Cassadaga Wind Project

Case No. 14-F-0490

1001.23 Exhibit 23

Water Resources and Aquatic Ecology

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EXHIBIT 23 WATER RESOURCES AND AQUATIC ECOLOGY

This exhibit includes a review of the groundwater, surface water, and aquatic ecology impacts of the Facility consisting of the identification and mapping of existing conditions, an impact analysis, and proposed impact avoidance and mitigation measures.

(a) Groundwater

(1) Hydrologic Information

The average depth to bedrock in the Facility Site is greater than 200 centimeters (cm), while the average depth to the water table in the Facility Site is approximately 110 cm. Maps showing depth to bedrock and depth to water table throughout the Facility Site, based on the Soil Survey of Chautauqua County New York, are provided in Figure 23-1.

(2) Groundwater Aquifers and Recharge Areas

The Facility Site overlays two groundwater aquifers, as depicted in Figure 23-2. Aquifers are located near the Facility Site in the river valleys of Cassadaga Creek, Mill Creek, Clear Creek, and Cherry Creek, although the only aquifer that is actually underneath Facility components is the aquifer in the Cassadaga Creek Valley. Maps identifying groundwater aquifers, groundwater recharge areas, and groundwater wells are provided in Figure 23-2. Data regarding groundwater aquifers and recharge areas were obtained from the NYSDEC Division of Water Resources, Bureau of Water Management.

To identify existing water wells in the Facility Site, a Freedom of Information Request letter was sent to the NYSDEC and the NYS Department of Health (NYSDOH) on April 17, 2015. These letters requested any information pertaining to groundwater wells (including location, construction logs, depths, and descriptions of encountered bedrock) within the Facility Site. An email response was received from the NYSDEC on May 5, 2015, which provided copies of 119 well completion reports found within the vicinity of the Facility Site. Because the data were not provided in a tabular format by NYSDEC, information regarding yield and depth to water table for each well is not provided in tabular format here. Instead, the dataset is summarized generally in the following paragraph. However, all of the records are included in Appendix SS, and locations of wells identified in the NYSDEC records are shown in Figure 23-2 (please note that only those well whose coordinates were actually included in the well completion reports are included in Figure 23-2).

The NYSDEC well completion reports showed that depth to water table at private wells varies throughout the Facility Site. Most of the wells had depth to water table that ranged between 30 and 100 feet, although depths as shallow as 2 feet and as deep at 164 feet were also reported. Yields of the private wells varied as well, with most wells producing between about 5 to 10 gallons per minute, with yields as small as 4 gallons per minute and as large as over 45 gallons per minute were documented by the well completion reports.

A response to the Freedom of Information Request letter from the NYSDOH was received on May 21, 2015, and it indicated that "no records responsive to your request have been located". The NYSDOH response suggested contacting the Chautauqua County Department of Health (CCDOH), and this consultation ultimately resulted in data provided by the Chautauqua County Department of Law in a letter dated July 6, 2015. The data included a list of public water supply wells in the area, as well as well logs, if available. These data attained from CCDOH are included in Appendix SS and summarized below in Table 23-1.

Table 23-1. Public Supply Water Well Records from Chautauqua County Department of Health

Well Location Identified by Chautauqua County Department of Public Health	Number of Wells	Well Log Available?	Approximate Distance to Nearest Turbine (miles)
Pine Acres Mobile Home Park – east side of Route 60, south of Nelson Road.	Not Identified	No	2.1
Cockaigne – closed ski area located on County Route 66 (Thornton Road) north of County Route 85.	1	Yes (see Appendix SS)	1.5
The Grainery – closed restaurant across the street from Cockaigne (see above entry)	Not Identified	No	1.4
Woodside Campground – on east side of Griswold Road, south of County Route 72 (Bard Rd)	3	No	1.0
Cherry Creek Village – borings drilled on Southside Avenue near village boundary (west side of Village)	2	Yes (see Appendix SS)	1.4
Sinclairville Village – wells located along southern Village boundary	2	Yes (see Appendix SS)	1.9

In addition, private wells were also identified by sending a well survey to all residences/businesses located within a 1-mile radius of the proposed Facility. The Applicant's environmental consultant, Environmental Design & Research, Landscape Architecture, Engineering, & Environmental Services, D.P.C. (EDR), sent out letters with a well survey questionnaire to the owners of 1357 different tax parcels. The questionnaire included questions about whether the land had well(s) on it, questions about size and yield, depth to groundwater, sampling and testing history of the well, location in relation to buildings on the property, etc. Included with the questionnaire was an

EDR-addressed envelope to facilitate return of the surveys. A summary of the methodology used to conduct the private water well survey is provided in a memorandum dated February 22, 2016, and is included in Appendix SS.

EDR received 268 responses to the surveys, both from private well holders who filled out the questionnaire and from residents who noted that no water wells exist on their property. Based on the private well survey responses, the depth of the private wells ranges from 10 feet to 200 feet below grade (averages approximately 75 feet below grade). Reported depths to groundwater within private wells installed in bedrock ranges from 1 foot to 100 feet below grade (averages approximately 40 feet below grade), and depth to groundwater within private wells installed in sand and gravel ranges from 1 foot to 90 feet below grade (averages approximately 35 feet below grade). According to the responses, private wells located within one-mile of the Facility are used primarily for general domestic and farming purposes, but there are some summer camps and businesses that are supplied by well water. Groundwater yields reported in this survey ranges from 1.5 gallons per minute (gpm) to 120 gpm (averages approximately 16 gpm). The responses are attached as Appendix SS.

Based on the private well survey responses, the depth of the private wells ranges from 10 feet to 200 feet below grade (averages approximately 75 feet below grade). Reported depths to groundwater within private wells installed in bedrock ranges from 1 foot to 100 feet below grade (averages approximately 40 feet below grade), and depth to groundwater within private wells installed in sand and gravel ranges from 1 foot to 90 feet below grade (averages approximately 35 feet below grade). According to the responses, private wells located within one-mile of the Facility are used primarily for general domestic and farming purposes, but there are some summer camps and businesses that are supplied by well water. Groundwater yields reported in this survey ranges from 1.5 gallons per minute (gpm) to 120 gpm (averages approximately 16 gpm).

