLES	CONDITIONS	(D)	S	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of Disfunction					
Inlet/Outlet Class	perennial inlet/no outlet	0	0	0	0
Nested Piezometer Data	recharge	0	0	0	0
Relationship to Regional Piezometric Surface	wetland substrate elevation above piezometric surface	0	0	0	0
Direct Indicators of Function					
Presence of Springs and Seeps	evidence of perennial steeps or springs	18	15	15	18
Neated Piezometer Data	discharge condition	18	15	15	18
Relationship to Regional Piezometric Surface	wetland substrate elevation below piezometric surface	18	15	15	18
Inlet/Outlet Class	no inlet/perennial outlet	18	15	15	18
Primary Variables					
Microrelief of Wetland Surfaces	pronounced	3	3	3	3
	well developed	2	2	2	2
	poorly developed	(1)	1	1	1
	absent	0	0	0	0
Inlet/Outlet Class	perennial inlet/perennial outlet	3	3	0	3
	intermittent inlet/perennial outlet	2	2	0	2
	all other classes	(0)	0	0	0
pH	alkaline	(3)	3	3	3
	circumneutral	2	2	2	2
	acid	0	0	0	0
	no water present	0	0	0	0
Surficial Geologic Deposit Under Wetland	high permeability stratified deposits	3	3	3	3
	low permeability stratified deposits	2	2	2	2
	glacial till	(1)	1	1	1
Wetland water regime	wet; permanently flooded, intermittently exposed semipermanently, flooded	(3)	0	3	3
	drier; seasonally flooded, temporarily flooded, saturated	1	0	1	1
Soil Type	histosol	3	3	3	3
	mineral hydric soil both	(2)	1	1	1
	Total Score:	10/18			
	Functional Capacity Index:	0.55			
	Model Range	3-18	2-15	3-15	3-18
	Index Range:	.19-1.0	.16-1.0	.22-1.0	.19-1.0

PROJECT NAME: Hampshire CC - Golf Course Drainage System 3

MODIFICATION OF GROUNDWATER RECHARGE						
Wetland ID(s): Drainage System 3 HGM Type: D		HGM TYPES:				
VARIABLES	CONDITIONS	(D)	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of Disfunction						
Inlet/Outlet Class	no inlet/perennial outlet; intermittent inlet/perennial outlet	0				0
Nested Piezometer Data:	discharge condtion	0	0	0	0	0
Relationship to Regional Piezometric Surface	wetland substrate elevation above piezometric surface	0	0	0	0	0
Presence of Seeps and Springs	presence of seeps or springs	0	0	0	0	0
Direct Indicators of Function						
Inlet/Outlet Class	perennial inlet/no outlet	21				21
Nested Piezometer Data	recharge condition	21				21
Relationship to Regional Peizometeric Surface	wetland substrate elevation below piezometric surface	21				21
Primary Variables						
Microrelief of Wetland Surface	poorly developed	(3)	3	1	3	3
	absent	3	3	1	3	3
	well developed	2	2	2	2	2
	pronounced	1	1	3	1	1
Inlet/Outlet Class	perennial inlet/intermittent outlet	3	0	0	0	3
	all other classes	(0)	0	0	0	0
pH	acid	3	3	3	3	3
	circumneutral	(2)	2	2	2	2
	alkaline	1	1	1	1	1
	no water present	0	0	0	0	0
Surficial Geologic Deposit Under Wetland	glacial till	(3)	1	1	1	3
	low permeability stratified deposits	2	2	2	2	2
	high permeability stratified deposits	1	3	3	3	1
Surface Water Level Fluctuation of the Wetland	high fluctuation	(3)	3	0	3	3
	low fluctuation	2	2	0	2	2
	never inundated	1	1	0	1	1

Hampshire CC - Golf Course Drainage System 3

Wetland ID(s): Drainage System 3 HGM Type: D		HGM TYPES:				
VARIABLES	CONDITIONS	(D)	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Wetland Water Regime	drier; seasonally flooded, temporarily flooded, saturated	3	3	0	3	3
	wet; permanently flooded, intermittently exposed, semipermanently flooded	(1)	1	0	1	1
Soil Type ~25%	gravelly or sandy mineral hydric	3	3	0	3	3
	silty or clayey mineral hydric	2	2	0	2	2
	sapric histosol	(1)	1	0	1	1
	fibric or hemic histosol ~75%	0	0	3	0	0
	Total Score:	13/21				
	Model Score:	4-21	4-18	2-12	4-18	4-21
	Functional Capacity Index:	0.62				
	Index Range:	.19-1.0	.22-1.0	0.16-1.0	.22-1.0	.19-1.0

* This model should be applied to both year long and seasonal recharge wetlands
* If the wetland is seasonally fluctuating between recharge and discharge, then reduce the above score by one half (1/2), because the wetland only functions in a recharge mode for roughly half of the year

PROJECT NAME: Hampshire CC - Golf Course Drainage System 3

STORM AND FLOOD-WATER STORAGE											
Wetland ID(s): 1 Drainage System 3 HGM Type: D		HGM TYPES:									
VARIABLES	CONDITIONS	(D)		S		L		EP		R		F	
		Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr
Indicators of disfunction	none												
Direct Indicators of Function	no outlet	27		21								30	
Primary Variables Inlet/Outlet Class	perennial inlet/intermittent outlet	3		3		0		0		0		3	
	intermittent inlet/intermittent outlet	2		2		0		0		0		2	
	non-inlet/intermittent outlet	(1)		1		0		0		0		1	
	non-inlet/perennial outlet	1		1		0		0		0		1	
	intermittent inlet/perennial outlet	1		1		0		0		0		1	
	perennial inlet/perennial outlet	1		1		0		0		0		1	
Degree of Outlet Restriction	restricted	(3)		0		0		0		0		3	
	unrestricted	0		0		0		0		0		0	
Basin Topographic Gradient	low gradient	3		3		0		3		3		3	
	high gradient	(1)		1		0		0		1		1	
Wetland Water Regime	drier: seasonally flooded, temporarily flooded, saturated	3		3		3		0		3		3	
	wet: permanently flooded, intermittently exposed, semipermanently flooded	(1)		1		1		0		1		1	
Surface Water Level Fluctuation of the Wetland	high fluctuation	(3)		0		3		0		3		3	
	low fluctuation	2		0		2		0		2		2	
	never inundated	0		0		0		0		0		0	
Ratio of Wetland Area to Watershed Area	large	3		3		3		0		3		3	
	small	(1)		1		1		0		1		1	
Microrelief of Wetland Surface	prounounced	3		3		3		3		3		3	
	well developed	2		2		2		2		2		2	
	poorly developed	(1)		1		1		1		1		1	
	absent	0		0		0		0		0		0	

Hampshire CC - Golf Course Drainage System 3

STORM AND FLOOD-WATER STORAGE

Wetland ID(s): Drainage System 3
HGM Type: D

HGM TYPES:

VARIABLES	CONDITIONS	D		S		L		EP		R		F	
		Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr
Frequency of Overbank Flooding	overbank flooding absent	0		0		0		0		0		0	
	return interval of >5 yrs.	(0)		0		1		0		1		1	
	return interval of 2-5 yrs.	0		0		2		0		2		2	
	return interval of 1-2 yrs.	0		0		3		0		3		3	
Vegetation Density/Dominance	high/very high	3		3		3		3		3		3	
	moderate	(2)		2		2		2		2		2	
	sparse/low	1		1		1		1		1		1	
	no vegetation	0		0		0		0		0		0	
Dead Woody Material	abundant	3		3		3		3		3		3	
	moderately abundant	2		2		2		2		2		2	
	sparse	(1)		1		1		1		1		1	
	absent	0		0		0		0		0		0	
	Total Score:	14/27											
	Functional Capacity Index:	0.52											
	Model Range:	4-27		4-21		2-21		0-12		3-24		4-30	
	Index Range:	0.15-1.0		0.19-1.0		0.09-1.0		0-1.0		0.12-1.0		0.13-1.0	

PROJECT NAME: Hampshire CC - Golf Course Drainage System 3

MODIFICATION OF STREAM FLOW (This model is identical for all HGM types)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Indicators of Disfunction	No Outlet	0
Direct Indicators of Function	None	

Primary Variables

Storm and Flood Water Storage Function Model Score X Modification of Groundwater Discharge Function Model Score — Total Score: 4

High*	3	X	High	3	=	9
Mod	2	X	High	3	=	6
Low	1	X	High	3	=	3
High	3	X	Mod	2	=	6
Mod	2	X	Mod	2	=	4
Low	1	X	Mod	2	=	2
High	3	X	Low	1	=	3
Mod	2	X	Low	1	=	2
Low	1	X	Low	1	=	1

Total Score: 4/9

Model Range: 1-9

Function Capacity Index: 0.44

Index Range: 0.11-1.0

*High = FCI of 0.67-1.0, Mod = FCI of 0.34-0.66, Low = FCI of 0-0.33 for the Storm and Flood Water Storage and Modification of Ground Water Discharge Function Model Scores.

PROJECT NAME: Hampshire CC - Golf Course Drainage System 3

MODIFICATION OF WATER QUALITY							
Wetland ID(s): Drainage System 3 HGM Type: D		HGM TYPES:					
VARIABLES	CONDITIONS	(D)	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of disfunction	None						
Direct Indicators of Function	Evidence of Sedimentation	(18)	15	12	12	12	18
Primary Variables Wetland Land Use	low intensity	3	3	3	3	3	3
	moderate intensity	2	2	2	2	2	2
	high intensity	1	1	1	1	1	1
Degree of Outlet Restriction	restricted outflow	3	0	0	0	0	3
	no outlet	2	0	0	0	0	2
	unrestricted outflow	1	0	0	0	0	1
Inlet/Outlet Type	no outlet	3	3	0	0	0	3
	intermittent outlet	2	2	0	0	0	2
	perennial outlet	1	1	0	0	0	1
Dominant Wetland Type	forested wetland	3	3	3	3	3	3
	scrub-shrub	2	2	2	2	2	2
	emergent wetland	2	2	2	2	2	2
	aquatic bed	1	0	0	0	0	0
	no vegetation	0	0	0	0	0	0
Cover Distribution	forming a continuous cover	3	3	3	3	3	3
	growing in small scattered patches	2	2	2	2	2	2
	one or more large patches	1	1	1	1	1	1
	solitary scattered stems	1	1	1	1	1	1
	no vegetation	0	0	0	0	0	0
Soil Type	histosol or clayey soil	3	3	3	3	3	3
	silty soil	2	2	2	0	2	2
	sandy or gravelly soil	1	1	1	0	1	1
	Total Score:	18/12					
	Functional Capacity Index:	1.0					
	Model Range:	4-18	3-15	2-12	1-12	2-12	4-18
	Index Range:	0.22-1.0	0.20-1.0	0.16-1.0	0.8-1.0	0.16-1.0	0.22-1.0

PROJECT NAME: Hampshire CC - Golf Course Drainage System 3

EXPORT OF DETRITUS							
Wetland ID(s): Drainage System 3 HGM Type: D		HGM TYPES:					
VARIABLES	CONDITIONS	(D)	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of Disfunction	no outlet	0	0		0		0
Direct Indicators of Function	none						
Primary Variables							
Wetland Land Use	moderate intensity	3	3	3	3	3	3
	low intensity	2	2	2	2	2	2
	high intensity	(1)	1	1	1	1	1
Degree of Outlet Restriction	unrestricted outflow	3	0	0	0	0	3
	restricted outflow	(1)	0	0	0	0	1
Inlet/Outlet Class	perennial outlet	3	3	0	0	0	3
	intermittent outlet	(1)	1	0	0	0	1
Wetland Water Regime	drier; seasonally flooded, temporarily flooded, saturated	3	3	3	0	3	3
	wet; permanently flooded, intermittently exposed, semipermanently flooded	(1)	1	1	1	1	1
Vegetation Density/Dominance	high/very high	3	3	3	3	3	3
	medium	(2)	2	2	2	2	2
	sparse/low	1	1	1	1	1	1
	no vegetation	0	0	0	0	0	0
Soil type	mineral hydric soil	3	3	3	3	3	3
	histosol both	1 (2)	1	1	1	1	1
	Total Score:	8/18					
	Functional Capacity Index:	0.44					
	Model Range:	5-18	4-15	3-12	2-10	3-12	5-18
	Index Range:	0.27-1.0	0.26-1.0	0.25-1.0	0.20-1.0	0.25-1.0	0.27-1.0

