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August 30, 2016

Via Federal Express/Electronic Mail

Todd Anthony Bianco, EFSB Coordinator
RI Energy Facility Siting Board
89 Jefferson Blvd.
Warwick, RI 02888

Re: Invenergy Docket No. SB-2015-06

Dear Mr. Bianco:

On behalf of Invenergy Thermal Development LLC ("Invenergy"), enclosed please find an original and 5 copies of Invenergy's Wetlands Addendum to its Energy Facility Siting Board ("EFSB") Application.

This Wetlands Addendum will also supplement Invenergy's Responses to the Conservation Law Foundation Data Request No. 6-1; Invenergy's Responses to the Rhode Island Department of Environmental Management Data Requests Nos. 2-9 – 2-12, 3-2(d), 3-3, 3-11, 3-51, 5-52 and 3-60; Invenergy's Responses to the EFSB Data Request No. 1-1; and Invenergy's Responses to the Town of Burrillville Data Requests Nos. 4-9, 4-10, 4-12, 4-14, 5-1, 5-6, 5-7, 5-10, 5-21, 8-3, 8-4, 8-9 – 8-14.

Please let me know if you have any questions.

Very truly yours,

Alan M. Shoer /nmv

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Enclosures

cc: Service List

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Clear River Energy Center
Rhode Island Energy Facility Siting Board Application
ADDENDUM - WETLANDS

DESCRIPTION OF EXISTING FRESHWATER WETLANDS

The proposed Project site is located within the Clear River watershed (HUC 12), which is part of the larger Lower Blackstone River basin (HUC 10) (see Figures 1-3). ESS was contracted by Clear River Energy LLC to delineate jurisdictional wetland resource areas at the proposed Project site. Subsequent to filing the RIEFSB Application, Clear River Energy LLC filed an Edge Verification Request to RIDEM – Office of Water for review and verification of the wetland edges. Approval from RIDEM included the majority of the delineated wetlands in close proximity to anticipated work. Those boundaries not approved as part of the Edge Verification Request will be reviewed by RIDEM once the Application to Alter is filed.

Wetland Delineation Methodology

Desktop Review

ESS reviewed existing desktop data sources prior to conducting the field investigation to determine the general extent of wetlands and streams in the project vicinity. Desktop data sources included a review of National Wetlands Inventory (NWI) maps from the U.S. Fish and Wildlife Service (USFWS), RIDEM mapped wetlands, Natural Resources Conservation Service (NRCS) soils maps, and Federal Emergency Management Agency (FEMA) flood mapping data.

National Wetlands Inventory Maps

NWI wetlands are mapped and classified by USFWS in accordance with the Classification of Wetlands and Deepwater Habitats (Cowardin et al. 1979). Wetlands are classified by dominant plant community (hydrophytes), soils (hydric soils), and frequency of flooding. Based on the NWI mapping, three different forested wetland types are located at the proposed Project site including the following:

- PFO4E: A seasonally flooded/saturated needle-leaved evergreen palustrine forested wetland.
- PFO1E: A seasonally flooded/saturated broad-leaved deciduous palustrine forested wetland.
- PFO4/1E: A seasonally flooded/saturated mixed needle-leaved evergreen and broad-leaved deciduous palustrine forested wetland.

In general, the NWI mapping does not identify wetland resources at the location of the proposed generating facility (Figure 4). A portion of the proposed new 345 kV overhead transmission line ROW is located within NWI mapped wetlands.

Rhode Island Department of Environmental Management Wetland Maps

Freshwater wetlands in Rhode Island were mapped based on interpretation of aerial photographs collected in 1988. According to the RIDEM wetland maps, three RIDEM mapped wetlands are

located at the proposed Project site. These wetlands are classified as deciduous forested wetland and coniferous-forested wetland. In general, the RIDEM mapping does not identify wetland resources at the location of the proposed generating facility. Portions of the proposed new 345 kV overhead transmission line corridor are located within RIDEM mapped wetlands.