(3) Groundwater Impacts

The Facility is not anticipated to result in any significant impacts to groundwater quality or quantity, drinking water supplies. However, there is potential for short-term, minor adverse impacts to groundwater. Additional detail regarding groundwater impacts is provided below.

A review of the existing aquifer mapping indicates that the Facility is proposed to be located in higher elevation uplands, outside of the surficial aquifer footprints located in the valleys. The USEPA has mapped sole source aquifers, which are defined as aquifers which supply at least 50 percent of the drinking water for their service area. Areas served by sole source aquifers have no alternative drinking water source(s) should their aquifers become contaminated (USEPA, 2015). The nearest sole source aquifer is approximately 13 miles northeast of the nearest

Facility components. Therefore, no impacts to sole source aquifers are anticipated as a result of Facility construction or operation.

Primary aquifers were originally identified by the NYSDOH as areas where groundwater is used as a significant source of potable water; 18 aquifers were established as "primary" under this classification. In the 1990's, NYSDEC recognized these primary aquifers as "highly productive aquifers presently being utilized as sources of water supply by major municipal water supply systems" (NYSDEC, 2016b). The U.S. Geological Survey (USGS) mapped locations of these aquifers in cooperation with NYSDOH and NYSDEC. Primary aquifer maps were compared with maps of the Facility Site, and it was found that the closest primary aquifer to the Facility is located approximately 4 miles south of the nearest Facility components (NYSDEC, 2014). Therefore, no impacts to primary aquifers are anticipated as a result of Facility construction or operation.

Additionally, the NYSDEC has mapped principal aquifers for New York State, defined as "aquifers known to be highly productive or whose geology suggests abundant potential water supply, but which are not intensively used as sources of water supply by major municipal systems at the present time" (NYSDEC, 2016b). Only one principal aquifer, which is also recognized as a surficial aquifer under the USGS Detailed Aquifer Mapping Program (USGS, 2013), is underneath portions of the Facility. This unconfined, high yield aquifer has an average yield of greater than 100 gallons per minute. The only Facility components proposed to be located above this aquifer are the point of interconnection substation and a small portion of the overhead transmission line. Therefore, potential impacts to this aquifer are minimized to a very small portion of the Facility. Boring at this location during the Preliminary Geotechnical Assessment showed that the water table in this location is approximately 3.5 feet below the ground surface (see Appendix II). Although excavations in this area are expected to be relatively shallow, it is possible that construction could intercept groundwater. The Applicant has developed a number of mitigation measures should groundwater be encountered during excavation, and as a result impacts to this aquifer are not anticipated. Mitigations measures are fully described in 1001.23(b)(5).

A potential impact to groundwater is the introduction of pollutants from the accidental discharge of petroleum or other chemicals used during construction, operations or maintenance. Such discharges could occur in the form of minor leaks from fuel and hydraulic systems, as well as more substantial spills that could occur during refueling or due to mechanical failures and other accidents. These impacts are not anticipated because the Applicant has developed a set of avoidance, minimization, and mitigation measures that are outlined in the Facility's Preliminary SPCC. Please see 1001.23(b)(5) for a discussion of the SPCC and other mitigation measures.

The Facility will add only small areas of impervious surface, which will be dispersed throughout the Facility Site, and will have a negligible effect on groundwater recharge. However, construction of the proposed Facility could result in certain localized impacts to groundwater, and the use of that water by adjacent landowners. These impacts could include:

- Minor localized disruption of groundwater flows down-gradient of proposed turbine foundations;
- Minor modification to surface runoff or stream-flow, thereby affecting groundwater recharge characteristics;
- Minor degradation of groundwater chemical quality from accidental spills and installation of concrete foundations;
- Impacts to groundwater recharge areas (wetlands); and
- Groundwater migration along collection line trenches.

During construction, groundwater may be encountered in shallow excavations in areas of poorly drained soils and/or shallow bedrock. Additionally, ponding of surface and/or precipitation may occur in open excavations and in low-lying areas. It is anticipated that groundwater and/or surface water that accumulates in shallow excavations of the upland areas can generally be controlled using conventional sump and pump methods. During dewatering activities, sediment laden water will be sufficiently filtered in upland locations and not discharged into wetlands or streams. Water velocity dissipation will be provided at all discharge points. Dewatering activities will not cause erosion in receiving channels or adversely impact water resources. Please see 1001.23(b)(5) for additional detail on dewatering methods, and Exhibit 11 for typical details.

Installation of turbine foundations has the greatest potential for impacts to groundwater across the Facility Site. Based on existing bedrock conditions and results of the Preliminary Geotechnical Report (Appendix II), it is anticipated that any bedrock encountered in shallow excavations will be rip-able using large excavators, rock rippers, or chipping hammers. Therefore, no blasting will be required, and no assessment of the potential impacts of blasting is necessary (see 1001.21(i) for additional information). Impacts associated with conventional excavation methods will be managed through use of BMPs appropriate for the Facility Site (e.g., SPCC, SWPPP, etc).

Construction activities have the potential to impact localized groundwater flow paths in areas where excavation occurs below the water table. In these instances, water is anticipated to flow around the disturbance and resume its original flow direction down gradient of the disturbance. Groundwater that infiltrates into the excavation may require removal by pumping, which could have a minimal, short-term effect on the elevation of the water table. However, this water will be pumped to the surface, discharged to the ground surface through a velocity dissipating

device, and allowed to infiltrate back into the water table with negligible loss of volume due to evaporation. Therefore, any effect will be very localized and temporary.