PROJECT NAME: Hampshire CC - Golf Course Drainage System 3

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND VEGETATION (This model is identical for all HGM types)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Indicators of Disfunction	No Vegetation	0
Direct Indicators of Function	None	
Primary Variables		Score:
Plant Species Diversity	high diversity 5 medium diversity (3) low diversity 1	
Vegetation Density/Dominance	high/very high 5 medium (3) sparse/low 1	
Wetland Juxtaposition	connected to upstream and downstream 5 connected above or below 3 other wetlands nearby but not connected (400 m or closer) (1) isolated 0	
		Total Score: 7/15 Model Range: 2-15
		Functional Capacity Index: 0.46 Index Range: 0.13-1.0

s

PROJECT NAME: Hampshire CC - Golf Course Drainage System 3

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND FAUNA (This model is identical for all HGM types except Slope Wetlands for which "Interspersion of Vegetation Cover and Open Water" does not apply)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Direct Indicators of Disfunction	None	
Direct Indicators of Function	None	
Primary Variables		
Watershed Land Use	low intensity (0-25% urbanized) moderate intensity (25-50% urbanized) high intensity (>50% urbanized)	3 2 (1)
Wetland Land Use	low intensity moderate intensity high intensity	3 2 (1)
Wetland Water Regime	wet: permanently flooded, intermittently exposed, semipermanently flooded drier: seasonally flooded, temporarily flooded, saturated	(3) 1
Microrelief of Wetland Surface	pronounced well developed poorly developed absent	3 2 (1) 0
Number of Wetland Types and Relative Proportions	5 or more types 3-4 types 1-2 types no vegetation	3 2 (1) 0
	even distribution moderately even distribution highly uneven distribution no vegetation	3 (2) 1 0
Vegetation Interspersion	high interspersion moderate interspersion low interspersion no vegetation	3 (2) 1 0

Hampshire CC - Golf Course Drainage System 3

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND FAUNA (CONT'D)		
Variables	**Conditions**	**Weights**
Number of Layers and Percent Cover	5 or more layers	3
	3-4 layers	(2)
	1-2 layers	1
	no vegetation	0
	layers well developed (>50% cover)	3
	layers with moderate cover (26-50% cover)	(2)
	layers poorly distinguishible (<25% cover)	1
	no vegetation	0
Interspersion of Vegetation Cover and Open Water	26-75%scattered or peripheral	(3)
	>75% scattered or peripheral	2
	<25% scattered or peripheral	1
	100% cover or open water	1
	no vegetation	0
Size	large (>100 acres)	3
	medium (10-100 acres)	2
	small (<10 acres)	(1)
Wetland Juxtaposition	other wetlands within 400 m and connected above or below	3
	other wetlands within 400 m but not connected	(1)
	wetland isolated (culvert)	0
Slope Wetlands:	All other HGM types:	
Model Range: 4-33	Total Score: 20/36	
Functional Capacity Index:	Model Range: 4-36	
Index Range: 0.12-1.0	Functional Capacity Index: 0.55	
	Index Range: 0.11-1.0	

WETLAND INVENTORY DATA - CHARACTERIZATION OF WETLAND

Project Name: Hampshire Country Club Date: 5/17/16

Field Investigators: David Kennedy, MS, Project Scientist, VHB

SURFACE WATER FLOW VECTORS

Isolated Wetland A (northwestern portion of property)

- ☒ Depressional - 100% Percent/Acreage
- ☐ Slope - _____Perecent/Acreage
- ☐ Extensive Peatland - ____Percent/Acreage
- ☐ Lacustrine Fringe - ____Percent/Acreage
- ☐ Riverine - _____Percent/Acreage

VEGETATION TYPES

Forested Wetland

- ☐ Evergreen Needle-leaved - _____Percent/Acreage
- ☐ Deciduous Broad-leaved - _____Percent/Acreage
- ☐ Deciduous Needle-leaved - _____Percent/Acreage

Scrub Shrub

- ☐ Evergreen Needle-leaved - _____Percent/Acreage
- ☐ Evergreen Broad-leaved - _____Percent/Acreage
- ☐ Deciduous Broad-leaved - _____Percent/Acreage
- ☐ Deciduous Needle-leaved - _____Percent/Acreage

Emergent Wetland

- ☒ Persistent - 100% Percent/Acreage
- ☐ Non-persistent - _____ Percent/acreage
- ☐ Aquatic Bed - _____Percent/Acreage

Total - 100%

SOIL TYPES

Histosol:

- ☐ Fibric
- ☒ Hemic
- ☐ Sapric

Mineral Hydric Soil:

- ☒ Gravelly
- ☐ Sandy
- ☐ Silty
- ☒ Clayey

GEOLOGY

Surficial: glacial till

Bedrock: pelitic schists

Hampshire CC - Isolated Wetland A

PRE-EMPTIVE STATUS

- ☐ Public Ownership
- ☐ Wildlife Management Area
- ☐ Fisheries Management Area
- ☐ Designated State or Federal Protected Wetland
- ☐ Documented Habitat for State or Federal Listed Species
- ☐ Regionally Scarce Wetland Category
- ☐ Historic/Archaeological Area

PLANT SPECIES

NAME	OW	FW	F	FU	DOM	C	S	TS	LS	H
Phragmites australis		X			X					X
Vitis riparia			X		X					
Polygonum pensylvanicum		X			X					X
Calestegia sepium			X		X					X
Rosa multiflora				X			X			
Polygonum cuspidatum				X						X
Salix babylonica		X				X				
Salix discolor		X				X				

OW-Obligate Wetland
FW- Facultative Wetland
F – Facultative
FU – Facultative Upland

Dom – Dominant
C- Canopy
S- Sapling
TS – Tall Shrub

LS- Low Shrub
H - Herb

Hampshire CC - Isolated Wetland A

WETLAND INVENTORY DATA - CHARACTERIZATION OF MODEL VARIABLES

LANDSCAPE VARIABLES

Size:

- [x] Small (< 10 ACRES)
- [ ] Medium (10-100 ACRES)
- [ ] Large (> 100 ACRES)

Wetland Juxtaposition:

- [ ] Connected Upstream and Downstream
- [ ] Only Connected Above
- [ ] Only Connected Below
- [ ] Other wetlands Nearby But Not Connected
- [x] Wetland Isolated

Fire Occurrence and Frequency:

- [ ] Natural; Predictable Frequency
- [ ] Natural; Sporadic Frequency
- [ ] Human-Caused; Predictable
- [ ] Human-Caused; Sporadic
- [ ] Rare Event
- [x] No Evidence

Regional Scarcity:

- [x] Not Scarce (> 5% of total wetland area of region)
- [ ] Scarce (< 5% of total wetland areas of region)

Watershed Land Use:

- [x] > 50% Urbanized
- [ ] 25-50% Urbanized
- [ ] 0-25% Urbanized

HYDROLOGICAL VARIABLES

Surface Water Level Fluctuation of Wetlands:

- [ ] High Fluctuation
- [x] Low Fluctuation
- [ ] Never Inundated

Frequency of Overbank Flooding:

- [x] Return Interval > 5 years
- [ ] Return Interval 2-5 Yeasts
- [ ] Return Interval 1-2 Years
- [ ] No Overbank Flooding

pH:

- [ ] Acid <5.5
- [ ] Circumneutral 5.5-7.4
- [ ] Alkaline > 7.4
- [x] No Water

Surficial Geologic Deposit Under Wetland:

- [ ] Low Permeability Stratified Deposits
- [ ] High Permeability Stratified Deposits
- [x] Glacial Till

Wetland Land Use:

- [x] High Intensity (i.e. agriculture) evidence of clearing runoff from golf course
- [ ] Moderate Intensity (i.e. forestry)
- [ ] Low Intensity (i.e. open space)

Wetland Water Regime:

- [ ] Wet: Permanently Flooded, Intermittently Exposed, Semi-Permanently Flooded
- [x] Drier: Seasonally Flooded, Temporarily Flooded, Saturated

Basin Topographic Gradient:

- [ ] High Gradient > 2%
- [x] Low Gradient < 2%

Degree of Outlet Restriction:

- [ ] Restricted Outflow
- [ ] Unrestricted Outflow
- [x] No Outflow

Ratio of Wetland Area to Watershed Area:

- [x] High > 10%
- [ ] Low < 10%

Microrelief of Wetland Surface:

- [ ] Pronounced > 45 cm
- [ ] Well Developed 15-45 cm
- [x] Poorly Developed < 15 cm
- [ ] Absent

Inlet/Outlet Class:

- [x] No Inlet/No Outlet
- [ ] No Inlet/Intermittent Outlet
- [ ] No Inlet/Perennial Outlet
- [ ] Intermittent Inlet/No Outlet
- [ ] Intermittent Inlet/Intermittent Outlet
- [ ] Intermittent Outlet/Perennial Outlet
- [ ] Perennial Inlet/No Outlet
- [ ] Perennial Inlet/Intermittent Outlet
- [ ] Perennial Inlet/Perennial Outlet

Nested Piezometer Data:

- [ ] Recharge
- [ ] Discharge
- [ ] Horizontal Flow
- [x] Not Available

Relations of Wetlands' Substrate Elevation to Regional Piezometric Surface:

- [ ] Piezometer Surface Above or at Substrate Elevation
- [ ] Piezometer Surface Below Substrate Elevation
- [x] Not Available

Evidence of Sedimentation:

- [x] No Evidence Observed
- [ ] Sediment Observed on Wetland Substrate
- [ ] Fluvaquent Soils

Evidence of Seeps and Springs:

- [x] No Seeps or Springs
- [ ] Seeps Observed
- [ ] Perennial Spring
- [ ] Intermittent Spring

SOIL VARIABLES

Soil Lacking:

- [ ]

Histosol:

- [ ] Fibric
- [x] Hemic
- [ ] Sapric

Hampshire CC - Isolated Wetland A

Mineral Hydric Soil:

- [x] Gravelly
- [ ] Sandy
- [ ] Silty
- [x] Clayey

VEGETATION VARIABLES

Vegetation Lacking:

- [ ]

Dominant Wetland Type:

- [ ] Forested – Evergreen – Needle-leaved
- [ ] Forested – Deciduous – Broad-leaved
- [ ] Forested – Deciduous – Needle-leaved
- [ ] Scrub Shrub – Evergreen – Broad-leaved
- [ ] Scrub Shrub – Evergreen – Needle-leaved
- [ ] Scrub Shrub – Deciduous – Broad-leaved
- [ ] Scrub Shrub – Decisuous – Needle-leaved
- [x] Emergent – Persistent
- [ ] Emergent – Non-persistent
- [ ] Aquatic Bed

Number of Types & Relative Proportions:

Number of Types:

- [ ] Actual #
- [ ] 5
- [ ] 4
- [ ] 3
- [ ] 2
- [x] 1

Evenness of Distribution:

- [ ] Even Distribution
- [ ] Moderately Even Distribution
- [x] Highly Uneven Distribution

Vegetation Density/Dominance:

- [ ] Sparce (0-20%)
- [ ] Low Density (20-40%)
- [ ] Medium Density (40-60%)
- [x] High Density (60-80%)
- [ ] Very High Density (80-100%)

Vegetation Interspersion:

- [ ] High (small groupings, diverse and interspersed)
- [x] Moderate (broken irregular rings)
- [ ] Low (large patches, concentric rings)

Number of Layers and Percent Cover:

Number of Layers:

- [ ] 6 or > (actual #)
- [ ] 5
- [ ] 4
- [x] 3
- [ ] 2
- [ ] 1

Percent Cover:

- [ ] Submergents:
- [ ] Floating:
- [ ] Moss-lichen:
- [x] Short Herb: 15
- [x] Tall Herb: 30
- [ ] Dwarf shrub:
- [ ] Short shrub:
- [ ] Tall shrub:
- [ ] Sapling:
- [x] Tree: 5

Plant Species Diversity:

- [ ] Low 1-2 plots sampled
- [x] Medium 3-4 plots sampled
- [ ] High 5 or more plots sampled

Proportion of Animal Plant Foods:

- [x] Low (5-25%)
- [ ] Medium (25-50%)
- [ ] High (> 50%)

Cover Distribution:

- [x] Continuous Cover
- [ ] Small Scattered Patches
- [ ] 1 or More Large Patches; Parts of Site Open
- [ ] Solitary, Scattered Stems

Dead Woody Material:

- [ ] Abundant (50% of wetland surface)
- [ ] Moderately Abundant (25-50% of surface)
- [x] Low Abundance (0-25% of surface)

Interspersion of Cover and Open Water:

- [ ] < 25% Scattered or Peripheral
- [ ] 26-75 % Scattered or Peripheral
- [ ] > 75% Scattered or Peripheral
- [x] 100% Cover or Open Water

Stream Sinuosity: N/A

- [ ] Highly Convoluted (Index 1.50 or >)
- [ ] Moderately Convoluted (Index 1.25-1.50)
- [ ] Straight/Slightly Irregular (Index 1.10-1.25)

Presence of Islands:

