



WATKINS GLEN SOLAR ENERGY CENTER

Case No. 17-F-0595

Wetland Functions and Values Assessment

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1.0 INTRODUCTION AND PURPOSE

This assessment report has been prepared by TRC on behalf of Watkins Glen Solar Energy Center, LLC (a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC). The report provides a functional assessment of the freshwater wetland resources that may or may not be impacted by construction and/or operation of a proposed solar-powered wholesale energy-generating facility with associated infrastructure located in the Town of Dix, Schuyler County, New York (Project).

Wetlands that are deemed Waters of the United States are regulated by the United States Army Corps of Engineers (USACE) under the Clean Water Act of 1972 (Section 404, CWA). Originating in 1987, *The Highway Methodology Workbook* (the Workbook), was created by the USACE New England District to integrate highway planning, design, and development with the requirements of USACE permit regulations, the National Environmental Policy Act (NEPA), and the Federal Highway Administration (FHWA) funding approvals (USACE, 1993). A memorandum of agreement between the Environmental Protection Agency (EPA) and USACE, dated February 7, 1990, was appended to the Workbook, recognizing a stepwise process of avoidance, minimization, and compensation of adverse impacts to an established set of wetland functions and values. Subsequently, *Wetlands Functions and Values: A Descriptive Approach*, was created by the USACE New England District as a supplement to the Workbook (the Supplement). Within the Supplement, a “Descriptive Approach” is presented as a method that any project, outside the scope of highway development, could adopt to characterize wetland resources necessary for Section 404 permit requirements.

Efforts to utilize best professional judgment to interpret functions and values are often unorganized, unpredictable, and legally difficult to defend and document (USACE, 1999). In response, the USACE developed a format in the Supplement to collect and display this information, and to describe the functions and values assessment of wetlands from a measurable and unbiased perspective.

In contrast, New York State does not yet have its own wetland functional assessment methodology. Nor does the State endorse any specific methodology. However, a survey of New York State Department of Environmental Conservation (NYSDEC) wetland biologists reveals the USACE Highway Methodology to be the most commonly used wetland functional assessment

technique for projects requiring NYSDEC permits (Bliss, 2016). Importantly, the functions and values reviewed by the Supplement are compatible with the wetland benefits outlined in the Environmental Conservation Law (ECL) at Article 24, the Freshwater Wetlands Act. For these reasons, TRC elects to utilize elements of the USACE Highway Methodology outlined in the Supplement as a means of providing a wetlands functions and values assessment.

Watkins Glen Solar Energy Center, LLC hired TRC to survey, identify, and document all wetlands within the Project Area. TRC delineated 682 acres of leased private lands within the Project Area. TRC delineated 34 freshwater wetlands within the Project Area, totaling approximately 20.71 wetland acres. This Functions and Values Assessment is intended to aid in determining the wetland functions and values that may be impacted and/or altered by the Project's construction and operation.

The functions and values of wetlands are the roles that a wetland provides to its surrounding environment, often to the benefit of human society. Functions and values are a result of specific biological, chemical, and physical characteristics within the wetland, and many complex relationships between the wetland and its watershed, local environment, and inhabitants and dependents, including the public. The wetland functions and values assessment is used to document wetland features based on their presence and level of significance relative to providing these many services. Doing so helps to ensure that wetlands receive proper protection through well-planned wetland impact avoidance, minimization, and mitigation.

The 13 functions and values that are considered by the USACE Supplement are described below in Sections 3.0 and 4.0. The list includes eight functions and five values. As noted above, these functions and values equate well to the benefits of concern within the applicable New York State ECL. These functions and values, together with the working suite of USACE Supplement descriptors, have been used to provide an objective representation of the wetland resources associated with the Project.

2.0 ASSESSMENT METHODOLOGY

This wetland functions and values assessment was conducted in accordance with the *Wetlands Functions and Values: A Descriptive Approach*, described in the supplement to *The Highway Methodology Workbook* (the Supplement) by the New England Division of the USACE (1999). This method incorporates wetland science and best professional judgement in data collection toward a qualitative description of the physical and biological characteristics of the wetlands. In

so doing, it identifies the functions and values exhibited, and very importantly, the basis for associated conclusions. The approach addresses the limitations of wetland assessments based on numerical weightings, rankings, and/or averaging of dissimilar wetland functions (USACE 1999). As part of this method, the evaluator accounted for many predetermined “Qualifiers” that are utilized as indicators or descriptors of specific functions and values. Based on the descriptions outlined in this Supplement, TRC developed a spreadsheet that displays several of these qualifiers. When attributed to a wetland, these qualifiers help to identify the functions and values thought to be provided by the wetland. This data was tabulated and titled as the Qualifier Assignment Table (Table 1). Considerations included observed vegetation conditions, hydrologic conditions, size, adjacent area conditions, and the availability of public access, among several other documented characteristics strategically defined to allow each wetland’s functions and values to be evaluated.