Installation of the concrete foundations could cause a temporary, localized increase in pH of groundwater during the curing process. This effect will not extend beyond the immediate area of the foundation and will not adversely affect groundwater quality. In the event that a perched groundwater condition should be encountered at a turbine site, temporary construction dewatering methods would be employed, as described above. Turbine foundations have typically been designed to resist hydrostatic forces, when required, rather than installing permanent drainage systems. Soil borings have been conducted to determine groundwater levels at the substation and a subset of turbine locations (see Preliminary Geotechnical Report, attached as Appendix II). This preliminary study conducted borings at 6 turbine locations. Four of the six were found to be completely dry, and the remaining two had groundwater depths at 16 and 12 feet. The results suggest that groundwater may be encountered at some turbine foundation locations. Should shallow/perched groundwater be encountered, related potential construction impacts are anticipated to be addressed through relatively common engineering measures and construction techniques, including dewatering (1001.23(b)(5) for details on dewatering methods), which will avoid and minimize the potential for groundwater to cause erosion and sedimentation.

In addition to impacts to groundwater due to turbine foundation installation, minor impacts could result from the installation of buried interconnect lines which may facilitate groundwater migration along trench backfill in areas of shallow groundwater. Due to the decompaction of soils within the trench of the buried interconnect, water could collect in the trench and migrate through the trench to areas of lower elevation, where it is naturally allowed to infiltrate back into the water table with negligible loss of volume.

(b) Surface Waters

(1) Surface Waters Map

A map showing locations of all surface waters is provided in Figure 23-3. Data sources used to generate this map include publicly available data from Chautauqua County, the NYSDEC, and ESRI, along with stream data collected during the on-site wetland/stream investigation and delineation effort. Intermittent streams were included on this map when data regarding their presence were available.

(2) Description of Stream Characteristics

Approximately 90% of the Facility Site lies within the Conewango drainage basin (USGS Hydrologic Unit 05010002), which includes 888 square miles in New York and Pennsylvania. The remaining northern-most portion of the Facility Site is located within the Chautauqua-Conneaut drainage basin, (USGS Hydrologic Unit 04120101), which includes 874 square miles in New York, Ohio, and Pennsylvania. According to the NYSDEC (1998), the Conewango watershed harbors endangered species, but was determined to have fish and wildlife population levels below desired goals and some modifications to water flow. The Chautauqua-Conneaut watershed similarly harbors endangered species, and has some modifications to water flow, but also contains streams and lakes affected by acid deposition.

Under Article 15 of the Environmental Conservation Law (Protection of Waters), NYSDEC has regulatory jurisdiction over any activity that disturbs the bed or banks of protected streams. Any stream, or particular portion of a stream, that has been assigned by the NYSDEC any of the following classifications or standards is considered a protected stream: AA, AA(T), A, A(T), B, B(T) or C(T) (6 NYCRR Part 701). A classification of AA or A indicates that the best use of the stream is as a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The best usages of Class B waters are primary and secondary contact recreation and fishing. The best usage of Class C waters is fishing and non-contact activities, and Class D waters represent the lowest classification standard. Streams designated (T) indicate that they support trout, and also include those more specifically designated (TS) which support trout spawning. A list of NYSDEC mapped streams that cross the Facility Site is provided below in Table 23-2. Protected streams in the Facility Site are all class C(T), and include Mill Creek, tributaries of Mill Creek, Cherry Creek, Clear Creek, and Fuller Gulf Creek. There are no mapped Class A, B, or D streams that cross the Facility Site.

Table 23-2. NYSDEC Mapped Streams within the Facility Site

Stream Name[1]	NYSDEC Class
Cherry Creek (tributaries)	C(T)
Clear Creek	C(T)
Mill Creek	C(T)
Mill Creek (tributaries)	C(T)
Fuller Gulf Creek	C(T)
Canadaway Creek (tributaries)	C
Cassadaga Creek (tributaries)	C
Cherry Creek (tributaries)	C
Fuller Gulf Creek (tributaries)	C

Stream Name[1]	NYSDEC Class
Mill Creek	C
Mill Creek (tributaries)	C
Wheeler Brook	C
West Branch Conewango Creek (tributaries)	C

On-site wetland/stream delineations that took place during 2015 (and wetland approximations that took place during the winter of 2016) collected data on streams that exist within the Facility Site. These efforts were specific to areas near where disturbance could occur during construction and operation, and therefore do not cover the entirety of parcels that define the Facility Site. For a full description of stream and wetland delineation results and methods, please see the Delineation Report included in Appendix RR. Sixty stream segments were identified during the delineations, including streams with both perennial and intermittent flow regimes. Included in the delineations are portions of the mapped streams listed above in Table 23-2, as well as unmapped streams, which are either intermittent or perennial tributaries of the mapped streams. Most of the streams were located in forests, and generally had gentle to moderate gradients. The majority of streams appear to be perennial, with a rocky substrate, well-defined banks and established floodplains. Water depths within the channels with stream flow averaged 2-10 inches.

Because most of the proposed components of the Facility are located high on ridges (e.g., turbines and the access roads that service them), the large majority of the streams delineated on-site are high in the watershed, and are unlikely to support fisheries or diverse aquatic invertebrate communities. Aquatic plants were nonexistent in many of the streams of the Facility Site as well. However, a few larger streams do exist in the lower elevation/valley settings within the Facility Site. The smaller streams are all tributaries to larger streams, and the larger streams support more diverse aquatic life.