- [ ] Several to Many
- [ ] One or Few
- [x] Absent

PROJECT NAME: Hampshire CC - Isolated Wetland A

MODIFICATION OF GROUNDWATER DISCHARGE					
Wetland ID(s): Isolated Wetland A HGM Type: D		HGM TYPES:			
VARIABLES	CONDITIONS	(D)	S	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of Disfunction					
Inlet/Outlet Class	perennial inlet/no outlet	0	0	0	0
Nested Piezometer Data	recharge	0	0	0	0
Relationship to Regional Piezometric Surface	wetland substrate elevation above piezometric surface	0	0	0	0
Direct Indicators of Function					
Presence of Springs and Seeps	evidence of perennial steeps or springs	18	15	15	18
Neated Piezometer Data	discharge condition	18	15	15	18
Relationship to Regional Piezometric Surface	wetland substrate elevation below piezometric surface	18	15	15	18
Inlet/Outlet Class	no inlet/perennial outlet	18	15	15	18
Primary Variables					
Microrelief of Wetland Surfaces	pronounced	3	3	3	3
	well developed	2	2	2	2
	poorly developed	(1)	1	1	1
	absent	0	0	0	0
Inlet/Outlet Class	perennial inlet/perennial outlet	3	3	0	3
	intermittent inlet/perennial outlet	2	2	0	2
	all other classes	(0)	0	0	0
pH	alkaline	3	3	3	3
	circumneutral	2	2	2	2
	acid	0	0	0	0
	no water present	(0)	0	0	0
Surficial Geologic Deposit Under Wetland	high permeability stratified deposits	3	3	3	3
	low permeability stratified deposits	2	2	2	2
	glacial till	(1)	1	1	1
Wetland water regime	wet; permanently flooded, intermittently exposed semipermanently, flooded	3	0	3	3
	drier; seasonally flooded, temporarily flooded, saturated	(1)	0	1	1
Soil Type	histosol	3	3	3	3
	mineral hydric soil	1	1	1	1
	both	(2)			
	Total Score:	5/18			
	Functional Capacity Index:	0.28			
	Model Range	3-18	2-15	3-15	3-18
	Index Range:	.19-1.0	.16-1.0	.22-1.0	.19-1.0

PROJECT NAME: Hampshire CC

MODIFICATION OF GROUNDWATER RECHARGE									
Wetland ID(s): Isolated Wetland A HGM Type: D		HGM TYPES:							
VARIABLES	CONDITIONS	(D)		L		EP		R		F	
		Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr
Indicators of Disfunction											
Inlet/Outlet Class	no inlet/perennial outlet; intermittent inlet/perennial outlet	0								0	
Nested Piezometer Data:	discharge condtion	0		0		0		0		0	
Relationship to Regional Piezometric Surface	wetland substrate elevation above piezometric surface	0		0		0		0		0	
Presence of Seeps and Springs	presence of seeps or springs	0		0		0		0		0	
Direct Indicators of Function											
Inlet/Outlet Class	perennial inlet/no outlet	21								21	
Nested Piezometer Data	recharge condition	21								21	
Relationship to Regional Peizometeric Surface	wetland substrate elevation below piezometric surface	21								21	
Primary Variables											
Microrelief of Wetland Surface	poorly developed	(3)		3		1		3		3	
	absent	3		3		1		3		3	
	well developed	2		2		2		2		2	
	pronounced	1		1		3		1		1	
Inlet/Outlet Class	perennial inlet/intermittent outlet	3		0		0		0		3	
	all other classes	(0)		0		0		0		0	
pH	acid	3		3		3		3		3	
	circumneutral	2		2		2		2		2	
	alkaline	1		1		1		1		1	
	no water present	(0)		0		0		0		0	
Surficial Geologic Deposit Under Wetland	glacial till	(3)		1		1		1		3	
	low permeability stratified deposits	2		2		2		2		2	
	high permeability stratified deposits	1		3		3		3		1	
Surface Water Level Fluctuation of the Wetland	high fluctuation	3		3		0		3		3	
	low fluctuation	(2)		2		0		2		2	
	never inundated	1		1		0		1		1	

Hampshire CC

Wetland ID(s): Isolated Wetland A HGM Type: D		HGM TYPES:				
VARIABLES	CONDITIONS	D	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Wetland Water Regime	drier; seasonally flooded, temporarily flooded, saturated	3	3	0	3	3
	wet; permanently flooded, intermittently exposed, semipermanently flooded	1	1	0	1	1
Soil Type	gravelly or sandy mineral hydric	3	3	0	3	3
	silty or clayey mineral hydric	2	2	0	2	2
	sapric histosol	1	1	0	1	1
	fibric or hemic histosol	0	0	3	0	0
	3 2					
Total Score:		13/21				
Model Score:		4-21	4-18	2-12	4-18	4-21
Functional Capacity Index:		0.62				
Index Range:		.19-1.0	.22-1.0	0.16-1.0	.22-1.0	.19-1.0

* This model should be applied to both year long and seasonal recharge wetlands
* If the wetland is seasonally fluctuating between recharge and discharge, then reduce the above score by one half (1/2), because the wetland only functions in a recharge mode for roughly half of the year

PROJECT NAME: Hampshire CC

STORM AND FLOOD-WATER STORAGE							
Wetland ID(s): Isolated Wetland A HGM Type: D		HGM TYPES:					
VARIABLES	CONDITIONS	(D)	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of disfunction	none						
Direct Indicators of Function	no outlet	(27)	21				30
Primary Variables Inlet/Outlet Class	perennial inlet/intermittent outlet	3	3	0	0	0	3
	intermittent inlet/intermittent outlet	2	2	0	0	0	2
	non-inlet/intermittent outlet	1	1	0	0	0	1
	non-inlet/perennial outlet	1	1	0	0	0	1
	intermittent inlet/perennial outlet	1	1	0	0	0	1
	perennial inlet/perennial outlet	1	1	0	0	0	1
Degree of Outlet Restriction	restricted	3	0	0	0	0	3
	unrestricted	0	0	0	0	0	0
Basin Topographic Gradient	low gradient	3	3	0	3	3	3
	high gradient	1	1	0	0	1	1
Wetland Water Regime	drier: seasonally flooded, temporarily flooded, saturated	3	3	3	0	3	3
	wet: permanently flooded, intermittently exposed, semipermanently flooded	1	1	1	0	1	1
Surface Water Level Fluctuation of the Wetland	high fluctuation	3	0	3	0	3	3
	low fluctuation	2	0	2	0	2	2
	never inundated	0	0	0	0	0	0
Ratio of Wetland Area to Watershed Area	large	3	3	3	0	3	3
	small	1	1	1	0	1	1
Microrelief of Wetland Surface	prounounced	3	3	3	3	3	3
	well developed	2	2	2	2	2	2
	poorly developed	1	1	1	1	1	1
	absent	0	0	0	0	0	0

Hampshire CC

STORM AND FLOOD-WATER STORAGE							
Wetland ID(s): Isolated Wetland A HGM Type: A		HGM TYPES:					
VARIABLES	CONDITIONS	(D)	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Frequency of Overbank Flooding	overbank flooding absent	0	0	0	0	0	0
	return interval of >5 yrs.	0	0	1	0	1	1
	return interval of 2-5 yrs.	0	0	2	0	2	2
	return interval of 1-2 yrs.	0	0	3	0	3	3
Vegetation Density/Dominance	high/very high	3	3	3	3	3	3
	moderate	2	2	2	2	2	2
	sparse/low	1	1	1	1	1	1
	no vegetation	0	0	0	0	0	0
Dead Woody Material	abundant	3	3	3	3	3	3
	moderately abundant	2	2	2	2	2	2
	sparse	1	1	1	1	1	1
	absent	0	0	0	0	0	0
	Total Score:	27/27					
	Functional Capacity Index:	1.0					
	Model Range:	4-27	4-21	2-21	0-12	3-24	4-30
	Index Range:	0.15-1.0	0.19-1.0	0.09-1.0	0-1.0	0.12-1.0	0.13-1.0

PROJECT NAME: Hampshire CC - Isolated Wetland A

MODIFICATION OF STREAM FLOW (This model is identical for all HGM types)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Indicators of Disfunction	No Outlet	0
Direct Indicators of Function	None	

Primary Variables

Storm and Flood Water Storage Function Model Score X Modification of Groundwater Discharge Function Model Score Total Score:

High*	3	X	High	3	=	9
Mod	2	X	High	3	=	6
Low	1	X	High	3	=	3
High	3	X	Mod	2	=	6
Mod	2	X	Mod	2	=	4
Low	1	X	Mod	2	=	2
High	3	X	Low	1	=	3
Mod	2	X	Low	1	=	2
Low	1	X	Low	1	=	1

Total Score: 0/9

Model Range: 1-9

Function Capacity Index: 0.0

Index Range: 0.0 - 1.0

*High = FCI of 0.67-1.0, Mod = FCI of 0.34-0.66, Low = FCI of 0-0.33 for the Storm and Flood Water Storage and Modification of Ground Water Discharge Function Model Scores.

PROJECT NAME: Hampshire CC

MODIFICATION OF WATER QUALITY											
Wetland ID(s): Isolated Wetland A HGM Type: D		HGM TYPES:									
VARIABLES	CONDITIONS	(D)		S		L		EP		R		F	
		Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr	Wgt	Scr
Indicators of disfunction	None												
Direct Indicators of Function	Evidence of Sedimentation	18		15		12		12		12		18	
Primary Variables Wetland Land Use	low intensity	3		3		3		3		3		3	
	moderate intensity	2		2		2		2		2		2	
	high intensity	(1)		1		1		1		1		1	
Degree of Outlet Restriction	restricted outflow	3		0		0		0		0		3	
	no outlet	(2)		0		0		0		0		2	
	unrestricted outflow	1		0		0		0		0		1	
Inlet/Outlet Type	no outlet	(3)		3		0		0		0		3	
	intermittent outlet	2		2		0		0		0		2	
	perennial outlet	1		1		0		0		0		1	
Dominant Wetland Type	forested wetland	3		3		3		3		3		3	
	scrub-shrub	2		2		2		2		2		2	
	emergent wetland	(2)		2		2		2		2		2	
	aquatic bed	1		0		0		0		0		0	
	no vegetation	0		0		0		0		0		0	
Cover Distribution	forming a continuous cover	(3)		3		3		3		3		3	
	growing in small scattered patches	2		2		2		2		2		2	
	one or more large patches	1		1		1		1		1		1	
	solitary scattered stems	1		1		1		1		1		1	
	no vegetation	0		0		0		0		0		0	
Soil Type	~~histosol~~ or clayey soil	(3)		3		3		3		3		3	
	silty soil	2		2		2		0		2		2	
	sandy or gravelly soil	1		1		1		0		1		1	
	Total Score:	14/18											
	Functional Capacity Index:	0.77											
	Model Range:	4-18		3-15		2-12		1-12		2-12		4-18	
	Index Range:	0.22-1.0		0.20-1.0		0.16-1.0		0.8-1.0		0.16-1.0		0.22-1.0	

PROJECT NAME: Hampshire CC

EXPORT OF DETRITUS							
Wetland ID(s): Isolated Wetland A HGM Type: D		HGM TYPES:					
VARIABLES	CONDITIONS	(D)	S	L	EP	R	F
		Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr	Wgt Scr
Indicators of Disfunction	(no outlet)	0	0		0		0
Direct Indicators of Function	none						
Primary Variables							
Wetland Land Use	moderate intensity	3	3	3	3	3	3
	low intensity	2	2	2	2	2	2
	high intensity	1	1	1	1	1	1
Degree of Outlet Restriction	unrestricted outflow	3	0	0	0	0	3
	restricted outflow	1	0	0	0	0	1
Inlet/Outlet Class	perennial outlet	3	3	0	0	0	3
	intermittent outlet	1	1	0	0	0	1
Wetland Water Regime	drier; seasonally flooded, temporarily flooded, saturated	3	3	3	0	3	3
	wet; permanently flooded, intermittently exposed, semipermanently flooded	1	1	1	1	1	1
Vegetation Density/Dominance	high/very high	3	3	3	3	3	3
	medium	2	2	2	2	2	2
	sparse/low	1	1	1	1	1	1
	no vegetation	0	0	0	0	0	0
Soil type	mineral hydric soil	3	3	3	3	3	3
	histosol	1	1	1	1	1	1
	Total Score:	0					
	Functional Capacity Index:	0.0					
	Model Range:	5-18	4-15	3-12	2-10	3-12	5-18
	Index Range:	0.27-1.0	0.26-1.0	0.25-1.0	0.20-1.0	0.25-1.0	0.27-1.0

PROJECT NAME: Hampshire CC - Isolated Wetland A

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND VEGETATION (This model is identical for all HGM types)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Indicators of Disfunction	No Vegetation	0
Direct Indicators of Function	None	
Primary Variables		Score:
Plant Species Diversity	high diversity 5 medium diversity (3) low diversity 1	
Vegetation Density/Dominance	high/very high (5) medium 3 sparse/low 1	
Wetland Juxtaposition	connected to upstream and 5 downstream connected above or below 3 other wetlands nearby but not connected (400 m or closer) (1) isolated 0	
		Total Score: 9/15 Model Range: 2-15
		Functional Capacity Index: 0.60 Index Range: 0.13-1.0

s

PROJECT NAME: Hampshire CC - Isolated Wetland A

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND FAUNA (This model is identical for all HGM types except Slope Wetlands for which "Interspersion of Vegetation Cover and Open Water" does not apply)		
VARIABLES	**CONDITIONS**	**WEIGHTS**
Direct Indicators of Disfunction	None	
Direct Indicators of Function	None	
Primary Variables		
Watershed Land Use	low intensity (0-25% urbanized) moderate intensity (25-50% urbanized) high intensity (>50% urbanized)	3 2 (1)
Wetland Land Use	low intensity moderate intensity high intensity	3 2 (1)
Wetland Water Regime	wet: permanently flooded, intermittently exposed, semipermanently flooded drier: seasonally flooded, temporarily flooded, saturated	3 (1)
Microrelief of Wetland Surface	pronounced well developed poorly developed absent	3 2 (1) 0
Number of Wetland Types and Relative Proportions	5 or more types 3-4 types 1-2 types no vegetation	3 2 (1) 0
	even distribution moderately even distribution highly uneven distribution no vegetation	3 2 (1) 0
Vegetation Interspersion	high interspersion moderate interspersion low interspersion no vegetation	3 (2) 1 0