Functions and values were evaluated for all wetlands that were observed in 2017 and 2019 during the growing seasons. Data on qualifiers of functions and values were documented at each wetland where vegetation, soils, hydrological data, location, and geographic nature were also collected as part of a formal delineation. All 34 wetlands delineated within the Project Area were entered in the spreadsheet together with the various wetland qualifiers identified at each wetland. Based on the entered data, cross-referenced to the predetermined Qualifier Assignment Table (Table 2), the functions and values provided by each wetland were determined.

Wetlands functions and values recognized under Article 24 of the ECL and Regulations are similar to those described by the Supplement:

1. Flood and storm control by the hydrologic absorption and storage capacity of freshwater wetlands;
2. Wildlife habitat by providing breeding, nesting, and feeding grounds and cover for many forms of wildlife, wildfowl, and shorebirds, including migratory wildfowl and species such as the bald eagle and osprey;
3. Protection of subsurface water resources and provision for valuable watersheds and recharging groundwater supplies;
4. Recreation by providing areas for hunting, fishing, boating, hiking, bird watching, photography, camping, and other uses;

5. Pollution treatment by serving as biological and chemical oxidation basins;
6. Erosion control by serving as sedimentation areas and filtering basins, absorbing silt and organic matter, and protecting channels and harbors;
7. Education and scientific research by providing readily accessible outdoor bio-physical laboratories, living classrooms, and vast training and education resources;
8. Open space and aesthetic appreciation by providing often the only remaining open areas along crowded river fronts and coastal Great Lakes regions; and
9. Sources of nutrients in freshwater food cycles and nursery grounds and sanctuaries for freshwater fish.

The Freshwater Wetlands Act (Article 24 of the ECL) gives the NYSDEC jurisdiction over state-protected wetlands and adjacent areas (typically a 100-foot upland buffer). The Freshwater Wetlands Act requires the NYSDEC to map all state-protected wetlands to allow landowners and other interested parties a means of determining where state-jurisdictional wetlands exist. To implement the Freshwater Wetlands Act, regulations were promulgated by the State under 6 New York Codes, Rules and Regulations Parts 663 and 664. Part 664 of the regulations designates wetlands into four class ratings, with Class I being the highest or best quality wetland and Class IV being the lowest. There are no NYSDEC-mapped wetlands within the Project Area.

3.0 WETLAND FUNCTIONS

Wetland functions are the properties or processes of a wetland ecosystem that aid in promoting a homeostatic natural environment. A wetland's functions result from both organic and inorganic components including physical, geologic, hydrologic, chemical, and biological systems. These components include all processes necessary for the self-maintenance of the wetland ecosystem. Wetland functions relate to the ecological significance of wetland properties without regard to subjective human values. The eight functions attributed to wetlands by the Supplement are defined as follows:

- 1. Flood-flow Alteration** - The effectiveness of the wetland to reduce flood damage by containing and desynchronizing floodwaters for an extended period following heavy precipitation and runoff events.

2. **Groundwater Recharge/Discharge** - The potential for a wetland to act as a source of groundwater recharge and/or discharge. Recharge describes the potential for the wetland to contribute water to an underlying aquifer. Discharge relates to the potential for the wetland to act as a source of groundwater transfer to the surface (i.e., springs and hillside seeps).
3. **Sediment/Pollutant Retention** - The ability to reduce or prevent the degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens based off its geomorphic position, connectivity, soil thickness, and other physical characteristics.
4. **Fish and Shellfish Habitat** - The ability to contain or influence suitable habitats for fish and shellfish.
5. **Sediment/Shoreline Stabilization** - The ability to effectively stabilize streambanks and shorelines against erosion.
6. **Production (Nutrient) Export** - The ability to produce food or usable products for all organisms, including humans.
7. **Nutrient Removal/Retention/Transformation** - The ability to prevent excess nutrients from entering aquifers or surface waters by trapping nutrients in runoff water from surrounding uplands or contiguous wetlands, and by processing these nutrients into other forms or trophic levels.
8. **Wildlife Habitat** - The effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and their periphery. Resident and migrating species are considered along with the potential for any state or federally listed species occurring within the target wetland.