In order to characterize the fish communities that are present within the Facility Site, data were retrieved from Version 45 of the NYSDEC Statewide Fisheries Database via a site-specific request from the Region 9 office of the NYSDEC. The following streams that cross or are proximate to the Facility Site were queried for lists of species documented to live in those streams: Blaisdell Creek, Canadaway Creek, Cassadaga Creek, Cherry Creek, Clear Creek, Conewango Creek, Fuller Golf Creek, Mill Creek, and Pickett Brook. In order to be conservative, this query included streams that were in the vicinity of Facility Site, but that do not actually cross the Facility Site in the final layout (Blaisdell Creek and Pickett Brook). Data returned from the search include records of fish species that have been caught or identified in the streams of interest. As stated previously, much of the Facility Site is high in the watershed, and the streams within the Facility Site are generally smaller than the streams where fish species were documented as occurring. However, in order to conservatively represent all species that could possibly occur, all

of the fish species documented in these streams by the NYSDEC Statewide Fisheries Database are included in the Wildlife Inventory (Appendix JJ). A total of 67 unique fish species were identified. These include larger fish valued by anglers such as brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), smallmouth bass (*Micropterus dolomieui*), largemouth bass (*Micropterus salmoides*), northern pike (*Esox lucius*), muskellunge (*Esox masquinongy*), bluegill (*Lepomis macrochirus*), white crappie (*Poxomis annularis*), and black crappie (*Poxomis nigromaculatus*). Smaller fish that are preyed upon by these larger fish are supported by these streams as well, including pumpkinseed (*Lepomis gibbosus*), a variety of darters (*Etheostoma* spp. and *Perca* spp.), shiners (*Cyprinella* spp., *Notropis* spp., and other genera), and minnows (*Pimephales* spp.). Please see 1001.22(f)(5) for additional information on threatened, endangered, and otherwise protected species within the Facility Site.

NYSDEC maintains a list of the *Common Aquatic Invasive Species of New York*, which includes fish, clam, mussel, insect, plant, and algae species, known habitat distributions of these species, and recommended boat-cleaning methods to prevent their spread (NYSDEC, 2016a). Of the 23 species included on the list, only 11 might occur within the vicinity of the Facility Site based on known distributions and habitat requirements, including white perch (*Morone* americana), round goby (*Neogobius melanostomus*), spiny waterflea (*Bythotrephes longimanus*), Quagga mussel (*Dreissena bugensis*), zebra mussel (*Dreissena polymorpha*), Asiatic clam (*Corbicula fluminea*), water chestnut (*Trapa natans*), Eurasian watermilfoil (*Myriophyllum spicatum*), European frogbit *(Hydrocharis morsus-ranae*), and curly leaf pondweed (*Potamogeton crispus*). None of the species on the list were observed during wetland delineations or other field investigations; however, a comprehensive aquatic species inventory was not conducted. Most of the aquatic habitat within the Facility Site is in the upper portion of the watershed and does not consist of water bodies large enough to support these species, and there are no lakes within the Facility Site.

(3) Drinking Water Supply Intakes

A request for data on the locations of surface drinking water intake sites was sent to the Chautauqua County Department of Health and Human Services on March 2, 2016. The inquiry requested data on public surface drinking water intake sites within 1 mile of the Facility Site or, if there were no such intake sites, the nearest intakes downstream of the Facility Site. Because the Facility is located within two watersheds, the Applicant requested data for both the Conewango and the Chautauqua-Conneaut watersheds. On March 28, County a staff person replied that there are no surface drinking water intake sites in the Facility Site, nor any within one mile of the Facility Site. The nearest such intake site in the Chautauqua-Conneaut watershed is the City of Dunkirk intake in Lake Erie. There are no surface drinking water intake sites downstream of the Facility Site in the Conewango Watershed in Chautauqua County. The Facility will not result in impacts to surface drinking water supply intakes because the

Applicant will take all measures practicable to avoid, minimize, and mitigate for impacts to surface waters, as outlined below in 1001.23(b)(5).

(4) Impacts to Surface Waters

Facility components have been sited to avoid or minimize both temporary and permanent impacts to surface waters to the extent practicable. Large built components of the Facility, including wind turbine foundations, O&M building, and substations, will avoid surface waters to the maximum extent practicable. In addition, large temporary construction facilities (e.g., staging areas) will avoid surface water impacts to the maximum extent practicable. Number and overall impacts due to access road and collection line crossings will be minimized by utilizing existing crossings and narrow crossing locations to the extent practicable.

During construction, potential direct or indirect impacts to surface waters may occur as a result of the installation of access roads and wind turbine foundations, the upgrade of local public roads, the installation of above ground or buried electrical interconnects, the development and use of temporary workspaces around the turbine sites, the installation of the overhead generator lead line, and temporary workspaces around substations. Direct impacts include 1) an increase in water temperature and conversion of cover type due to clearing of vegetation, 2) siltation and sedimentation due to earthwork, such as excavating and grading activities, 3) disturbance of stream banks and/or substrates resulting from buried cable installation, and 4) the direct placement of fill in surface waters to accommodate road crossings. Indirect impacts to surface waters may result from sedimentation and erosion caused by construction activities (e.g., removal of vegetation and soil disturbance).

Potential temporary and permanent impacts to streams and open waters that could result from Facility construction and operation have been calculated using disturbance assumptions presented in 1001.22(b). The Facility is anticipated to result in up to approximately 8,845 linear feet of temporary disturbance to perennial and intermittent streams and up to approximately 341 linear feet of permanent disturbance to perennial and intermittent streams. Impacts have been estimated conservatively. It appears that the majority of the temporary stream impacts associated with wind turbine workspaces may be able to be avoided, and once the final turbine model is selected further avoidance will be evaluated during final engineering. As stated above, these impacts have already been minimized substantially due changes in the Facility layout. A 75-turbine layout, proposed early in Facility siting, was evaluated at a reconnaissance level for wetland and stream resources. This layout would have resulted in permanent impacts to 604 linear feet of streams. Therefore, this proposed layout represents a 44% reduction in permanent stream impacts, with just a 23% reduction in the number of turbines. See Exhibit 9 for a comparison of impacts from the 75-turbine layout and the currently proposed layout. In addition, impacts have been minimized

through siting of several of the stream crossings in locations of existing access, including areas that are already culverted or areas farm drives or logging roads cross streams without culverts. Table 23-3 provides a summary of the potential impacts to streams.