Hampshire CC - Isolated Wetland A

CONTRIBUTION TO ABUNDANCE AND DIVERSITY OF WETLAND FAUNA (CONT'D)		
Variables	**Conditions**	**Weights**
Number of Layers and Percent Cover	5 or more layers	3
	3-4 layers	(2)
	1-2 layers	1
	no vegetation	0
	layers well developed (>50% cover)	(3)
	layers with moderate cover (26-50% cover)	2
	layers poorly distinguishible (<25% cover)	1
	no vegetation	0
Interspersion of Vegetation Cover and Open Water	26-75%scattered or peripheral	3
	>75% scattered or peripheral	2
	<25% scattered or peripheral	1
	100% cover or open water	(1)
	no vegetation	0
Size	large (>100 acres)	3
	medium (10-100 acres)	2
	small (<10 acres)	(1)
Wetland Juxtaposition	other wetlands within 400 m and connected above or below	3
	other wetlands within 400 m but not connected	(1)
	wetland isolated	0
Slope Wetlands:	All other HGM types:	
Model Range: 4-33	Total Score: 16/36	
Functional Capacity Index:	Model Range: 4-36	
Index Range: 0.12-1.0	Functional Capacity Index: 0.44	
	Index Range: 0.11-1.0	

Attachment D

HAMPSHIRE COUNTRY CLUB

Mamaroneck, New York

WETLANDS CHARACTERIZATION ASSESSMENT

Prepared for:	New World Realty Advisors, LLC c/o Daniel Pfeffer 1500 Broadway, 25th Floor New York, NY 10036
Prepared by:	Nelson, Pope & Voorhis, LLC 572 Walt Whitman Road Melville, New York 11747
Date:	May 3, 2010
Revised:	*September 17, 2012*

1.0 INTRODUCTION AND REGULATORY FRAMEWORK

The above-referenced property was inspected by Sara N. da Silva on April 30 and May 2, 2010 for the purpose of delineating wetlands in accordance with the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (3 parameter approach). The subject property is occupied by an 18-hole golf course with a newly renovated clubhouse, outdoor dining patio, golf and swimming pool pavilion, tennis pavilion with two (2) tennis courts, and associated maintenance buildings (see aerial photograph in **Figure 1**). The property consists of fairways and greens for the golf course, seven (7) ponds, three (3) associated man-made stream systems, and two additional vegetated wetland areas. The golf course has been in operation since 1944.

Field observations of the property found that there is an extensive drainage system throughout the property that is comprised of a series of underdrain pipes that feed into the on-site ponds and associated man-made streams within the low-lying areas of the site. The boundaries of the ponds and man made streams on the property were determined to be at the well-defined edge of surface water, where the ponds and streams are either rock-lined or quickly transition from surface water to bank and then to maintained turf vegetation. Two vegetated wetland areas were identified; one in the northwest corner of the property and the second in the southwest corner of the property (see **Figure 4**).

In accordance with the Village of Mamaroneck and Town of Mamaroneck wetlands regulations (Chapters 192 and 114, respectively), field methods for delineating wetlands

followed those methods that (a) meet the definition provided in Article 25-0103 of the New York State (NYS) Environmental Conservation Law (tidal wetlands), and (b) include all other areas 2,500 square feet or larger that can be defined as wetlands in accordance with the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (**1989**) (hereafter "Federal Manual"). The Federal Manual utilizes hydrology, hydric soils and hydrophytic vegetation as the three essential criteria which must be met for an area to be identified as a wetland. The Village and Town of Mamaroneck both reference the 1989 Federal Manual as the technical source for delineating jurisdictional wetlands. The Federal Manual provides technical criteria, field indicators, and recommended procedures to be followed in determining a jurisdictional wetland, as well as in determining the location of wetland boundaries. Data was recorded in the field on standard data collection sheets.

According to the Federal Manual, when more than 50 percent of the dominant species in a sampling area have an indicator status of obligate, facultative wetland, and/or facultative species, hydrophytic vegetation is present. If the vegetation fails to be dominated by these types of species, the area is usually not a wetland. However, field indicators for one or more of the three technical criteria for wetland identification are usually absent in disturbed areas. For instance, disturbed areas may not contain hydrophytic vegetation or hydrology under certain circumstances if the vegetation and/or hydrology have been significantly altered by human activities (i.e. filling, clearing, draining, mowing, other landscape maintenance, etc.). As per the Federal Manual, "if the [disturbance] activity occurred prior to the effective date of regulation or other jurisdiction, it may not be necessary to make a wetland determination for regulatory purposes" (page 50).

On the subject property, much of the low-lying areas exhibit wetland hydrology and hydric soils, but do not possess hydrophytic vegetation. These areas have been and continue to be maintained as fairways and greens with the assistance of an extensive underdrain system and turf maintenance typical of a golf course, and therefore are currently vegetated with associated upland grasses (e.g. Kentucky bluegrass). Review of historic aerial photographs going back to 1966 (*www.historicaerials.com*) reveal the site has been maintained as a golf course since prior to the effective date of State and Federal regulation in the 1970's. According to the Hampshire Country Club's website, the golf course was organized in 1944 and further supports the fact that the turf areas of the golf course have existed since prior to regulations.

To facilitate on-site gathering of data, preliminary information collected included the existing site survey (**PEAPC, undated**), the existing property boundary survey (**Richard A. Spinelli, L.S., 2010**), the Topographic Map of the Clubhouse area (**Gabriel E. Senor, P.C., March 13, 2012**), Federal Emergency Management Agency flood map data (**FEMA, 2009**), NYS Department of Environmental Conservation (NYSDEC) Freshwater and Tidal Wetlands Maps (**Westchester GIS, 2004**), National Wetlands Inventory Map (**Westchester GIS, 2009**) of the Mamaroneck quadrangle, soil survey data from the Westchester County Soil Survey (**Westchester GIS, 2006**), the Westchester hydric soils data (**Westchester GIS, 2006**), and spring 2007 and 2009 aerial photographs from the NYSGIS Orthophotoimagery Program.

As per FEMA, the property is located within a designated flood zone, Flood Zone AE (EL 12) (see **Figure 2**). Pursuant to NYS Building Code, this special flood hazard area requires that the bottom of the horizontal structural members (for multi-family structures) be located a minimum of 12 feet above mean sea level; or, for single family dwellings, a minimum freeboard of two feet be provided above the established base flood elevation (EL. 12 for the subject property). Any new structures situated within the Flood Zone would need to be appropriately designed for such conditions.

The New York State Department of Environmental Conservation (NYSDEC) Freshwater Wetlands Maps indicate that the ponds and associated streams currently on the property are not regulated by New York State. However, the National Wetlands Inventory indicates four (4) wetland areas on the site, including three ponds and one emergent marsh area (see **Figure 4**). Additionally, the Westchester Soil Survey information indicates the presence of hydric soils throughout low lying areas of the site (see **Figure 3**). Modifications to jurisdictional wetlands on the property and within 100 feet of the wetland boundary will require approvals by the Village of Mamaroneck, the Town of Mamaroneck, and the U.S. Army Corps of Engineers. Delancy Cove, located immediately off-site to the south of the subject property, is a regulated tidal wetland pursuant to Article 25 of the NYS Environmental Conservation Law (see **Figure 4**). Therefore pursuant to Article 25 of the NYS Environmental Conservation Law, the NYSDEC may regulate any new disturbance activities within 300 feet or up to the 10-foot elevation contour (whichever is farthest seaward) adjacent to the tidal wetlands. The Village of Mamaroneck and the Town of Mamaroneck both regulate activities within 100 feet of designated tidal wetlands.

2.0 EXISTING CONDITIONS ANALYSIS

The ponds and man made streams on the property appear to be ground and surface water fed features which function as part of the drainage system as well as water hazards for the golf course. No liners were observed along the edges of these features and it is evident that they are influenced by the underlying groundwater table. The ponds and man made streams/drainage ditches have well defined edges, and are largely rock lined. The water features on the property all appear to be interconnected via a network of underground pipes which serve to alleviate ponding conditions throughout low-lying areas of the property.

Based on field observations and information provided by the Hampshire Country Club's course superintendent, Tony Campanella, the golf course has three separate drainage systems that interconnect the man made system of streams and ponds, either through physical connections or via subsurface pipe conveyances. Two of these systems ultimately discharge to Delancy Cove, located immediately off-site to the south of the subject property. **Figure 5** illustrates the three drainage systems and connectivity of the various ponds and man made streams throughout the property, which is described in further detail below.

Drainage System 1: This system is comprised of Ponds #13 and #16 and associated subsurface and surface drainage connections. Pond #16 straddles the northwest property line between the golf course and the adjacent multi-family development. This pond is connected to Pond #13 via underground piping, which day-lights approximately mid-way between Pond #16 to the north side of Pond #13. A similar man-made stream/drainage ditch collects water from the north-central portion of the golf course and transitions to underground piping approximately mid-way to Pond #13, where it ultimately discharges. Pond #13 has a piped overflow under Hommocks Road and underneath the athletic field located on the west side of Hommocks Road to a subsurface vault. This vault then discharges to the tidal wetland located southwest of the vault.

Drainage System 2: This system consists of Ponds #5 and #6 in the northeastern portion of the course. In the early 1990's Pond #5 was modified and Pond #6 was created for storage of irrigation water. A well is located adjacent to these ponds that supplies the course's irrigation water. Stormwater from the immediately surrounding area is directed to these two ponds via overland flow. Additionally, it has been noted that at least one discharge pipe from the residences to the east of the ponds is directed to Pond #6.

Drainage System 3: This system consists of Ponds #10 and #11 and associated collection streams/ditches. Beginning in approximately the mid-points of both fairways #5 and #6, water is directed south toward a collection stream/drainage ditch located south of Pond #5. This stream continues south through the golf course, past Pond #18 and beneath Eagle Knolls Road. A stream/drainage ditch located on the west side of Eagle Knolls Road connects the system from the east side of the road and empties into Pond #10. It is noted that this stream/drainage ditch does not empty into Pond #18; rather it is directed to a subsurface pipe below Eagle Knolls Road. Pond #10 contains a tidal valve that controls the input and output of water between this pond and the adjacent tidal wetlands. Additionally, water from the area northeast of Pond #10 is directed to Pond #10, including a piped overflow from Pond #11.

Pond #18: Pond #18 is an isolated drainage system. The pond receives stormwater from inlets located within the Macadam Driveway and parking area adjacent to the pro shop, which is piped to a manhole for sediment removal prior to overflowing into the Upper Pond (southern portion of Pond #18). An emergency overflow pipe is located in the northeast corner of the Lower Pond (northern portion of Pond #18), which discharges into Drainage System 3 during significant rainfall events.

Further details regarding each pond are provided below.

Rock-lined stream

Review of historic aerials suggest that Pond #13 was a naturally occurring system that was modified and expanded between 1960 and 1976. Pond #13's connection to the athletic field on the west side of Hommocks Road is apparent as a pipe beneath Hommocks Road was visible at the western edge of this pond.

Pond #13

Fairway Green Townhouses pond (Pond #16).

The connection between Pond #13 and Pond #16 was evident also during field inspections. Underground piping and culverts from the Pond #16 were found to be contiguous with the stream which enters Pond #13. Pond #16 was reportedly built in 1982 for use by both the townhomes to the north and the golf course. This pond has notable silt and organic sediment build-up. An illicit discharge from a commercial use located to the north was previously detected and was contributing to the silt and organic inputs to the pond. This discharge has since been removed.

Ponds #5 and #6 were both artificially created, as historic aerials reveal that Pond #5 was constructed between 1960 and 1976 and Pond #6 was constructed between 1976 and 1994. As noted above, it is believed that Pond #5 was modified and Pond #6 was constructed in the early 1990s. These ponds are utilized for storage of irrigation water, and a pump is located in the vicinity of the ponds to provide water to the irrigation system. It is noted that a permit was issued by the Village in 2008 for the expansion of these ponds, but the work was never completed.

Pond #11 was reportedly created between 1997 and 1998 in an area that was identified as having poor drainage. As previously stated, this pond overflows to Pond #10 via subsurface piping.

The southern pond, identified on the survey as "Prickly Pear Inlet," or Pond #10 has a concrete control structure which separates it from the tidal wetlands of Delancey Cove immediately south of the property. The control structure contains two pipes which are set at different elevations so that one is partially submerged during low tides, while the other is raised higher though still within the range of tidal influence. On the landward side of this control structure, the lower pipe appeared to be closed, but the higher elevation pipe is currently in the open position. This pond is also a naturally occurring feature that has been modified over time.