4.0 WETLAND VALUES

Values are the societal benefits resulting from one or more of the functions and the physical characteristics associated with a wetland. Most wetlands have a corresponding public value to an assessable degree. The value of a wetland function, or combination of functions, is based on the worth, merit, or importance to society of the various functions it provides. The five values defined

by the Supplement and adopted for use in this assessment, including short descriptions defining each value, are documented below.

1. **Recreation** - The effectiveness of the wetland to provide or assist in the establishment of recreational opportunities such as boating, fishing, hunting, and other leisurely pursuits. Recreation in this capacity includes both consumptive and non-consumptive activities. Unlike non-consumptive activities, consumptive activities consume or diminish the plants, animals, or other resources that are naturally located in or dependent upon the wetland.
2. **Education/Scientific Value** - The effectiveness of the wetland as a site for public education or as a location for scientific research.
3. **Uniqueness/Heritage** - The ability to contain or demonstrate a singular or rare quality. Such qualities may include the presence of archaeological sites; an unusual aesthetic quality; historical events that took place at the wetland; or unique plants, animals, or geologic features located within or supported by the wetland.
4. **Visual Quality/Aesthetics** - The ability to provide pleasing or unique visual and aesthetic qualities.
5. **Threatened or Endangered Species Habitat** - The effectiveness of the wetland to specifically support threatened or endangered species.

5.0 RESULTS

The assignment of qualifiers, which when attributed to a given wetland, and in some instances combined with other qualifiers, identified the primary functions and values thought to be provided by the wetlands identified within the Project Area (Table 1). The primary functions and values of each delineated wetland were based on observed qualifiers (Table 2).

Table 1. Qualifier Assignment Table

Qualifiers	Wetland Functions								Wetland Values				
	Groundwater Recharge or Discharge	Flood Flow Alteration	Fish or Shellfish Habitat	Sediment, Toxicant, Pathogen Retention	Nutrient Removal, Retention, Transformation	Production Export	Sediment, Shoreline Stabilization	Wildlife Habitat	Recreation	Educational or Scientific Value	Uniqueness and Heritage	Visual Quality and Aesthetics	Threatened or Endangered Species Habitat
Associated with Watercourse	X	X	X	X	X	X	X	X	X	X	X	X	
Signs of Springs/Seeps	X										X		
Concave Landform or Gentle Gradient		X		X	X								
Deep Surface Soil Layer (16"+)		X		X	X	X							
Dense Vegetative Coverage		X		X	X	X		X					
Sizeable Wetland		X			X	X			X	X	X	X	
Deep Open Water Area	X	X	X	X	X	X		X			X	X	
Fish/Shellfish Present			X			X		X				X	
Ecologically Rich					X	X		X	X	X	X		
Fine-grained or Organic Soils Present	X	X		X	X								
No to Low Wetland Fragmentation						X		X			X		
Publicly Accessible									X	X		X	
Threatened/Endangered Present or Habitat Present						X		X		X	X		X
Multiple Cover Types					X	X		X	X		X	X	

Table 2. Functions and Values of Delineated Wetlands

Wetland Name	Associated with Watercourse	Signs of Springs/ Seeps	Concave Landform or Gentle Gradient	Deep Surface Soil Layer (16"+)	Vegetative Cover Density (High, Medium, Low)	Wetland Size (Small, Medium, Large)	Deep Open Water Area (3'+)	Fish or Shellfish Present in Associated Stream	Ecologically Rich	Fine-grained or Organic Soils Present	Wetland Fragmentation (High, Medium, Low)	Publicly Accessible	Threatened or Endangered Species Present or Habitat Present	Multiple Covertypes	Rare Unique Features	Attributed Functions and Values
W-DL-1	Yes	No	Yes	No	Medium	Medium	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-DL-2	No	No	Yes	Yes	Medium	Medium	No	No	No	Yes	Medium	No	No	Yes	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Wildlife Habitat.
W-DL-3	No	No	Yes	No	Low	Medium	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Wildlife Habitat.
W-DL-4	Yes	No	Yes	No	Low	Small	No	No	No	Yes	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration;

Wetland Name	Associated with Watercourse	Signs of Springs/ Seeps	Concave Landform or Gentle Gradient	Deep Surface Soil Layer (16"+)	Vegetative Cover Density (High, Medium, Low)	Wetland Size (Small, Medium, Large)	Deep Open Water Area (3'+)	Fish or Shellfish Present in Associated Stream	Ecologically Rich	Fine-grained or Organic Soils Present	Wetland Fragmentation (High, Medium, Low)	Publicly Accessible	Threatened or Endangered Species Present or Habitat Present	Multiple Covertypes	Rare Unique Features	Attributed Functions and Values
																Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-DL-5	Yes	No	Yes	Yes	Low	Small	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-TC-1	No	No	Yes	Yes	Medium	Medium	No	No	No	Yes	High	No	No	Yes	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Wildlife Habitat.
W-TC-2	Yes	Yes	Yes	Yes	Low	Small	No	No	No	Yes	Low	No	No	Yes	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline

Wetland Name	Associated with Watercourse	Signs of Springs/ Seeps	Concave Landform or Gentle Gradient	Deep Surface Soil Layer (16"+)	Vegetative Cover Density (High, Medium, Low)	Wetland Size (Small, Medium, Large)	Deep Open Water Area (3'+)	Fish or Shellfish Present in Associated Stream	Ecologically Rich	Fine-grained or Organic Soils Present	Wetland Fragmentation (High, Medium, Low)	Publicly Accessible	Threatened or Endangered Species Present or Habitat Present	Multiple Covertypes	Rare Unique Features	Attributed Functions and Values
																Stabilization; Wildlife Habitat.
W-TC-3	No	No	Yes	No	Low	Small	Yes	No	No	No	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Wildlife Habitat.
W-TC-4	No	No	Yes	No	Low	Small	Yes	No	No	No	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Wildlife Habitat.
W-TC-5	No	No	Yes	Yes	Low	Small	No	No	No	Yes	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export.
W-TC-6	Yes	No	Yes	Yes	Medium	Medium	No	No	No	Yes	Medium	No	No	Yes	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.

Wetland Name	Associated with Watercourse	Signs of Springs/ Seeps	Concave Landform or Gentle Gradient	Deep Surface Soil Layer (16"+)	Vegetative Cover Density (High, Medium, Low)	Wetland Size (Small, Medium, Large)	Deep Open Water Area (3'+)	Fish or Shellfish Present in Associated Stream	Ecologically Rich	Fine-grained or Organic Soils Present	Wetland Fragmentation (High, Medium, Low)	Publicly Accessible	Threatened or Endangered Species Present or Habitat Present	Multiple Covertypes	Rare Unique Features	Attributed Functions and Values
W-TC-7	No	No	Yes	Yes	Low	Small	No	No	No	Yes	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export.
W-TC-8	No	No	Yes	Yes	Low	Small	No	No	No	Yes	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export.
W-TC-9	No	No	Yes	Yes	Medium	Small	No	No	No	Yes	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export.
W-TC-10	No	No	Yes	Yes	Low	Small	No	No	No	Yes	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export.
W-TC-11	No	No	Yes	Yes	Low	Small	No	Yes	No	Yes	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention,

Wetland Name	Associated with Watercourse	Signs of Springs/ Seeps	Concave Landform or Gentle Gradient	Deep Surface Soil Layer (16"+)	Vegetative Cover Density (High, Medium, Low)	Wetland Size (Small, Medium, Large)	Deep Open Water Area (3'+)	Fish or Shellfish Present in Associated Stream	Ecologically Rich	Fine-grained or Organic Soils Present	Wetland Fragmentation (High, Medium, Low)	Publicly Accessible	Threatened or Endangered Species Present or Habitat Present	Multiple Covertypes	Rare Unique Features	Attributed Functions and Values
																Transformation; Production Export.
W-TC-12	No	No	Yes	No	High	Small	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Wildlife Habitat.
W-TC-13	No	No	Yes	Yes	Low	Small	Yes	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export.
W-JJB-1	Yes	No	Yes	No	Medium	Small	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-JJB-2	Yes	No	Yes	No	Medium	Small	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention,

Wetland Name	Associated with Watercourse	Signs of Springs/ Seeps	Concave Landform or Gentle Gradient	Deep Surface Soil Layer (16"+)	Vegetative Cover Density (High, Medium, Low)	Wetland Size (Small, Medium, Large)	Deep Open Water Area (3'+)	Fish or Shellfish Present in Associated Stream	Ecologically Rich	Fine-grained or Organic Soils Present	Wetland Fragmentation (High, Medium, Low)	Publicly Accessible	Threatened or Endangered Species Present or Habitat Present	Multiple Covertypes	Rare Unique Features	Attributed Functions and Values
																Transformation; Production Export.
W-JJB-3	Yes	No	Yes	No	High	Large	No	No	No	Yes	Low	No	No	Yes	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-JJB-4	Yes	No	Yes	No	Medium	Small	No	No	No	Yes	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-JJB-5	No	No	Yes	No	Low	Small	No	No	No	Yes	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation.