Natural Resources Conservation Service Soil Data

Seven different soil map units are present at the proposed project according to the data available from NRCS. Three of these soil map units (Scarboro mucky sandy loam; Ridgebury, Whitman, and Leicester extremely stony fine sandy loams; and Freetown muck) include hydric soil components as summarized in the following table. Mapped hydric soil units can be an indicator of the presence of regulated wetland resources. Portions of the proposed generating facility as well as the proposed new 345 kV overhead located within mapped hydric soils (Figure 4).

List of Soil Map Units at the Proposed Project site

Map Unit Symbol	Map Unit Name	Hydric Soil	Landforms
CeC	Canton and Charlton fine sandy loams, very rocky 3 to 15 percent slopes	N	Side slopes and crests of hills
ChD	Canton and Charlton very stony fine sandy loams 15 to 25 percent slopes	N	Side slopes of hills
FeA	Freetown muck 0 to 2 percent slopes	Y	Depressions
Rf	Ridgebury, Whitman, and Leicester extremely stony fine sandy loams 0 to 3 percent slopes	Y	Depressions and drainageways
Sb	Scarboro mucky sandy loam 0 to 3 percent slopes	Y	Depressions and drainageways
SuB	Sutton very stony fine sandy loam 0 to 8 percent slopes	N	Depressions and lower side slopes
WoB	Woodbridge very stony fine sandy loam 0 to 8 percent slopes	N	Side slopes and crests of hills

Federal Emergency

Management Agency Floodplain Data

Digital floodplain data available from FEMA indicates that the wetland complex associated within the Dry Arm Brook watershed is located within Flood Zone A (100-year floodplain), however no base flood elevations have been determined for the proposed project site (FEMA Map Nos. 44007C0110G [Effective date: March 2, 2009] and 44007C0130G [Effective Date: March 2, 2009]) (Figure 5). The floodplain associated with the Iron Mine Brook drainage has not been mapped. As 100-year flood elevations are not available from published sources and proposed activities may involve work below the 100-year flood elevation, ESS conducted an evaluation of flooding during

the 100-year flood event to establish a Base Flood Elevation (BFE) for both stream systems in the vicinity of the proposed project.

The determination of the BFE was based on the results from a HEC-RAS model which simulated both brooks from their headwaters to their confluence at the Wilson Reservoir. The model used the effective 100-year flood plain for Wilson Reservoir, 445 ft NAVD88 (FEMA, 2013), as the downstream boundary condition and the predicted 100-year flow rates from StreamStats (USGS, 2015) for the upstream boundary conditions for each brook. Both Dry Arm Brook and Iron Mine Brook pass through culverts under Wallum Lake Road. The culverts were surveyed and then incorporated into the HEC-RAS model. The HEC-RAS model included ground elevations from both on-site survey and from statewide elevation data (RIGIS, 2015).

The results of the analysis determined that the BFE for Iron Mine Brook begins at 550 ft. NAVD88 at the upstream limit of Iron Mine Brook as shown in Figure 5 and slopes down to an elevation of 519 ft. NAVD88 at the culvert under Wallum Lake Road south of the proposed facility which would not include the unnamed tributary crossing by the new access road from Wallum Lake Road. The BFE for Dry Arm Brook where it passes through the powerline right of way is approximately 558 ft. NAVD88 and continues down to 554 ft. NAVD88 at the culvert under Wallum Lake Road.

As 100-year flood elevations are not available from published sources, an evaluation of flooding during the 100-year flood event to establish a Base Flood Elevation (BFE) for both streams potentially impacted by project activities was conducted. The limits of flooding based on this analysis are shown on Figure 5. A portion of the proposed 345 kV overhead transmission line corridor is located within the modelled 100-year floodplain of the Dry Arm Brook system.

Field Delineation

ESS wetland scientists completed a delineation of wetlands and streams at the proposed Project site in the fall of 2014 and spring of 2015. Wetlands were delineated in accordance with the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands and the Regional Supplement. Representative photographs of delineated wetlands and streams have been provided in Appendix A.