Pond #10 control structure

On the seaward side, this higher elevation pipe also appears to potentially be partially open and may allow some restricted connection of tidal flow. Though primarily freshwater, Prickly Pear Inlet does appear to have some evidence of saltwater influence based upon macroalgae characteristics observed in the lower portion of the inlet stream to the pond and trace evidence of what appeared to be former salt marsh vegetation (currently dead) along the inner fringe of the pond near the control structure.

Cove side of control structure

Pond #18 located to the northwest of the existing clubhouse (individually referred to as "Upper Pond" and "Lower Pond") are the water features in closest proximity to the clubhouse. Lower Pond was constructed in 1998 and is not lined. Upper Pond was added in 2005 with a waterfall feature that spills to Lower Pond and is also unlined. The maximum depth encountered in each pond is approximately 6 feet. Water levels within

these ponds are periodically supplemented with additional water from on-site wells as the ponds appear to have no connection to the network of ponds and ditches on the site and therefore have no input of water from this system. No natural vegetation exists within or along the perimeter of these ponds as turf for the golf course is managed up to the edge of each pond. A soil boring (B-1) was installed east of the ponds, which indicated the depth to groundwater in the vicinity of these ponds is approximately 10 feet.

View of the waterfall structure on Pond 18

The ponds and streams were all found to contain fish. Frogs were observed in the northern most Fairway Green pond. A few pairs of ducks and two egrets were also observed utilizing the ponds, though to a much lesser degree than the numerous pairs of Canada Geese observed throughout the property. There was substantial evidence of heavy use by Canada geese on the turf leading up to the pond edges.

Plant identification was performed and wetland indicators assigned using the Region 1 USDA-NRCS plant list. No floating or submerged aquatic plants were observed in the ponds, although all contained some degree of unicellar algae typically associated with freshwater ponds. The southernmost stream flowing into Prickly Pear Inlet also contained macroalgae along its rocky bottom.

Adjacent to the west of Prickly Pear Inlet, an additional wetlands area was identified and field located with a hand-held Geographic Positioning System (GPS). This area is best characterized as an emergent marsh dominated by the invasive strain of common reed (*Phragmites australis*), a common wetland plant. The wetland area exhibited varying degrees of saturated soils and standing water, organic hydric soils and hydrophytic vegetation contiguous with the adjacent pond. Several specimens of bastard oak (*Quercus sinuata*), which is a southern tree characteristic of moist habitats, were also observed growing upon the drier hummocks within this marsh area.

Southern vegetated marsh

The vegetated wetland area in the northwestern corner of the site is also an emergent marsh dominated by *Phragmites australis* as well as jewelweed (*Impatiens capensis*), another hydrophytic species. This marsh also contained black willow (*Salix nigra*) and pussy willow (*Salix discolor*), both of which are characteristic of wetland conditions.

Northern vegetated marsh

The ponds appear to vary in depth and are capable of supporting fish populations. During the time of the site visit, all of the streams on the property were observed to contain standing or slowly flowing water that was a minimum of 2-3 inches deep or more. The last rain event occurred four days prior to the site visit, when nearly two inches of rain was reported to have fallen in the Mamaroneck area during the previous weekend (as per *www.weather.com*, accessed on 5/3/10).

Soil observations were performed around the perimeter of the ponds and in low-lying areas of the property using a hand held spade and soil auger. Observations revealed turf growing up to the edge of the ponds and streams, and hydric soil conditions occurring throughout these low-lying areas. Hydric organic soils (histosols) were evidenced by a variety of indicators, predominantly well-decomposed low-chroma organic soils immediately beneath the turf surface. In turf areas with these very poorly drained soils, groundwater was often observed within 6 to 12 inches of the surface, and saturated soils were often observed within 0 to 10 inches of the surface. Indicators of a fluctuating water table were also frequently observed as oxidized root channels within the upper 2 to 12 inches of the soil, and occasional patches of water stained leaves and lack of vegetation within the lowest lying areas of turf.

The boundaries of the ponds, streams/drainage ditches and two additional vegetated wetland areas on the property are illustrated in by **Figure 4.**

3.0 FINDINGS OF THIS ASSESSMENT

Review of available information as well as on-site observations have verified that the freshwater ponds currently on the property can be characterized as Town, Village and Federally-regulated wetlands, though they are not State-regulated wetlands. There are two areas of NYSDEC regulated tidal wetlands associated with Delancy Cove (located immediately off-site to the south of the subject property). Additionally, based on field observations and discussions with the golf course superintendent, Drainage System 1 and Drainage System 3 have physical connections to the tidal wetlands associated with Delancy Cove (see **Figure 5**).

Despite the presence of hydrology and hydric soils indicative of wetlands throughout low-lying areas of the property, these areas have been maintained as golf course and have been supporting turf vegetation for more than 60 years with the constant maintenance/mowing and turf management practices, as well as the installation and upkeep of the site's underlying drainage system. This maintenance has precluded the establishment of any hydrophitic vegetation surrounding all of the ponds, with the exception of Pond #10. As a result, the on-site ponds (with the exception of Pond #10) would not meet the requirements of the Federal Manual 3-parameter approach for wetland delineation. Even though the ponds do not support hydrophitic vegetation, it is noted that the Village has historically asserted jurisdiction over these ponds pursuant to Chapter 192. It is noted that the Village and Town definition for freshwater wetlands (Chapter 192 and 114, respectively) includes wetlands identified on the NYSDEC regulatory maps and wetlands 2,500 SF or larger, even if they are not located on the NYSDEC regulatory maps. As a result, the drainage ditches located between the ponds would not be considered regulated under the Village and Town definition as each are less than 2,500 SF in size.

In accordance with the Village and Town Code, the regulatory adjacent area/buffer area surrounding a jurisdictional wetland (tidal or freshwater) or watercourse extends 100 feet horizontally away from its outermost boundary. A wetland/watercourse permit is

therefore required to conduct regulated activities, including subdivision of land, within these buffer areas. The U.S. Army Corps of Engineers only regulates activities conducted within the boundaries of the jurisdictional wetlands and waterways. The NYSDEC would regulate any new disturbance activities within 300 feet or up to the 10-foot elevation contour (whichever is farthest seaward) adjacent to the Delancy Cove tidal wetlands (located immediately off-site to the south of the subject property) (see **Figure 4**). Note that NYSDEC tidal wetlands jurisdiction would not extend landward of Eagle Knolls Road or Hommocks Road as it is an existing substantial roadway existing since prior to 1977.

Future development may be permitted within the regulated wetland adjacent areas, particularly within those areas currently maintained turf/golf course. Neither the Town nor the Village wetland regulations specify a required setback for structures, sanitary systems or other proposed improvements; just that a permit is required for disturbance within 100 feet of the regulated wetland boundary (tidal and freshwater wetlands). Therefore, development setbacks will be subject to negotiations with the Village and the Town during the permit process and will likely depend on the type of use and other environmental benefits that may be proposed in association with the project (i.e., mitigation measures such as adjacent area vegetated buffers, wetland creation, stormwater management, etc.).

Pursuant to Article 25 of the NYSECL, NYSDEC standards for development within the regulated tidal wetlands adjacent area [i.e., 300 feet landward of the tidal wetlands boundary or to the 10 foot contour (whichever is more seaward) and not extending beyond the seaward edge of pavement associated with Eagle Knolls Road and Hommocks Road] include the following:

- 75 foot setback from the wetland boundary for principle buildings;
- Not more than 20 percent impervious coverage within the regulated wetland adjacent area;
- 20,000 SF minimum lot area for principle buildings served by public/community sewage disposal systems (however, clustering of principle buildings for multiple family dwellings is permitted).

The high groundwater table and organic soils throughout the low-lying areas of the property in conjunction with rock outcrops and underlying bedrock throughout the remainder of the site present significant constraints to development. These conditions require thoughtful planning and engineering of an extensive drainage system (meeting NYS stormwater management requirements) for any proposed development on the property. Allowances for the jurisdictional wetland areas and adjacent buffers, as well as planning for stormwater management practices, should be considered in the development of a yield map for the property, as well as for future development planning.

FIGURES

FIGURE 1
AERIAL PHOTOGRAPH

Source: NYSGIS Orthophotoimagery Program, 2007;
NPV GIS Library;
Scale: 1 inch = 500 feet

Hampshire Country Club,
Mamaronek

Wetland Feasibility Assessment

FIGURE 2
FEMA FLOOD MAP

Source: NYSGIS Orthophotoimagery Program, 2007;
NPV GIS Library;
Scale: 1 inch = 500 feet

Hampshire Country Club,
Mamaronek

Wetland Feasibility Assessment

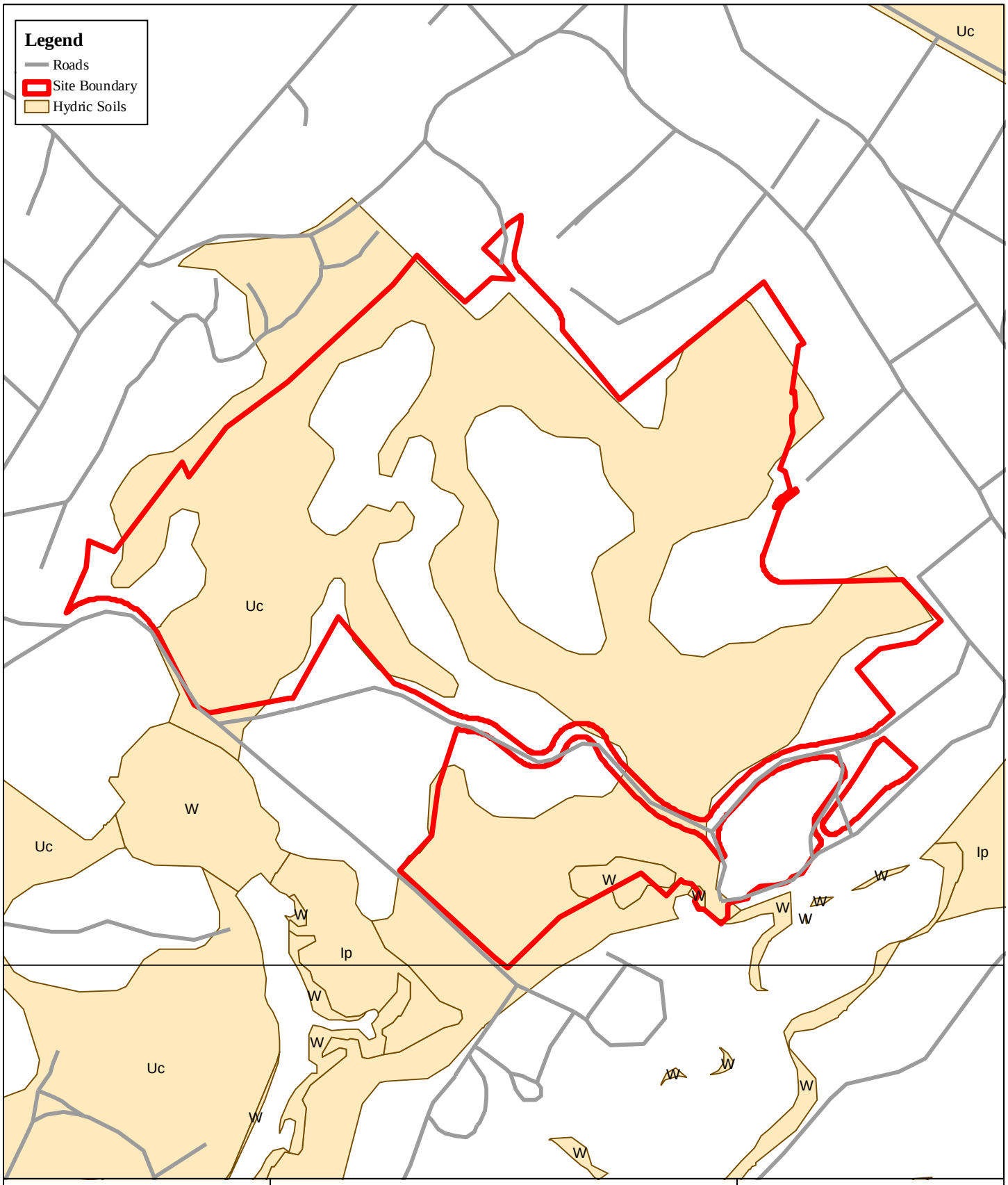
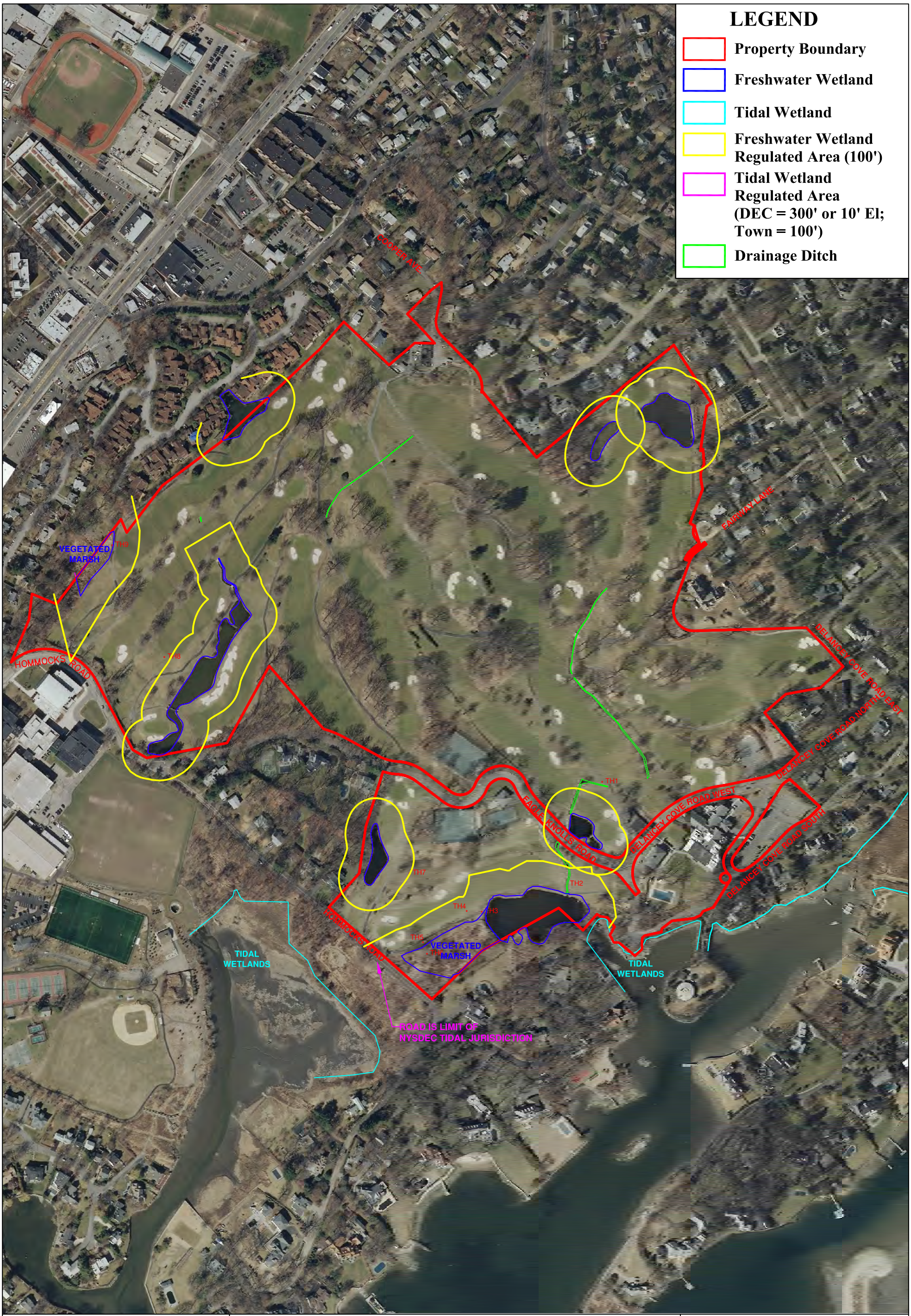