Table 23-3. Impacts to Streams

Delineated Stream ID[1]	Type[2]	NYSDEC Stream Classification[3]	NYSDEC Protected Stream?	Temporary Impact (linear feet)	Permanent Impact (linear feet)	Facilities Crossing Stream[4]	Anticipated Crossing Methodology, If Impacted by Only Collection Line[5]	Utilizes Existing Access?
E	RIN	D	No	40.7	20.4	BI	Trench	No
L	RIN	D	No	326.1	0.0	WT	-	No
T	RIN	C	No	42.4	98.8	BI	Trench	No
II	RUP	C	No	311.6	0.0	BI, AR, WT	-	Yes
JJ	RIN	D	No	79.9	0.0	BI, AR	-	No
KK	RIN	D	No	48.4	58.7	AR	-	Yes
OO	RIN	D[6]	No[6]	104.3	0.0	AR	-	No
SS	RIN	D	No	29.6	0.0	AR	-	No
HHH	RIN	D	No	109.3	0.0	OT	-	No
JJJ	REPH	D	No	146.5	0.0	BI, AR	-	No
JJJ	RUP	C	No	36.3	0.0	AR	-	Yes
KKK	RUP	C	No	229.9	22.2	WT	-	No
LLL	RUP	C	No	387.8	0.0	OI, WT	-	No
LLL	RIN	D	No	64.5	0.0	OI	-	No
NNN	RIN	D	No	103.7	0.0	OI	-	No
PPP	RUP	C	No	349.6	0.0	BI, AR, WT	-	No
PPP	RIN	D	No	254.1	0.0	BI, WT	-	No
SSS	RIN	D	No	10.1	24.2	AR	-	No
TTT	RUP	C	No	0.0	23.3	BI	HDD	Yes
VVV	RUP	C	No	55.2	0.0	BI, AR	-	Yes
CCCC	RUP	C	No	209.9	0.0	BI, AR	-	No
DDDD	RUP	C	No	110.3	0.0	BI, AR	-	No
EEEE	RUP	C(T)	Yes	136.5	0.0	OT	-	No
FFFF	REPH	D	No	72.1	0.0	OT	-	No
JJJJ	RUP	C(T)	Yes	101.7	0.0	OT	-	No
LLLL	RUP	C(T)	Yes	120.9	0.0	OT	-	No
LLLL	RIN	D	No	117.4	0.0	OT	-	No
MMMM	RUP	C	No	298.7	0.0	OT	-	No
NNNN	RUP	C	No	104.6	0.0	OT	-	No
OOOO	RUP	C	No	78.6	0.0	OI	-	No
PPPP	REPH	D	No	59.3	0.0	OI	-	No
QQQQ	RIN	D	No	73.7	0.0	OI	-	No
QQQQ	RUP	C(T)	Yes	150.5	0.0	OI	-	No
RRRR	RUP	C	No	216.7	0.0	OI	-	No
TTTT	RUP	C	No	101.4	0.0	OI	-	No
TTTT	RIN	D	No	107.7	0.0	OI	-	No
UUUU	RUP	C	No	530.6	0.0	OI	-	No
UUUU	RIN	D	No	257.0	0.0	OI	-	No
VVVV	RUP	C	No	105.2	0.0	OI	-	No
VVVV	REPH	D	No	7.2	0.0	OI	-	No
5B	RUP	C(T)	Yes	197.8	0.0	OT	-	No
5C	RUP	C(T)	Yes	219.8	0.0	OT	-	No
5D	RUP	C(T)	Yes	186.7	0.0	OI	-	No

Delineated Stream ID[1]	Type[2]	NYSDEC Stream Classification[3]	NYSDEC Protected Stream?	Temporary Impact (linear feet)	Permanent Impact (linear feet)	Facilities Crossing Stream[4]	Anticipated Crossing Methodology, If Impacted by Only Collection Line[5]	Utilizes Existing Access?
5F	RUP	C	No	24.4	0.0	BI	Trench	Yes
5P	RIN	C	No	226.1	0.0	OI	-	No
5R	RUP	C	No	211.2	0.0	BI	Trench	No
5R	RIN	D	No	32.9	0.0	BI	Trench	No
5S	RUP	C	No	130.3	0.0	OI	-	No
5T	RUP	C	No	100.8	0.0	OI	-	No
5V	RUP	C	No	111.4	0.0	OI	-	No
5W	RUP	C	No	0.0	0.0	BI	HDD	No
6A	RIN	D	No	11.6	0.0	OI		No
6B	RIN	D	No	69.4	0.0	OI		No
6D	RIN	C	No	202.9	0.0	OI	-	No
6F	RIN	D	No	3.9	0.0	BI	-	Yes
6G	RUP	D	No	104.5	22.2	BI, AR	-	No
6I	RUP	C	No	447.4	22.0	BI, AR	-	No
6K	RUP	C	No	85.5	9.2	BI, AR	-	Yes
6L	RIN	C	No	99.7	20.1	BI, AR	-	Yes
6O	RIN	D	No	105.4	20.1	BI, AR	-	Yes
6Q	RUP	D	No	29.4	0.0	BI	Trench	No
6U	RUP	C	No	152.1	0.0	BI, OT	Trench	No
6Y	RUP	C	No	300.6	0.0	OI	-	No
6Z	RUP	C	No	101.2	0.0	OI		No
Total Linear Feet				8845	341			

[1]Streams with the same ID may appear more than once in the table in cases where streams are mapped as separate linear features. For example, two segments of stream connected by a culvert are typically mapped separately.

[2]RUP = riverine perennial, RIN = riverine intermittent, REPH = riverine ephemeral.

[3]Per NYSDEC regulations, perennial streams not appearing on NYSDEC stream maps take on the classification of the streams they flow into. Intermittent and ephemeral streams not appearing on NYSDEC stream maps are assigned to class D.

[4]Includes facilities that cause temporary or permanent impacts. BI = buried interconnect, OI = overhead interconnect, AR = access road, WT = wind turbine, OT = overhead transmission line.