Wetland Name	Associated with Watercourse	Signs of Springs/ Seeps	Concave Landform or Gentle Gradient	Deep Surface Soil Layer (16"+)	Vegetative Cover Density (High, Medium, Low)	Wetland Size (Small, Medium, Large)	Deep Open Water Area (3'+)	Fish or Shellfish Present in Associated Stream	Ecologically Rich	Fine-grained or Organic Soils Present	Wetland Fragmentation (High, Medium, Low)	Publicly Accessible	Threatened or Endangered Species Present or Habitat Present	Multiple Covertypes	Rare Unique Features	Attributed Functions and Values
W-JJB-6	No	No	Yes	Yes	Low	Small	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; F; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export.
W-JJB-7	Yes	No	Yes	No	Medium	Medium	No	No	No	Yes	High	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-JJB-8	Yes	No	Yes	Yes	Low	Small	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-JJB-9	No	No	Yes	No	Low	Small	Yes	No	No	No	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation.

Wetland Name	Associated with Watercourse	Signs of Springs/ Seeps	Concave Landform or Gentle Gradient	Deep Surface Soil Layer (16"+)	Vegetative Cover Density (High, Medium, Low)	Wetland Size (Small, Medium, Large)	Deep Open Water Area (3'+)	Fish or Shellfish Present in Associated Stream	Ecologically Rich	Fine-grained or Organic Soils Present	Wetland Fragmentation (High, Medium, Low)	Publicly Accessible	Threatened or Endangered Species Present or Habitat Present	Multiple Covertypes	Rare Unique Features	Attributed Functions and Values
W-JJB-10	No	No	Yes	No	Low	Small	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish and/or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation.
W-JJB-11	Yes	No	Yes	Yes	Low	Medium	No	No	Yes	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-JJB-12	Yes	No	Yes	No	High	Large	No	No	No	Yes	Low	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.

Wetland Name	Associated with Watercourse	Signs of Springs/ Seeps	Concave Landform or Gentle Gradient	Deep Surface Soil Layer (16"+)	Vegetative Cover Density (High, Medium, Low)	Wetland Size (Small, Medium, Large)	Deep Open Water Area (3'+)	Fish or Shellfish Present in Associated Stream	Ecologically Rich	Fine-grained or Organic Soils Present	Wetland Fragmentation (High, Medium, Low)	Publicly Accessible	Threatened or Endangered Species Present or Habitat Present	Multiple Covertypes	Rare Unique Features	Attributed Functions and Values
W-JJB-13	Yes	No	Yes	No	Low	Small	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export.
W-JJB-14	Yes	No	Yes	Yes	Medium	Medium	No	No	No	Yes	Low	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-JJB-15	Yes	No	Yes	No	High	Large	No	No	No	Yes	Low	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.
W-JJB-16	Yes	No	Yes	Yes	Medium	Medium	No	No	No	Yes	Medium	No	No	No	No	Groundwater Recharge/Discharge; Flood-flow Alteration; Fish or Shellfish Habitat; Sediment, Toxicant, Pathogen Retention; Nutrient

Wetland Name	Associated with Watercourse	Signs of Springs/ Seeps	Concave Landform or Gentle Gradient	Deep Surface Soil Layer (16"+)	Vegetative Cover Density (High, Medium, Low)	Wetland Size (Small, Medium, Large)	Deep Open Water Area (3'+)	Fish or Shellfish Present in Associated Stream	Ecologically Rich	Fine-grained or Organic Soils Present	Wetland Fragmentation (High, Medium, Low)	Publicly Accessible	Threatened or Endangered Species Present or Habitat Present	Multiple Covertypes	Rare Unique Features	Attributed Functions and Values
																Removal, Retention, Transformation; Production Export; Sediment, Shoreline Stabilization; Wildlife Habitat.

5.1 Groundwater Recharge/Discharge

Groundwater can be found within surficial geology and within deep formations. Groundwater is recharged naturally through multiple avenues. Recharge can occur from precipitation events directly on the surface, through percolation from waterbodies flowing across or situated above permeable material, and by subsurface flows between aquifers. Wetlands and waterbodies can assist in groundwater recharge by being collection points for stormwater and surface water flows. Based on the specific soil content, geomorphology, and underlying bedrock characteristics, wetlands and waterbodies can be a direct source of groundwater replenishment. If specific wetland and waterbody characteristics are not conducive for direct groundwater recharge, they are still often important as facilitators of flow regimes towards groundwater recharge sites downstream.

In addition to being potential groundwater recharge locations, wetlands may be natural groundwater discharge points. This often occurs at springs and seeps. Wetlands and waterbodies receive groundwater discharge typically where the water table is high relative to surrounding elevations. This discharge is an important contributor to spring flows, both in terms of quantity and character, e.g., temperature.