FIGURE 3
HYDRIC SOIL MAP

Source: NYSGIS Orthophotoimagery Program, 2007;
SSURGO, 2006;
Scale: 1 inch = 500 feet

Hampshire Country Club,
Mamaronek
Wetland Feasibility Assessment



NELSON, POPE & VOORHIS, LLC
ENVIRONMENTAL • PLANNING • CONSULTING

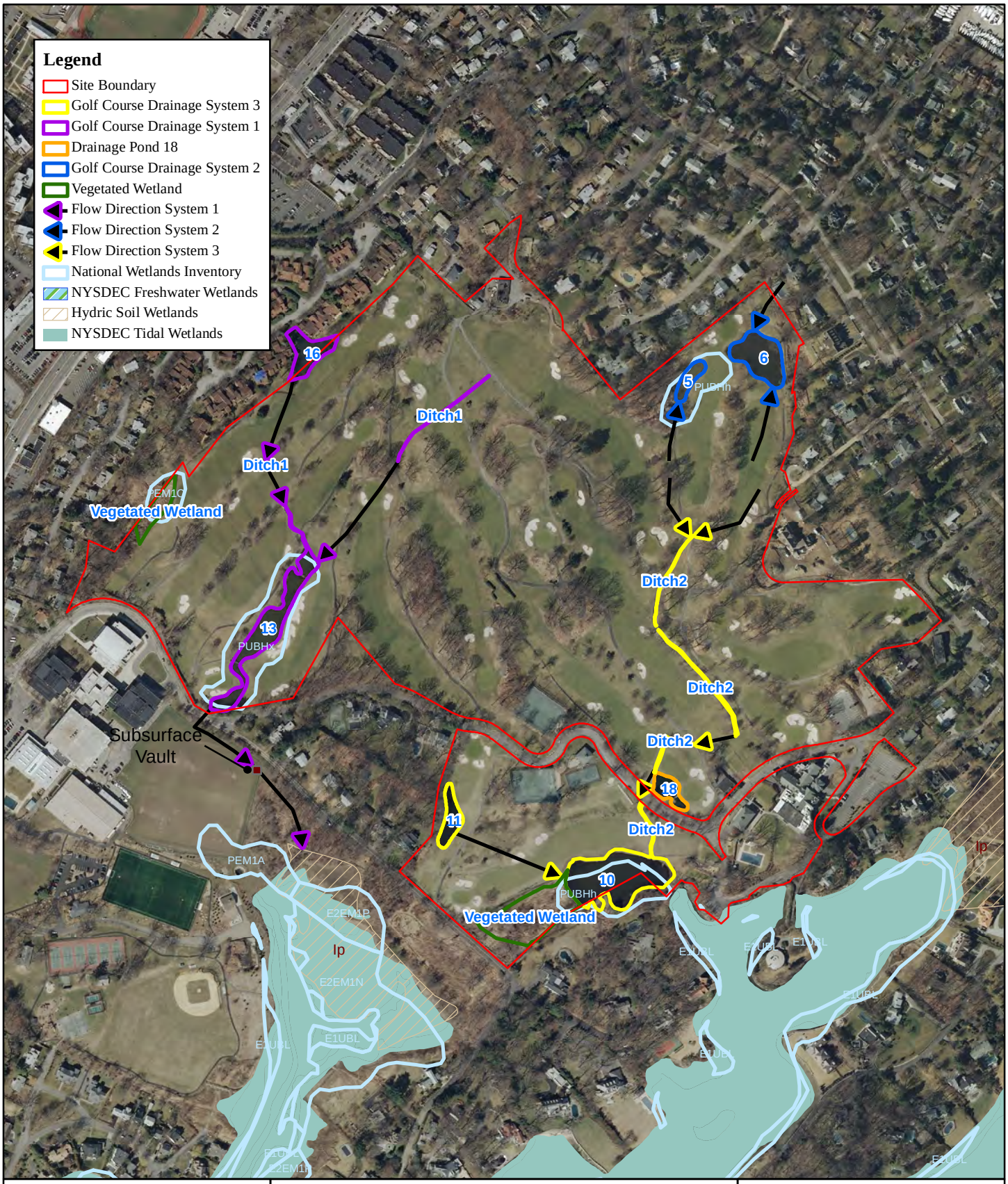
FIGURE 4
REGULATED WETLAND AREAS

Source: NYSGIS Orthophotoimagery Program, 2009
Scale: 1" = 350'

NORTH

Hampshire Country Club, Mamaroneck

Wetland Feasibility Assessment



NELSON, POPE & VOORHIS, LLC
ENVIRONMENTAL • PLANNING • CONSULTING

FIGURE 5
GOLF COURSE DRAINAGE

Source: NYSGIS Orthophotoimagery Program, 2009; NPV GIS Library;
Scale: 1 inch = 500 feet

N

Hampshire Country Club, Mamaronek

Wetland Feasibility Assessment

Attachment E

David Kennedy

Project Scientist

Education

MS, Geosciences, University of Arizona, 2005

BS, Environmental Science, Paul Smith's College, 2003

Training

NYSDEC iMap Invasive Species Training, 2016

Quality Parks Long Island Master Naturalist Program Graduate, 2015

New York State Wetland Forum Phase I Bog Turtle Habitat Assessment Training Course, 2015

Massachusetts Audubon Society Wetland Construction and Restoration Workshop, 2013

Winter Vegetation Identification for Wetland Delineation, Rutgers University, 2012

Summer Vegetation Identification for Wetland Delineation, Rutgers University, 2011

United States Army Corp of Engineers 38 Hour Wetland Delineation Training Program, 2010

Rutgers University Wetland Delineation Training Program, 2007

The Nyanza Project Tropical Lakes Research Program Graduate, Tanzania, East Africa, 2003-2004

OSHA Hazardous Waste Operations and Emergency Response Training, 2006-2014

David is an environmental and wetland scientist who conducts ecological surveys, habitat assessments, species inventories and rare/protected species evaluations. He also performs freshwater and tidal wetland delineations and provides wetland permitting services for clients with federal, state and local government agencies. David also conducts Phase I and Phase II Environmental Site Assessments, oversees environmental remediation projects and designs and oversees soil management plans.

11 years of professional experience

Silo Ridge Resort Community, Ecological and Wetland Services, Amenia, NY

David performed various tasks in association with the construction of the Silo Ridge Resort Community at a 670-acre property located in Dutchess County, NY and comprised of an existing golf course and extensive mountainous, forested, wetland and old field habitats. As part of the State Environmental Quality Review Act (SEQRA) and Town of Amenia review process, David prepared evaluations of the potential project impacts on existing ecological resources, including endangered and threatened species such as northern long-eared bat (*Myotis septentrionalis*), Indiana bat (*Myotis sodalis*) and bog turtle (*Glyptemys muhlenbergii*). As part of this effort, David initiated consultations with the United States Fish and Wildlife Service (USFWS) and prepared a federally-listed species assessment and avoidance/minimization/mitigation plan that was subsequently approved by the USFWS. The plan included preservation of extensive existing habitat, seasonal clearing restrictions, site lighting requirements and a pesticide management plan, as well as the creation of new species habitat and improvements to existing habitat. David further obtained United States Army Corps of Engineers (USACE) and New York State Department of Environmental Conservation (NYSDEC) wetlands permits in for the alteration of existing wetlands and creation of new wetlands, as well as impacts and mitigation measures associated with the construction of a site wastewater treatment plant. David also conducted a comprehensive ecological survey of a 188-acre adjoining parcel being considered for future expansion of the facility. The survey included vegetation and wildlife inventories, habitat identification and assessment, and rare/protected species evaluations. In association with this effort, David conducted vernal pool amphibian surveys and a breeding bird survey at the property. David further delineated multiple acres of wetland habitats at the property, pursuant to USACE and NYSDEC protocols.

Dredging, Bulkhead Replacement and Revetment Construction Project, Tidal Wetland Delineation and Permitting, East Marion, NY

David performed a tidal wetland delineation and ecological survey at an 18-acre former oyster processing facility for a proposed dredging, bulkhead replacement and revetment construction project located on Gardiners Bay in the Town of Southold, NY. David also obtained a Tidal Wetlands Permit from the New York State Department of Environmental Conservation (NYSDEC) and a United States Army Corps of Engineers (USACE) Individual Permit for the project. As part of the federal wetland permitting process, David also prepared and Essential Fish Habitat assessment for the National Oceanographic and Atmospheric Administration (NOAA) and endangered species assessment for the United States Fish and Wildlife Service (USFWS). In association with

the NYSDEC and USACE permitting processes, David designed a wetland mitigation/ smooth cordgrass *(Spartina alterniflora*) planting plan that was approved by both agencies. The plan includes provisions for monitoring and ongoing maintenance of the planted wetland area. Additionally, David prepared a consistency analysis with New York State Department of State (NYSDOS) Coastal Policies, and subsequently received a Coastal Concurrence letter from the NYSDOS. David also prepared a consistency analysis Town of Southold Local Waterfront Revitalization Program (LWRP) Coastal Policies.