[5]Streams crossed by access roads or any permanent facilities will be culverted; streams crossed by transmission line and overhead interconnect will be spanned overhead with pole placed outside of stream banks.

[6]Although this stream is mapped as an NYSDEC class C(T) stream, field observations showed that it was intermittent, rather than perennial. Therefore, this stream is assumed to be class D, subject to NYSDEC jurisdictional determination.

As indicated above in Table 23-3, it is anticipated that there will be seven stream crossings of NYSDEC protected streams, which are regulated under Article 15 of the Environmental Conservation Law. The streams include Mill Creek, tributaries of Mill Creek, and tributaries of Cherry Creek. Stream crossings will be done in accordance with all applicable laws and regulations. All of these crossings are limited to spans of the overhead generator lead line or overhead collection line (i.e., no permanent impacts, fill or physical disturbance to the bed or banks of these streams currently anticipated). Best management practices (BMPs) and other guidelines for Article 15 stream crossings will be developed in consultation with NYSDEC and the New York State Department of Public Service (NYSDPS). Please see 1001.23(b)(5) for further discussion of avoidance, minimization, and mitigation of impacts to surface waters.

Table 23-4 summarizes impacts to wetlands containing open waters as a result of Facility construction and operation. For the purposes of this calculation, temporary and permanent impacts to delineated wetlands with open water features were used, even if disturbance would only occur in only the vegetated part of the open water wetland and not within the open water portion itself. Therefore, acreages provided in Table 23-4 represent a conservative estimate of open water impacts. All of these impacts are also accounted for in Exhibit 22(m). Construction and operation is anticipated to result in up to 2.02 acres of temporary disturbance to open waters and surrounding wetlands and less than 0.01 acre of permanent loss of open water habitats and the wetlands that surround them.

Table 23-4. Impacts to Wetlands Containing Open Waters

Wetland ID	Type[1]	NYSDEC Wetland ID	Temporary Impact (square feet)	Permanent Impact (square feet)	Facilities Crossing Wetland[2]
PP	PSS/OW	-	1,665.4	0.0	OI
QQ	PSS/OW	-	7,094.9	0.0	WT
XX	OW	-	4,917.0	212.1	BI, AR
ZZ	PFO/PSS/OW	-	25,651.7	0.0	WT
BBB	PFO/PSS/PEM/OW	HA-4	28,217.4	0.0	OI
RRRR	PSS/OW	HA-7	20,601.0	0.0	OI
Total Square Feet			88,147	212.1	
Total Acres			2.02	<0.01	

[1]PEM = palustrine emergent marsh, PSS = palustrine scrub shrub, PFO = palustrine forested, WM = wet meadow, OW = open water.
[2]Includes facilities that cause temporary or permanent impacts. BI = buried interconnect, OI = overhead interconnect, AR = access road, WT = wind turbine.

Surface water sources that are most vulnerable to sedimentation are those that have steep adjacent uplands where work is being performed. The Facility has been designed to avoid steep slopes to the extent practicable, but some construction in areas of steep slopes is unavoidable. Construction of the Facility could result in some siltation and sedimentation in streams adjacent to steep uplands. However, these impacts are anticipated to be minor because the Applicant will take measures to avoid and minimize siltation (see 1001.23(b)(5)).

Impacts to drinking water are not anticipated as a result of Facility construction or operation. Surface water intake sites are located well downstream of where Facility construction will take place. The measures that the Applicant will take to avoid, minimize, and mitigate for impacts to surface waters (described below in 1001.23(b)(5)) will ensure that drinking water sourced at surface intake sites is not degraded as a result of Facility construction or operation. The Facility is not expected to have adverse impacts on public or private water wells because impacts to groundwater will be minimal and localized. However, should a resident feel that their well water has been adversely impacted by Facility construction or operation, they may file a formal complaint, which will be responded to by the Applicant through the Complaint Resolution Plan (attached as Appendix T). The Applicant has also developed a Preliminary Spill Prevention, Containment and Counter Measures (SPCC) Plan that will be developed and implemented to minimize the potential for unintended releases of petroleum and other hazardous chemicals

during Facility construction and operation. Proper implementation of the SPCC will avoid, minimize, and mitigate for contamination of both surface and groundwater, thereby protected drinking water supplies.

(5) Measures to Avoid or Mitigate Surface Water Impacts

Direct impacts to surface waters will be minimized by utilizing existing or narrow crossing locations whenever possible. Please see Appendix TT for photos of typical existing access that has been utilized in wetlands and uplands. The Applicant will install collection line via horizontal directional drilling at two perennial stream locations in order to avoid impacts to streams with potential endangered mussel habitat (please see Exhibit 22(f)(5) for a discussion of protected mussel species and avoidance and minimization of impacts to these species). Please see Figure 22-2 in Exhibit 22 for locations where directional drills are proposed. Upgrading existing crossings that are under-maintained/undersized will have a long-term beneficial effect on water quality, as it will help to keep farm equipment or other vehicles out of surface waters. However, many crossings are not using existing disturbances. Special crossing techniques (e.g., bottomless culverts), equipment restrictions, herbicide use restrictions, and erosion and sedimentation control measures will be utilized to reduce adverse impacts to water quality, surface water hydrology, and aquatic organisms. In addition, clearing of vegetation along stream banks will be kept to an absolute minimum.

Following Certification, determination of the turbine model, and definition of the Final Facility Footprint (e.g., fewer turbines than presented herein will likely result in fewer crossings), the Applicant will complete final engineering and consult with the USACE and NYSDEC regarding each proposed crossing. Where crossings of surface waters are required, BMPs will be utilized, as recommended by the NYSDEC and the USACE. Specific mitigation measures for protecting surface water resources will include the following:

- *No Equipment Access Areas:* Except where crossed by permitted access roads or through non-jurisdictional use of temporary matting, streams will be designated "No Equipment Access," thus prohibiting the use of motorized equipment in these areas.
- *Restricted Activities Area:* A buffer zone of 100 feet, referred to as "Restricted Activities Area", will be established where Facility construction traverses streams, wetlands and other bodies of water. Restrictions will include:
    - No deposition of slash within or adjacent to a waterbody;
    - No accumulation of construction debris within the area;

- Herbicide restrictions within 100 feet of a stream or wetland (or as required per manufacturer's instructions);
- No degradation of stream banks;
- No equipment washing or refueling within the area;
- No storage of any petroleum or chemical material; and
- No disposal of excess concrete or concrete wash water.