Within the Project Area, all the identified wetlands were found to execute a level of groundwater recharge/discharge function. This conclusion is due in part to the relative fluidity and connectivity of wetlands and waterbodies through surface or groundwater flows and the fundamental interactions that occur between wetlands and aquifers. Wetlands in the Project Area that displayed the function of either groundwater recharge or discharge were observed to have characteristics such as being associated with a watercourse, ponded water, signs of springs or seeps, sandy or organic soils, located in a concave depression or contain a gradual gradient, water marks, and deep surface soil layers. These characteristics indicate that the water level changes periodically or seasonally within the wetland due to potential discharge/recharge events, which the wetland assists in the continuance of surface water flows for groundwater recharge, or that physical attributes in the wetland allows for groundwater recharge/discharge to occur on site at variable rates.

5.2 Flood-flow Alteration

All wetlands within the Project Area were found to contain a practical ability to function as a site of flood-flow alteration or attenuation. Flood-flow alteration and/or attenuation is a wetland's

ability to reduce or inhibit the peak flow of major storm events from damaging properties downstream. Wetlands that occur higher in the watershed can reduce flooding of downstream waterbodies through ponding water or diffusing or diverting flow velocities. Wetlands that occur lower in the watershed may contain the ability to store high volumes of water through direct interactions with the local floodplain or contain large areas of deep porous surface soils with the ability to become heavily saturated and still maintain integrity during increased saturation events. Furthermore, if the wetland is situated in the riparian zone along a waterbody and contains dense vegetation, it can attenuate the severity of peak flows by dissipating flow velocity during flooding events.

All of the delineated wetlands that had the potential to function as an area of flood-flow alteration or attenuation were noted to contain one or more of the following features: had ponded water, had water marks, had dense vegetation coverages, were associated with a waterbody, contained deep top layers of fine-grained or organic soils, were larger in size when compared to other wetlands in the local watershed, or were located in a concave depression or contained a gradual gradient. All of these characteristics contribute to the ability to reduce and diffuse stormwater flow velocities, divert stormwater flows, and store excess water volumes.

5.3 Fish and Shellfish Habitat

For a wetland to contain fish and/or shellfish habitat, or directly contribute to the support of suitable habitats downstream, the wetland must be associated with a fish/shellfish bearing water. Wetlands providing the fish and shellfish habitat are typically associated with perennial streams or large bodies of standing water. These waterbodies contain enough production, nutrients, structure, complexity, and annual flow levels in the water column at depths to support the lifecycles of various fish and/or shellfish species.

A total of 16 wetlands within the Project Area were designated as having the function of supporting fish/shellfish habitat. Wetlands within the Project Area that primarily contained fish/shellfish and associated with perennial streams or large open waterbodies were determined to function as fish/shellfish habitat. Other contributing characteristics to the primary indicators of fish/shellfish habitat included wetlands that contained gradual slopes to allow for slow to moderate stream flows, wetlands that contained dense vegetation, and wetlands that contained little to no fragmentation were considered to function in support of fish and shellfish habitat. Wetlands with dense vegetation and associated with perennial waterbodies provide habitat

through overhanging vegetation along the waterbody, which provide shading and cover objects such as woody debris in the stream substrate. Delineated wetlands were also included as contributing to potential fish/shellfish habitat if they contained intermittent tributaries and/or ponded wetland areas that were in close connection to a perennial waterbody and could provide seasonal fish habitat or potential refugia within confluence areas. Wetlands directly connected and adjacent to predetermined high quality streams or designated trout streams by the NYSDEC were also characterized as containing the function of supporting fish/shellfish populations and/or habitat.

5.4 Sediment/Toxicant/Pathogen Retention

All wetlands in the Project Area, primarily wetlands with palustrine emergent (PEM) wetland characteristics, were noted to contain prominent sediment/toxicant/pathogen retention abilities. The sediment/toxicant/pathogen retention ability of a wetland is defined as characteristics that help inhibit the spread of sediments/toxicants/pathogens downstream and negatively affect lower sections of the watershed. Ultimately, the retention of excessive sediments, toxicants, or pathogens that may be carried by surface water runoff within the watershed reduces or prevents the degradation of water quality and is a function shared by many wetland features.

These wetlands were determined to have thick layers of organic soils that drain slowly, occur in a concave depression or shallow gradient to reduce outflow velocity, and contain areas of deep open water or inundation for extended durations to trap sediment/toxicant/pathogens and allow them to settle out of the water column. Dense vegetation also assists in trapping sediment and is a secondary characteristic associated with sediment/toxicant/pathogen retention. Generally, wetlands that were associated with a watercourse and were deemed suitable to provide flood-flow alteration were also noted to contain the function of sediment/toxicant/pathogen retention. This is due in part by the belief that sediments/toxicants will be carried downstream and deposited in wetlands during flooding events as well. Suspected potential sources of excess sediment/toxicants/pathogens such as livestock farms, agriculture areas, construction sites, roadways, and industrial activities along watershed areas above wetlands increased the importance of this function and these wetlands were specifically targeted to support this function.