Wetlands and soils mapping, along with field observations of vegetation types, soils and surface hydrology, were used to locate areas for evaluation. At each evaluation area, three parameters were considered to document whether the sample point was within a wetland: (1) a predominance of hydrophytic vegetation, (2) the presence of hydric soils, and (3) the presence of wetland hydrology. Details regarding the application of these techniques are provided below.

Hydrophytic Vegetation: The hydrophytic vegetation criterion is satisfied at a location if more than 50% of all the dominant species present within the vegetation unit have a wetland indicator status of obligate (OBL), facultative wetland (FACW), or facultative (FAC). An OBL indicator status refers to plants that have a 99% probability of occurring in wetlands under natural conditions. A FACW indicator status refers to plants that usually occur in wetlands (67% to 99% probability) but occasionally are found elsewhere. A FAC indicator status refers to plants that are equally likely to occur in wetlands or elsewhere (estimated probability 34% to 66% for each).

Hydric Soils: The hydric soil criterion is satisfied at a location if soils in the area can be inferred or observed to have a high groundwater table, if there is evidence of prolonged soil saturation, or if there are any indicators suggesting a long-term reduced environment in the upper 18 inches of the soil profile.

Hydric soil indicators from the Regional Supplement were used to identify whether a particular soil observed within a sample location met the hydric soil criteria.

Wetland Hydrology: The wetland hydrology criterion is satisfied at a location based on conclusions inferred from field observations that indicate that an area has a high probability of being inundated or saturated (flooded, ponded, or tidally influenced) long enough during the growing season to develop anaerobic conditions in the surface soil environment, especially within the root zone.

In addition, ESS classified each delineated wetland according to criteria outlined by Cowardin, et al, 1979, in Classification of Wetlands and Deepwater Habitats of the United States.

Wetlands were identified in the field by marking the wetland boundary with pink flagging, labeled "WETLAND DELINEATION." Each flag was labeled in consecutive order. Flags were tied so that each flag was visible from the flag tied previously.

Delineated Wetland Resource Areas

ESS delineated four jurisdictional wetlands (Wetlands 1, 2, 3, and 4) at the Project site (Figure 3). Wetland 1, 2 and 3 are greater than three acres in size, and therefore have associated 50-foot perimeter wetlands, which begin at the wetland edge per the RIDEM Wetland Regulations. The following narrative describes the wetland resource areas present at the proposed project site with respect to their geographic setting, hydrology, vegetation, habitat, soil types, and adjacent upland areas, and provides a rationale for the delineation of these wetlands in the field. Table 1 provides a list of vegetation and relative abundance.

Wetland 1

Wetland 1 is located in the eastern project area, at approximate elevation 550 to 560 feet above sea level. Wetland 1 is set in a series of topographic depressions and drainageways down-gradient to the east and southeast to the intermittent and perennial streams that flow through the wetland. Wetland 1 is located to the southwest of Wallum Lake Road and to the southeast of Algonquin Lane. The center of Wetland 1 is located approximately 1,500 feet to the southeast of the Burrillville Compressor Station.

The primary surface hydrologic feature in this wetland is Iron Mine Brook, a perennial stream that flows in a northeasterly direction through the southern portion of Wetland 1 at the proposed project site. In its reach through the proposed project site, Iron Mine Brook is a small lower perennial stream (R2) with a sandy bottom. Iron Mine Brook flows beneath Wallum Lake Road to the east of the proposed project site via twin 2.5 foot diameter RCP culverts. Where it passes through the proposed project site, Iron Mine Brook is approximately 10 to 12 feet wide; it therefore has an associated 200-foot Riverbank Wetland per the RIDEM Wetland Regulations.