- *Sediment and Siltation Control*: A soil erosion and sedimentation control plan will be developed and implemented as part of the SPDES General Permit for the Facility. Silt fences, hay bales, and temporary siltation basins will be installed and maintained throughout Facility construction. Exposed soil will be seeded and/or mulched to assure that erosion and siltation is kept to a minimum along wetland boundaries. Specific control measures are identified in the Preliminary Stormwater Pollution Prevention Plan (SWPPP), and the location of these features will be indicated on construction drawings and reviewed by the contractor and other appropriate parties prior to construction. These features will be inspected on a regular basis to assure that they function properly throughout the period of construction, and until completion of all restoration work.
- *Work Period Restriction for Stream Crossings*: Construction in streams protected under Article 15 will comply with work period restrictions that are established to protect fish spawning and migration. The work period restriction is from October 1 to April 30 for streams with trout and from March 15 to June 15 for other protected streams (NYSDEC, 2005). However, site-specific consultation with NYSDEC stream biologists may result in less restrictive no-work periods. For example, the Final Environmental Impact Statement (FEIS) for the Arkwright Summit Wind Farm noted that NYSDEC personnel indicated that in-stream work could take place outside of the seasonal work restriction window, as determined on a case-by-case basis (EDR, 2016). Seasonal work period restrictions on in-stream work during Facility Construction will be established in consultation with NYSDEC. All of the protected streams within the Facility Site are C(T) streams, and these are anticipated to either be spanned overhead or bored locations where collection lines cross them, so as reduce impacts to streams and avoid in-stream work.

In the event that shallow groundwater is encountered during construction activities such as foundation excavation, dewatering likely occur. If dewatering is required, a temporary pit (or sediment trap) will be constructed in upland areas (i.e., not within streams or wetlands) to trap and filter water prior to discharging it to a stable discharge area. Dewatering will involve pumping accumulated water to a device (e.g., sediment filter bag, silt fence barrier) that decreases discharge velocity and traps suspended sediment prior to outletting to undisturbed ground. The stable outlet must be capable of filtering further sediment and withstanding the velocity of the discharged water to prevent erosion. Typical details are included in Exhibit 11.

(c) Stormwater

(1) Stormwater Pollution Prevention Plan

Prior to construction, the Applicant will seek coverage under the NYSDEC State Pollution Discharge Elimination System (SPDES) General Permit with a Notice of Intent for Stormwater Discharges from Construction Activity issued in January 2015 and effective on January 29, 2015 (modified July 15, 2015) (please see http://www.dec.ny.gov/docs/water_pdf/gp015002.pdf). This authorization is subject to review by NYSDEC, and is independent of the Article 10 process. However, a Preliminary SWPPP, which has been prepared consistent with the SPDES General permit, is attached as Appendix GG. The Preliminary SWPPP includes a discussion of pre-construction requirements, which include ensuring that there is at least one person on-site on a daily basis to inspect the site's erosion and sediment control practices when soil disturbing activities are being performed. Requirements during construction are also described in the Preliminary SWPPP. The document includes a discussion of the maximum allowable level of soil disturbance (5 acres unless permission from NYSDEC is otherwise obtained), a specific construction sequence that must be followed, specifications for construction site inspection, discussion of authorized and non-authorized non-stormwater discharges, measures for maintaining surface water quality, chemical and oil management, and post-construction maintenance requirements. The Preliminary SWPPP also discusses use of appropriate erosion and sediment controls and stabilization practices during construction, as well as provisions for managing post-construction stormwater quality and quantity. The Applicant anticipates that submission and approval of a final SWPPP will be a condition of the Article 10 Certificate.

(2) Post-Construction Erosion and Sediment Control Practices

The Preliminary SWPPP described in 1001.23(c)(1) includes information on permanent, post-construction erosion and sediment control measures that will be used in during operation of the Facility. The following green infrastructure practices were specifically both stormwater quality and quantity controls: dry swales, vegetative filters, and level spreaders. Dry swales will treat stormwater for sections of the access roads that drain to swales/ditches along the road edge. These dry swales will discharges to level spreaders that will convey stormwater in a sheet flow fashion and will allow for a natural distribution of stormwater runoff. Most of the project will benefit from vegetative filters. Runoff from the access roads will sheet flow across these filters and provide runoff reduction volume for the stormwater requirements for the project.

Following Certification and final engineering of the Facility, it is anticipated that hydrologic models (e.g., Hydraflow Hydrographs Extension for AutoCAD Civil 3D software) based upon measurable watershed characteristics will be utilized by professional engineers to calculate stormwater discharges. Stormwater runoff rates discharged from the site under existing conditions (pre-construction) will provide the basis for evaluation and comparison to proposed conditions (post-construction). Design points of interest will be established where stormwater runoff exits the site (e.g., where proposed Facility access roads intersect with existing public roads/roadside ditches). These design points will provide fixed locations at which existing and proposed stormwater quantities can be compared. The areas draining to these design points will be delineated using topographic information and proposed grading plans, and a hydrologic analysis of each of the drainage areas will be conducted to model their discharges (typically for the 1, 2, 10, 25, 50 and 100-year storm events). As stated above, because final engineering will not be completed until the Facility has been certified and a turbine model has been selected, the final SWPPP cannot be included in the Application. Following Certification of the Facility, the Applicant will conduct the detailed engineering necessary to prepare a final SWPPP, in accordance with the SPDES General Permit.