5.5 Nutrient Removal/Retention/Transformation

All wetlands within the Project Area perform a nutrient removal/retention/transformation function. This function defines a wetland's ability to remove excess nutrients, such as fertilizers, from

incoming water and prevent them from impacting waters downstream. Wetlands remove nutrients through variable processes. Mostly wetlands remove excess nutrients by trapping sediments infused with nutrients, by adsorption into soils with high organic matter, and through nitrification and denitrification events in alternating oxic and anoxic water conditions.

Wetlands that support this function also commonly assist in trapping and retention like the wetlands mentioned to contain the sediment/toxicant/pathogen retention ability. As such, wetlands within the Project Area that support nutrient removal/retention/transformation contain characteristics such as inundation or deep water habitats, were associated with a watercourse, contained a concave landform or gentle gradient to support slow draining, large in size, contained thick layers of fine-grained or organic soils, and contained dense vegetation coverage. Variation in vegetation cover types also allowed for more uptake, retention, and transformation of nutrients in wetland systems due to a presence of more variable plant life. Significant portions of the Project Area are under agricultural land use. As such, wetlands that contain the nutrient removal/retention/transformation function are particularly important in helping reduce the input of excess nutrients to downstream watercourses. An excess of nutrients deposited into a watershed can be associated with increased productivity levels of aquatic plant life, eutrophication events, and lowered dissolved oxygen levels throughout the water column. Such instances may lower water quality, alter aquatic habitat, and adversely impact fish and other aquatic species downstream.

5.6 Production Export

A total of 30 wetlands within the Project Area assist in production export. This function relates to the ability of a wetland to produce resources that may be consumed by various trophic levels or also used by wildlife and humans downstream. To perform this function, a wetland must contain a level of high productivity. Generally, wetlands with greater size have greater areas of vegetation. These areas in turn have the potential for more production of organic matter. Wetlands that serve this function are also associated with having an abundance of wildlife habitat and ecological richness. This is due to the notion that an increased amount of trophic levels aid in the support of more production levels within the system and in turn, an increased level of production export downstream. Most of the wetlands in the Project Area that are associated with production export are large wetlands with a dense vegetative community and associated with a watercourse. Wetlands in the Project Area with this function also contained a relatively high ecological richness and a high structural diversity through the presence of multiple vegetative

cover types. Wetlands with ponding or seasonal inundation also commonly serve as habitats for amphibians, reptiles, freshwater fish, and aquatic invertebrates. Also, these ponded areas serve as breeding areas for insects that are consumed by higher trophic levels like birds, fish, bats, and other mammals.

5.7 Sediment/Shoreline Stabilization

A total of 17 wetlands within the Project Area contained the function of sediment/shoreline stabilization. Sediment/shoreline stabilization is a function of wetlands that border an associated waterbody. This role is defined as an ability of the wetland to reduce erosion of stream channels downgradient of the wetland and within the wetland itself. This function readily occurs in areas where highly erosional forces take place during storm events when water channels are running at higher than average velocities.

Wetlands in the Project Area were considered to function in stabilizing the sediment and banks of a waterbody if they created a wide buffer zone adjacent to a waterbody and contained dense vegetation that acts to absorb and/or diffuse high-flow velocities during flood events. Other evidence of the wetlands containing sediment/shoreline stabilization function included the location of the wetland within a concave depression or gentle gradient, which helped to reduce erosional forces from occurring along the banks and shoreline of the waterbody within the wetland complex due to the gentle downgradient.

5.8 Wildlife Habitat

Within the Project Area, each of the identified wetlands were found to execute a measurable level of wildlife habitat. Wildlife use or evidence of general wildlife use was directly observed during field surveys in many of the wetlands. White-tailed deer, gray squirrel, various songbirds, various birds of prey, green frogs, salamanders, and several other species were seen within wetlands located within the Project Area during field surveys. Other evidence of wildlife included indication of animal presence including tracks, scat, mammal burrows, scrapes, and chews. Wildlife habitat value can also be inferred by the characteristics of the wetland, particularly its ecological community type, dominant vegetation, and landscape setting. Emergent wetlands are deemed to be suitable for a variety of wetland bird species among other animals. Emergent wetlands also often support abundant insect populations, which provide a food source for birds, bats, and other wildlife. Open water and emergent wetlands within the Project Area have pools and seasonally inundated areas respectively, which can provide aquatic breeding habitats for amphibians as

well. In shrub swamps and forested wetlands, shrubs and trees that produce berries such as common buckthorn (*Rhamnus cathartica*), Allegheny blackberry (*Rubus allegheniensis*), nannyberry (*Viburnum lentago*), and ash (*Fraxinus* spp.) may be used by birds and mammals as a food source.