Enterprise Park at Calverton (EPCAL), DSGEIS Ecological Assessment and Comprehensive Habitat Protection Plan, Town of Riverhead, NY

David performed an ecological assessment in association with the Draft Supplemental Environmental Impact Statement (DSGEIS) for the proposed development of the 2,323.9-acre Enterprise Park at Calverton (EPCAL) property, which consists of portions of land formerly owned by the United States Department of the Navy (U.S. Navy) and known as the Naval Weapons Industrial Reserve Plant (NWIRP). The site supports extensive wooded wetland and surface water communities, and also includes the largest remaining native grassland habitat on Long Island. The site provides habitat for a number of rare wildlife and plant species, including several NYS-Endangered, -Threatened and Special Concern species. The DSGEIS ecological assessment included habitat characterization, species inventories and rare species assessments. David also performed an evaluation of potential impacts of the proposed action to on-site ecological resources for the DSGEIS and further prepared a comprehensive habitat protection plan (CHPP) for the site for approval by the New York State Department of Environmental Conservation (NYSDEC). The CHHP includes measures to protect and preserve existing habitats for resident wildlife and plant species, including the NYS-Endangered short-eared owl (*Asio flammeus*) and eastern tiger salamander (*Ambystoma tigrinum*) as well as the NYS-Threatened northern harrier (*Circus cyaneus*). The CHPP further provides for the preservation, creation, maintenance and enhancement of 596.4 acres of native grassland habitat as a wildlife preserve for grassland birds and other species.

enXco Solar Generating Facilities, Freshwater Wetlands and Wild, Scenic and Recreational Rivers Permitting, Various Locations, Long Island, NY

David coordinated with the New York State Department of Environmental Conservation (NYSDEC) and obtained NYSDEC Freshwater Wetlands Permits for the construction of solar generating facilities at government-owned properties in the Towns of Islip, Smithtown, and Riverhead, New York. David also obtained NYSDEC Wild, Scenic and Recreational Rivers (WSRR) Permits for the latter two facility locations. The permitting effort also include the approval of mitigation planting plans designed by David.

Proposed Natural Gas Facility, Freshwater Wetland Delineation, Towns of Monroe and Montgomery, NY

David performed a freshwater wetland delineation at a currently undeveloped, 107-acre property that is proposed for development with a natural gas facility. The property supports extensive palustrine, scrub/shrub, emergent, lacustrine and riverine wetland habitats. The delineation was performed over the course of three weeks, according to United States Army Corps of Engineers USACE) and New York State Department of Environmental Conservation (NYSDEC)-required protocols. Prior to the wetland delineation, David coordinated a pre-application meeting with NYSDEC biologists at the

property, in order to determine those portions of the site wetlands that are under NYSDEC jurisdiction and to discuss potential project mitigation measures.

Rosehill Residential Development Project, Breeding Bird Survey, New Castle, NY

As part of an existing ecological conditions analysis for a proposed redevelopment plan, David performed a breeding bird survey on this 96-acre wooded property featuring ridgeline, wooded, old field, riverine, wetland and lacustrine habitats. The breeding bird survey was conducted according to Audubon, NY protocols and in accordance with Town of New Castle requirements. A total of 57 avian species were identified by David at various survey point locations during three separate surveys of the property during the spring migration/breeding season.

NSTAR Right-of-Way, Freshwater Wetland Delineations, Eastern MA

David was a contributing scientist in a delineation of freshwater wetlands along an approximately five-mile section of this utility company right-of-way, for which additional power transmission lines are proposed.

Landmark Colony, Ecological and Wetland Services, Staten Island, NY

David conducted an ecological survey for the preparation of an EAS and supplemental environmental studies for a new senior-age residential community in the Willowbrook area of Staten Island. The project site, which supports both woodland and developed habitats, is a 46-acre parcel owned by the City of New York and located within the New York City (NYC) Farm Colony-Sea View Hospital Historic District. The ecological survey included a habitat assessment, observed/expected vegetation and wildlife species inventories and an evaluation for the presence of rare/protected species and ecological communities. Existing conditions, potential impacts of the proposed project and mitigation measures were also addressed. As part of the NYC Environmental Quality Review (CEQR) of the project, David addressed comments from the NYC Department of Environmental Protection (DEP) and the NYC Department of Parks and Recreation. In addition, David performed a wetland delineation and secured a non-jurisdictional determination from the United States Army Corps of Engineers (USACE) for the project. David further conducted a Phase II Environmental Site Assessment, in order to evaluate the impacts of past site usage on soils and groundwater. The Phase II ESA included a geophysical survey, as well as soil, soil vapor and groundwater sampling and impact assessment.

NYSDOT Accelerated Bridge Program, Freshwater Wetland Permitting, Albany, NY

As part of a $31.3 million Accelerated Bridge Program to rehabilitate bridges in the Capital District and northern New York State, the New York State Department of Transportation designated 13 bridges as below par due to deteriorating bridge decks. Listed on the deficient bridge list, the structures range from 30-foot-long, two-lane bridges in rural environments to a 2,000-foot-long, four-lane bridge in an urban environment. David conducted wetland assessments and delineations, as well as USACE and NYSDEC wetland permitting associated with this bridge rehabilitation project.

St. Vincent's Hospital Property, Freshwater Wetland Delineation, Town of Harrison, NY

David performed a freshwater wetland delineation at this 79-acre hospital campus property, the majority of which is comprised of undeveloped woodlands. The woodland

areas support extensive palustrine, riverine and emergent wetland habitats. The delineation was performed according to United States Army Corps of Engineers USACE) and New York State Department of Environmental Conservation (NYSDEC) wetland delineation protocols.

Heritage at Cutchogue, Existing Conditions, Impact Assessment and Mitigation Plan, Cutchogue, NY

David conducted a comprehensive ecological survey of this undeveloped 46 acre property, which supports woodland, shrubland, and old field habitats. The survey included a habitat assessment, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities. David further prepared an Ecology Resources section for the Draft Environmental Impact Statement (DEIS) for a proposed condominium development. Existing conditions, potential impacts and mitigation measures were addressed.

Sunshine Children's Home and Rehabilitation Center, Wetland Functional Assessment and Mitigation Plan, Ossining, NY

David conducted a wetland functional assessment for three freshwater wetland habitats at this 33 acre, predominantly wooded property, which is the site of a rehabilitation center for sick children. The functional assessment was performed according to the Magee-Hollands method, which examines the functional capacity for each of eight principal wetland functions, based primarily upon field observations and measurements of hydrological, geological and biological characteristics of the wetland, the surrounding watershed and local land uses. David further provided technical assistance and wrote a summary report for a wetland mitigation plan for a proposed facility expansion. The functional assessment and mitigation plan were subsequently approved by the Town of New Castle.

Port Authority of New York and New Jersey Airport Capacity Study, Existing Ecological Conditions Assessment

David performed a comprehensive assessment of existing natural resources at the five Port Authority of New York and New Jersey airport properties (John F. Kennedy, LaGuardia, Newark, Stewart and Teterboro airports. The assessment included a summary of observed and expected flora and fauna, rare/protected species and wetland resources at the five airport properties.

Olivet Redevelopment Project, Freshwater Wetland Delineation and Permitting, Wingdale, NY

In association with a proposed residential development at a currently vacant municipal property, David delineated approximately 15 acres of freshwater wetlands, including palustrine, scrub/shrub, emergent, lacustrine and riverine wetland habitats. The delineation was performed over the course of a week, according to United States Army Corps of Engineers (USACE) and New York State Department of Environmental Conservation (NYSDEC)-required protocols.

Residences at Corporate Park, Existing Ecological Conditions and Impact Assessment and Freshwater Wetland Permitting, Town of Harrison, NY

In association with a proposed residential development at this 10.35 acre property, David conducted an ecological survey of observed and expected flora and fauna, as well as rare/protected species. David summarized the results of the ecological survey

and provided an impact assessment and mitigation analysis of the proposed action in a Draft Environmental Impact Statement (DEIS). Mr. Kennedy further performed a wetland functional assessment and obtained a wetland permit for the project from the Town of Harrison.

Northwoods Property Existing Ecological Conditions Assessment, Manorville, NY

David performed an ecological assessment on this 662-acre wooded property located within the Long Island Central Pine Barrens. The ecological assessment included observed and expected plant and wildlife species inventories, as well as habitat characterization and evaluation. David additionally conducted a rare/protected species survey for several New York State-listed plant and wildlife species known to occur in the vicinity of the property, based upon New York State Natural Heritage Program (NYNHP) records. During field surveys, several of these species were identified on-site. David prepared a report and graphics which details the species locations and the existing habitat conditions. The report further identifies potential threats and mitigation efforts for the identified species.

Proposed Wireless Communications Facility, USFWS Coordination, South Farmingdale, NY

David prepared and submitted a protected species habitat evaluation to the United States Fish and wildlife Service for a proposed wireless communications facility at municipal water district property comprised of developed and undeveloped habitats. The evaluation included an assessment of potential northern long-eared bat (*Myotis septentrionalis*) habitat at the site and a request for concurrence with a proposed no effect determination for this mammal species. The USFWS subsequently issued a concurrence letter indicating that the project could proceed as planned with no further agency consultation or coordination.

Building Renovation Project, Wetland Delineation, Permitting and Mitigation Plan, Brooklyn, NY

In association with the New York State Department of Environmental Conservation (NYSDEC) Tidal Wetlands permitting process for this building renovation project, David delineated wetlands and obtained an NYSDEC Tidal Wetlands Permit. As part of the permitting process, David designed an upland native planting plan for the NYSDEC-regulated adjacent area of English Kills/Newtown Creek. The planting plan, which was approved and permitted by the NYSDEC, includes an appropriate native trees, shrubs and herbaceous plants that were noted by David within the general surrounding area of the project site.

Westchester County Airport Master Plan, Existing Ecological Conditions, Impact and Mitigation Assessment, Westchester County, NY

David performed a review of existing biological and wetland resources at Westchester County Airport, as part of the Westchester County Airport Master Plan. The review included research of government agency records and prior ecological assessments of the site. David further identified and characterized various terrestrial, palustrine and aquatic ecological communities and wildlife species during a field survey of the airport property.

Seaford Union Free School District, Tidal Wetland Permitting/Mitigation and Ecological Survey, Seaford, NY

David obtained tidal wetland permits from the New York State Department of Environmental Conservation (NYSDEC) and the United States Army Corps of Engineers (USACE) for the construction of an access driveway on an undeveloped parcel adjacent to the Seaford Harbor School. As part of this effort, David prepared a wetland mitigation and planting plan a mitigation for filling within portions of a tidal wetland habitat at the property. The mitigation plan, which was approved by the USACE and NYSDEC, included creation and planting of new tidal wetland habitat. David also conducted an ecological survey and prepared an ecology resources report for the subject property. The survey included an assessment of existing wooded and wetland habitats, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities. Potential impacts of the proposed action and wetland mitigation measures were also addressed.

LaGuardia Airport Runway Area Safety Enhancements, Ecological Assessment and Impact Analysis, Queens, NY

David served as a project scientist for preparation of an Environmental Assessment for the construction of runway safety area improvements at LaGuardia Airport in accordance with NEPA and SEQRA requirements. The Environmental Assessment addressed the airport's unique environmental conditions along the Flushing Bay and Bowery Bay waterfronts in Queens. David performed an assessment of existing terrestrial ecological resources, including an inventory of observed and expected flora and fauna and an assessment of rare species and habitats, as well as an impact analysis on these natural resources.

Verizon Wireless Communications Site, Tidal Wetland Permitting and Phase I ESA, Captree Island, NY

David performed a wetland delineation and obtained a tidal wetland permit from the New York State Department of Environmental Conservation for the construction of a wireless communications facility located within and adjacent to regulated tidal wetlands. The permit included the approval of a wetland mitigation/planting plan designed by David. David further secured permit amendments from the New York State Department of Environmental Conservation in response to project design changes by the site engineer. Additionally, David completed a Phase I ESA of the site.

Proposed Solar Energy Generation Facility, Ecological Survey and Wetland Permitting, Calverton, NY

David conducted an ecological survey of this 45-acre site, which supports agricultural, woodland and wetland/aquatic habitats. The ecological survey included a habitat assessment, observed/expected vegetation and wildlife species inventories and an evaluation for the presence of rare/protected species and ecological communities. David further performed a wetland delineation at the site and secured a Determination of Non-Jurisdiction from the New York State Department of Environmental Conservation for a proposed solar power generating facility at the site. Additionally, David conducted a Phase I Environmental Site Assessment of the property, which included an evaluation of recognized environmental conditions and recommendations for further evaluation and remedial action.

City of White Plains, Existing Ecological Conditions and Impact Assessment and Open Space Study DGEIS, Westchester County, NY

As part of Draft Generic Environmental Impact Statement (DGEIS) to evaluate the potential impacts of the adoption of a new open space zoning classification within the City of White Plains, David performed an analysis of existing natural resources at five golf course properties. The analysis included field assessments and research of local, state and federal government agency records pertaining to wildlife, vegetation, protected species/habitats, wetlands and water resources at the five properties. David further performed an impact assessment of the proposed action and alternatives on the aforementioned resources.

Commercial Development Project, Wetland Mitigation, Riverhead, NY

As mitigation for the filling of an isolated freshwater wetland habitat, David designed a freshwater wetland restoration and planting plan in association with a proposed commercial development at an undeveloped property in Riverhead, NY. The plan, which was reviewed and approved by the Town of Riverhead, NY, included restoration of the original site hydrology, planting of native wetland trees, shrubs and herbaceous plants and provisions for monitoring and ongoing maintenance of the wetland habitat.

Arthur Kill Correctional Facility Redevelopment EAS, Existing Ecological Conditions, Impact and Mitigation Analysis, Staten Island, NY

David conducted an ecological survey for the preparation of an EAS and supplemental environmental studies for the redevelopment of this former prison facility. The 69-acre project site, which supports forested, early successional, tidal wetland, freshwater wetland and developed habitats. The ecological survey included a terrestrial and wetland habitat assessment, observed/expected vegetation and wildlife species inventories and an evaluation for the presence of rare/protected species and ecological communities. Existing conditions, potential impacts, and mitigation measures were also addressed.