(d) Chemical and Petroleum Bulk Storage

(1) Spill Prevention and Control Measures

During Facility construction, BMPs will be implemented prevent and contain spills. These measures will be used to reduce the risk of spills and other accidental exposures that could potentially result in impacts to stormwater quality. The following list identifies some of the BMPs that will be implemented during all phases of construction to prevent spills, as feasible:

- Construction Material Storage – including storing materials consistent with the manufacturer's recommendations, proper labeling of containers, keeping an inventory of all MSDS for each chemical at each storage location, and storing chemicals that are not compatible in separate areas so that they do not mix in the event of a spill.
- Leak and Integrity Inspections – including visual inspection of aboveground tanks on a daily basis, temporarily patching any identified leaks in tanks immediately.
- Fueling and Hazardous Materials Handling – including storing fuels and lubricants only at designated staging areas and in appropriate service vehicles, refueling at least 100 feet from wetlands, and handling waste materials and construction debris in a manner that does not contaminate groundwater or stormwater.

- Spill Response Materials on Hand – equipment including absorbent and barrier materials, shoves, tank patch kits, 55 gallon drums, and personal protective equipment will be kept on hand at the construction staging area.
- Refueling and Maintenance Areas – Construction vehicles and equipment will be refueld only in designated refueling areas, to be located at a minimum of 100 feet from any wetlands or surface waters. Routine maintenance will be performed in the staging area.
- Restricted Activities Areas – Such areas will be established within a 100-foot zone around wetlands. Within the restricted activities areas, no accumulation of construction debris, no equipment washing, and no storage of any petroleum or chemical material will be stored.
- Spill Response – All spills will be immediately reported in accordance with NYSDEC regulations by calling the NYSDEC Spill Hotline.

Spill prevention and control measures for Facility operation are described in the Preliminary SPCC Plan. These measures will be implemented to minimize the potential for unintended releases of petroleum and other hazardous chemicals is attached as Appendix UU. The Plan contains information about water bodies to be included in the final SPCC, procedures for loading and unloading transfers of oil, discharge or drainage controls, procedures in the event of discharge discovery, a discharge response procedure, a list of spill response equipment to be maintained on-site (including a fire extinguisher, shovel, tank patch kit, and oil-absorbent materials), methods of disposal of contaminated materials in the event of a discharge, and spill reporting information. The Preliminary SPCC contains information about the Oil Spill Contingency Plan that will be developed in the final SPCC. As described in the Preliminary SPCC, any personnel handling oil will be trained on discharge prevention procedures. Any spills will be reported in accordance with state and/or federal regulations, and the BOP contractor will, at a minimum, be required to adhere to the SPCC.

(2) Compliance with New York State Chemical and Petroleum Bulk Storage Regulations

It is not anticipated that the Facility will require the on-site storage or disposal of large volumes of any substances subject to regulation under the State of New York's chemical and petroleum bulk storage programs (e.g., fuel oil, petroleum, etc.).

(3) Compliance with Local Laws for Storage of Chemicals or Petroleum

As indicated above, it is not anticipated that the Facility will require the on-site storage or disposal of large volumes of any substances subject to regulation under local laws.

(e) Aquatic Species and Invasive Species

(1) Impact to Biological Aquatic Resources

With respect to potential impacts to wetlands, please see 1001.22(m). With respect to impacts to surface waters, please see Tables 23-3 and 23-4, above. Impact to surface waters will result in impacts to biological aquatic resources that require aquatic habitats. However, only a small fraction of the available aquatic habitat that exists within the Facility Site will be impacted. None of the species included in the *Common Aquatic Invasive Species of New York* (NYSDEC, 2016a) list were observed during on-site delineations or field investigations. However, a comprehensive inventory of aquatic species was not conducted. The Facility Site contains very little suitable habitat for aquatic invasive species because the large majority of surface waterbodies are headwater streams high in the watershed where diversity of aquatic life is low. There are no lakes within the Facility Site. Therefore, adverse impacts to biological aquatic species as a result of invasive species propagated by Facility construction is not anticipated. A discussion of aquatic invasive species is provided in 1001.23(b)(2).

(2) Measures to Avoid or Mitigate Impacts to Aquatic Species

Measures to avoid and mitigate impacts to surface waters during construction are addressed in 1001.23(b)(5). These measures protect aquatic species through protecting the water quality in the habitats where they occur. They also offer direct protection through ensuring avoidance of protected streams during times of the year when fish are likely to be migrating and spawning. Where collection lines cross open water, in many cases they will be spanned over the surface waters, thereby avoiding impacts associated with in-stream work at these surface waters. This method will be utilized at all NYSDEC protected streams. Please see Exhibit 22(f)(5) for a discussion of two federally listed endangered mussel species and measures the Applicant will take to avoid impacts to these species.

Surface waters will not be disturbed during Facility operation because any potential disturbance to these features will occur during construction, and the resulting infrastructure will used during operations. Therefore, operational impacts to aquatic species should be limited to the habituation to the minor permanent loss of habitat resulting from placement of Facility components in surface waters. This loss of habitat has been largely avoided through careful Facility siting and design. As described above, the majority of the Facility will be located high in the watershed, away from larger streams and rivers that comprise the majority of aquatic habitat that exists in the

region. In addition, where permanent access roads cross streams, special crossing techniques (e.g., “bottomless” culverts) will be used in accordance with regulatory requirements.

(f) Cooling Water

The proposed Facility does not involve the use of cooling water, and as such, the requirements of this section are not applicable to this Facility. Therefore, information related to cooling water systems, intake, and discharge are not addressed in this Application.

REFERENCES

EDR. 2016. *Final Environmental Impact Statement (FEIS) for Arkwright Summit Wind Farm*. Prepared for Arkwright Summit Wind Farm, LLC. January, 2016.

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NYSDEC. 2014. *Primary Aquifers 1:24,000 – NYS*. GIS Data. Available from NYSDEC, Division of Water, Bureau of Water Resource Management. Available at: http://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1232. (Originally downloaded November, 2014).

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