Wetlands in the Project Area that support wildlife habitat were observed to have characteristics such as being associated with a watercourse, have dense and variable vegetative coverage, and having limited wetland fragmentation.

5.9 Recreation

None of the wetlands in the Project Area are considered suitable for public recreation, as they are located on private land without available public access, parking, or available recreational facilities. However, hunting on private lands is very prevalent within the Project Area. In some instances, wetlands provide habitat complexity, shelter, and food sources to multiple game species and impacts to wetlands should account for impacts to the local hunting community. Small man-made farm ponds also provide recreational opportunities for hunting and fishing. Qualifiers of a wetland that would support a recreational value were determined to be availability of public access, the presence of wildlife habitat, association with a watercourse, sizable wetland complexes, multiple cover types, ecological richness, and rare and unique features. However, due to the limitations to public access, the value of recreation is not deemed a principal value for any of the wetlands within the Project Area.

5.10 Educational/Scientific Value

The wetlands in the Project Area do not provide educational or scientific value as they are located on private land without available or safe public access, parking, or facilities. Qualifiers within a wetland that would support an educational or scientific value include the presence of wildlife habitat, association with a watercourse, sizable wetland complexes, multiple cover types, ecological richness, the presence of threatened or endangered species or their habitats, and rare and unique features. However, due to the limitations to public access, the value of education or scientific value is not deemed a principal value for any of the wetlands within the Project Area.

5.11 Uniqueness/Heritage

The uniqueness/heritage value accounts for the special value that a wetland may have in the context of cultural features located within or adjacent to the wetland, if the wetland has been identified by a local jurisdiction as having local/regional significance, and if there is an assumed rarity of the wetland/habitat type in the local area. None of wetlands within the Project Area have been determined to contain a uniqueness/heritage value primarily. No wetlands containing an especially large and continuous wetland area, a high quality of wetland habitat, and/or the presence of a rarer wetland habitat within the local watershed were observed.

5.12 Visual Quality/Aesthetics

All wetlands in the Project Area are unsuitable for visual quality/aesthetics because they lack a primary or publicly accessible viewing location. Qualifiers within a wetland that would support a value of visual quality/aesthetics include an associated watercourse, deep open water area, sizeable wetland complex, fish/shellfish present, publicly accessible, and multiple cover types.

5.13 Threatened or Endangered Species Habitat

No wetlands within the Project Area contain the potential for threatened or endangered species habitat. Correspondence with the NYSDEC indicated there were no occurrences of threatened or endangered species within the Project Area.

6.0 CONCLUSIONS

Wetlands delineated within the Project Area displayed multiple functions based on their specific site characteristics. Each of the wetlands identified within the Project Area were determined to have the ability to provide some function of groundwater recharge/discharge, flood-flow alteration, nutrient removal/retention/transformation, and wildlife habitat. Other functions displayed within wetlands delineated within the Project Area include:

- Fish and Shellfish Habitat (16 wetlands),
- Sediment/Shoreline Stabilization (17 wetlands), and
- Production Export (30 wetlands).

Values were not found to occur in any wetlands within the Project Area due to the Project Area not being accessible to the public and lack of wetlands containing the values of Threatened/Endangered Species Habitat.

Assessing a specific wetland's functions and values is needed to determine the overall effects an impact or alteration may have on a wetland feature. Ultimately, such a measurement aids in establishing the appropriate level of mitigation after impacts to a wetland occur. As such, this functions and values assessment will be utilized during the impact analysis and mitigation planning efforts for the Project.

7.0 REFERENCES

Bliss, Kevin. 2016. NYSWF Wetland Functional Assessment Workshop [PowerPoint Slides]. Retrieved from <http://www.wetlandsforum.org/NYSWFWetlandAssessmentOctober13WorkshopIntro.pdf>

U.S. Army Corps of Engineers (USACE). 1993. *The Highway Methodology Workbook*. U.S. Army Corps of Engineers, New England Division. NEDEP-360-1-30. 30 pp.

USACE. 1999. *The Highway Methodology Workbook Supplement. Wetland Functions and Values: A Descriptive Approach*. U.S. Army Corps of Engineers, New England Division. NAEEP-360-1-30a. 32 pp.