Cold Spring Harbor Laboratory Waterfront Project, Tidal Wetland Delineation Mitigation and Permitting, Cold Spring Harbor, NY

David conducted a tidal wetland assessment for the proposed redevelopment of a waterfront property on the campus of Cold Spring Harbor Laboratory in the Village of Laurel Hollow, NY. David further delineated on-site wetlands, designed a wetland mitigation planting plan and obtained a tidal wetland permit from the New York State Department of Environmental Conservation (NYSDEC) for the project.

Country Pointe Development, Existing Conditions, Impact Assessment and Mitigation Plan, Plainview, NY

David conducted a comprehensive ecological survey of this 143 acre property, which supports woodland, meadow, landscaped and developed habitats. The survey included a habitat assessment, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities. David further prepared an Ecology Resources section for the Draft Environmental Impact Statement (DEIS) for this proposed residential development. Existing conditions, potential impacts and mitigation measures were addressed. David additionally addressed public and government agency comments in Final Environmental Impact Statement (FEIS) for the proposed project. As a result of a challenge to the findings of the FEIS filed in New York State

Supreme Court, David prepared a 30 page affidavit defending the methods and findings of the ecological survey. The challenge was subsequently dismissed by the court in December 2015.

Proposed Solar Energy Generation Facility, Ecological Survey and Wetland Delineation/Permitting, Calverton, NY
David conducted an ecological survey of this 45-acre site, which supports agricultural, woodland and wetland/aquatic habitats. The ecological survey included a habitat assessment, observed/expected vegetation and wildlife species inventories and an evaluation for the presence of rare/protected species and ecological communities. David further performed a wetland delineation at the site and secured a Determination of Non-Jurisdiction from the New York State Department of Environmental Conservation for a proposed solar power generating facility at the site. Additionally, David conducted a Phase I Environmental Site Assessment of the property, which included an evaluation of recognized environmental conditions and recommendations for further evaluation and remedial action.

Woodbury Crossing Commercial Development, Ecological Survey and USFWS Coordination, Plainview, NY
David prepared and submitted a protected species habitat evaluation to the United States Fish and wildlife Service for a proposed commercial development at a property consisting of an existing commercial use and undeveloped, wooded habitats. The evaluation included an assessment of potential northern long-eared bat (*Myotis septentrionalis*) habitat at the site and a request for concurrence with a proposed no effect determination for this mammal species. The USFWS subsequently issued a concurrence letter indicating that the project could proceed as planned with no further agency consultation or coordination. David further performed and ecological survey and impact assessment of the proposed project.

Town of Islip Landfill Site Investigation, Freshwater Wetland Delineation/Permitting and Ecological Survey, Bay Shore, NY
David performed a comprehensive Phase II Environmental Site Assessment of this 24 acre inactive municipal landfill, incinerator and sewage treatment facility, which is proposed for commercial redevelopment. The investigation included soil vapor monitoring, surficial soil sampling, test pit excavation and groundwater monitoring well installation. David also conducted a freshwater wetland delineation and assisted with securing a New York State Department of Environmental Conservation freshwater wetlands permit for the Phase II investigation. He designed and oversaw the site restoration and mitigation plan following completion of the investigation. David further conducted an ecological survey of the site which included a habitat assessment, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities.

Proposed Commercial Development, Rare/Protected Species Survey and USFWS Concurrence Request, Smithtown, NY
David performed an evaluation for the potential presence of federal and NYS protected species and communities at a 20-acre property that currently supports undeveloped woodlands and commercial/industrial operations. The assessment included a field survey for the NYS-Endangered plant slender crabgrass (*Digitaria filiformis*), which was identified in New York Natural Heritage Program (NYNHP) records for the site and

vicinity. David further conducted a northern long-eared bat (*Myotis septentrionalis*) habitat evaluation and prepared a project review and no-effects concurrence request for United States Fish and Wildlife Service (USFWS) review.

Ronkonkoma Hub Transit-Oriented Development, Existing Ecological Conditions, Impact and Mitigation Assessment, Ronkonkoma, NY
David conducted an ecological survey of this 54 acre property. The survey included an assessment of both developed and undeveloped habitats, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities. David further prepared an Ecology Resources section for the Draft Generic Environmental Impact Statement for this proposed mixed use development. Existing conditions, potential impacts and mitigation measures were addressed.

Arboretum DEIS, Ecological Survey and Impact Assessment, Farmingville, NY
David conducted an ecological survey for the preparation of a Draft Environmental Impact Statement (DEIS) on this 65-acre property. The project site, which currently supports old field, shrubland, woodland, agricultural and developed habitats, is proposed for construction of a mixed-use development. The ecological survey included a habitat assessment, observed/expected vegetation and wildlife species inventories and an evaluation for the presence of rare/protected species and ecological communities. Existing conditions, potential impacts, and mitigation measures were also addressed.

East Hampton Airport Construction Project, Existing Ecological Conditions and Impact Assessment, Town of East Hampton, Suffolk County, New York
As part of an environmental assessment for a proposed seasonal air traffic control tower construction project, David performed field surveys and researched government agency records pertaining to flora, fauna, endangered/threatened species, wetlands, water resources, coastal resources, floodplains and farmlands. David further prepared an assessment of existing conditions and expected impacts of the proposed action on the aforementioned resources.

Costco Environmental Site Assessments, Wetland and Ecological Services, Town of Islip Landfill Site Investigation, Bay Shore, NY
David performed a comprehensive Phase II Environmental Site Assessment of this 24 acre inactive municipal landfill, incinerator and sewage treatment facility, which is proposed for commercial redevelopment. The investigation included soil vapor monitoring, surficial soil sampling, test pit excavation and groundwater monitoring well installation. David also conducted a freshwater wetland delineation and assisted with securing a New York State Department of Environmental Conservation freshwater wetlands permit for the Phase II investigation. He designed and oversaw the site restoration and mitigation plan following completion of the investigation. David further conducted an ecological survey of the site which included a habitat assessment, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities.

Avalon at Huntington Station, Existing Ecological Conditions, Impacts and Mitigation Assessment, Huntington, NY
David conducted an ecological survey of this 27 acre undeveloped property, which is proposed for a residential subdivision. The survey included a habitat assessment, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities. David further prepared an Ecology Resources

section for the Draft Environmental Impact Statement for the proposed action. Existing conditions, potential impacts and mitigation measures were addressed.

Brookhaven Town Drainage Project, Freshwater and Tidal Wetland Permitting, Stony Brook, NY
David secured tidal and freshwater permits from the New York State Department of Environmental Conservation and the United States Army Corps of Engineers for the Town of Brookhaven for this highway drainage improvement project.

Brookhaven Village Square, Existing Ecological Conditions, Impact and Mitigation Assessment, Blumenfeld Development Group, Bellport, NY
David conducted an ecological survey of this 58 acre wooded property. The survey included a habitat assessment, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities. David further prepared an Ecology Resources section for the Expanded Environmental Assessment Form for this proposed commercial/industrial development. Existing conditions, potential impacts and mitigation measures were addressed.

Center Square Development (Zoumas Property) Existing Ecological Conditions, and Impact Assessment, Wading River, NY
David conducted an endangered/threatened species survey of this 18 acre fallow agricultural property, which is proposed for a mixed use commercial development and open space preservation. The survey included a habitat assessment, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities. David prepared a summary report which included conclusions and recommendations regarding the potential impacts of the proposed action.

Avalon at Great Neck Residential Development, Phase 1 and Phase 2 Environmental Site Assessments, Tidal Wetland Permitting, Great Neck, NY
David conducted Phase I and Phase II Environmental Site Assessments in order to assess impacts to soil and groundwater due to historic site usage at this marine terminal and major oil storage facility, which is proposed for residential redevelopment. The investigation included surficial and sub-surface soil sampling, groundwater monitoring well installation and sampling and an analysis of tidal influence on water table elevation beneath the site. David also conducted a wetland investigation and prepared a New York State Department of Environmental Conservation tidal wetland permit application package for the proposed residential redevelopment. David further provided technical support in the design of a wetland mitigation and restoration plan for the site

Proposed Wireless Communications Facility, Tidal Wetland Delineation and Permitting, West Gilgo Beach, NY
David performed tidal wetland delineations and permitting at two proposed locations for this public utility wireless communications facility.

Islip Pines Development, Existing Ecological Conditions, Impact and Mitigation Assessment, Holbrook, NY
David conducted an ecological survey of this 135 acre wooded property. The survey included a habitat assessment, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities. David further prepared an Ecology Resources section for the Draft Environmental Impact Statement

for this proposed residential development. Existing conditions, potential impacts and mitigation measures were addressed.

LA Fitness, Freshwater Wetland Permitting Patchogue, NY
David performed wetland delineation and secured New York State Department of Environmental Conservation and Town of Brookhaven freshwater wetlands permits for the construction of a health club facility on this eight-acre wooded property. Preparation of a Town of Brookhaven Part 1 Environmental Assessment Form (EAF) for the proposed construction of a health club facility on this undeveloped property, which contains woodlands, a creek and freshwater wetlands.

Lowes Home Centers, Inc., Ecological Survey and Wetland Permitting, Commack, NY
David conducted an ecological survey of this 22 acre property as part of a retail home improvement center development project. The ecological assessment included wetland evaluation of a federally-regulated recharge basin located at the site. David further obtained a United States Army Corps of Engineers (USAC) Nationwide Permit for disturbance/expansion to the recharge basin. As part of this permitting effort, David designed a wetland mitigation/planting plan and coordinated with the New York State Department of Environmental Conservation (NYSDEC) to obtain a Water Quality Certificate, as required by the USACE. David also conducted Phase I and Phase II Environmental Site Assessments of the property, which included surficial and subsurface soil sampling, and bottom sediment sampling of underground injection control structures.

Proposed Wireless Communications Facility, Freshwater Wetland Delineation and Permitting, Islip, NY
David conducted freshwater wetland delineation and obtained a New York State Department of Environmental Conservation freshwater wetlands permit for this wireless communications facility site.

Highway Improvement Project, Freshwater and Tidal Wetlands Permitting, Incorporated Village of Lloyd Harbor, NY
David coordinated with the New York State Department of Environmental Conservation (NYSDEC) to secure freshwater and tidal wetlands permits for a traffic safety improvement project along six miles of public roadways within the Incorporated Village of Lloyd Harbor.

Silver Oak Stables, Freshwater Wetlands Permitting and Ecological Survey, Nissequogue, NY
David obtained a freshwater wetlands permit the New York State Department of Environmental for an extensive demolition and construction project at this 35 acre equestrian center and boarding facility. David also conducted an ecological survey and prepared an ecology resources report for the subject property. The survey included an assessment of existing meadow and wetland habitats, vegetation and wildlife species inventories and an evaluation for the presence of rare species and ecological communities. Potential impacts of the proposed action and wetland mitigation measures were also addressed in the report.

Solar Energy Generation Facility, Existing Ecological Conditions Assessment Southold, NY
David conducted an ecological survey of this 21 acre site, which supports agricultural, successional, woodland and wetland/aquatic habitats. The ecological survey included a habitat assessment, observed/expected vegetation and wildlife species inventories and an evaluation for the presence of rare/protected species and ecological communities. David further conducted a Phase I Environmental Site Inspection of the property, to identify and assess existing environmental concerns for future redevelopment.

Vintage Vines Development, Existing Ecological Conditions, Impact and Mitigation Assessment, Bridgehampton, NY
David performed an ecological assessment and tiger salamander survey for a proposed residential development on this 49 acre undeveloped property. He subsequently wrote the Ecology Resources section for the Draft Environmental Impact Statement, in which existing ecological conditions, potential impacts and mitigation measures were addressed. David also responded to public comments in the Final Environmental Impact Statement for the proposed action.

Prior Positions

Hydrogeologist, R&C Formation
Prior to VHB, David performed groundwater monitoring and evaluation activities at federal, state and local government sites, including the United States Department of Energy's Brookhaven National Laboratory facility.

Fish and Wildlife Technician, New York State Department of Environmental Conservation
Prior to VHB, David conducted biological assessments, population surveys, water quality evaluations and fish stocking of various local waters for the New York State Department of Environmental Conservation. David also participated in endangered species surveys, invasive species remediation projects, environmental education workshops and public outreach events.

Visiting Scientist Position, The Nyanza Project, Tanzania, East Africa
Prior to VHB, David performed multi-disciplinary scientific research activities as a student (2003) and visiting scientist/teaching assistant (2004) with The Nyanza Project, an international tropical lakes research program held annually at Lake Tanganyika, Tanzania, East Africa.

Publications

Eggermont, H., Kennedy, D., Hasiotis, S.T., Verschuren D. & Cohen, A. 2008. Distribution of living larval Chironomidae (Insecta: Diptera) along a depth transect at Kigoma Bay, Lake Tanganyika: implications for palaeoenvironmental reconstruction. African Entomology 16(2): 162-184.