Two intermittent streams (R4) are also present within Wetland 1. Both of these streams originate north of the project area and flow under Algonquin Lane via culverts. The two streams meet in the northeastern portion of Wetland 1 and flow south, passing through an approximately 18-inch metal pipe culvert under the woods road, until ultimately reaching Iron Mine Brook. These streams average significantly less than 10 feet wide in their reach through the proposed project site; they therefore have an associated 100 foot Riverbank Wetland per the RIDEM Wetland Regulations.

Seasonal saturation to the surface is present throughout much of Wetland 1, and was observed at both wetland edge delineation data form plots. The plot located along the western edge of Wetland 1 also

featured a high water table, with free water present at 4 inches below the surface. Other indicators of hydrology present throughout Wetland 1 include water-stressed trees, water-stained leaves, drainage pathways, and hummock-and-pool microtopography.

Wetland 1 is classified as a seasonally flooded/saturated palustrine broad-leaved deciduous forest (PFO1E). Wetland 1 is a mature forest with trees 18 to 24 inches diameter at breash height (dbh) and 50 to 60 feet tall. The primary tree species present within Wetland 1 are red maple (*Acer rubrum*) and red oak (*Quercus rubra*), with white pine (*Pinus strobus*) also present to a lesser extent. The dominant shrub species within this wetland are sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), witch hazel (*Hamamelis virginiana*), and mountain laurel (*Kalmia latifolia*). Primary groundcover species are cinnamon fern (*Osumundastrum cinnamomeum*), New York fern (*Thelypteris noveboracensis*), threeleaf goldthread (*Coptis trifolia*), Canada mayflower (*Maianthemum canadense*), and peat moss (Sphagnum sp.). Fringed sedge (*Carex crinata*) and greenbrier (*Smilax rotundifolia*) are also common in some areas.

Wetland 1 is mapping by NRCS as primarily Ridgebury, Whitman, and Leicester extremely stony fine sandy loams and to a lesser extent Woodbridge very stony fine sandy loam. The Ridgebury, Whitman, and Leicester map unit is classified as hydric, while the Woodbridge map unit is not. Soil data was recorded at the two data points within Wetland 1.

The wetland soil core recorded at the delineation plot in the western end of Wetland 1 had a three inch subsurface layer of organic duff. Below this organic layer, the soil core contained three inches of black fine sandy loam (2.5/N), underlain by six inches of light gray silty fine to medium sand (10YR 7/1). A matrix value of 5 or more and a chroma 1 (with or without redoximorphic features) meets the definition of a depleted matrix. At twelve inches and deeper, the soil in this location was a light yellowish brown silty medium to coarse sand (10YR 6/4). The hydric soil indicators present at this location are A11 and F3:

> A11: Depleted below dark surface - A layer with a depleted or gleyed matrix that has 60% or more chroma of 2 or less, starting within 12 inches of the soil surface, and having a minimum thickness of 6 inches.
>
> F3: Depleted Matrix - A layer that has a depleted matrix with 60 percent or more chroma of 2 or less and that has a minimum thickness of either:

- 2 inches if the 2 inches is entirely within the upper 6 inches of the soil, or
- 6 inches starting within 10 inches of the soil surface.

The wetland soil core recorded at the delineation plot in the eastern end of Wetland 1 contained a two inch layer of subsurface organic duff. Below this layer was a four inch layer of dark brown medium sand (7.5YR 3/3), followed by a two inch layer of brown fine sandy clayey loam (7.5YR 5/2). From 8 to 22 inches below the surface, the soil was a black fine sandy loam (7.5YR 2.5/1). While the delineation plot clearly supports wetland hydrology, the soil profile does not meet any hydric soil criteria. This is attributed to past disturbance which has buried the former black fine sandy loam (7.5YR 2.5/1) surface horizon. Past disturbance along the upstream stream channel is likely responsible for this sediment accumulation.

The upland areas adjacent to Wetland 1 are characterized as a mixed oak-pine woodland. The primary tree species in these areas are red oak, white oak (*Quercus alba*), white pine, and red maple. The shrub layer is similar to adjacent wetland areas, and is comprised primarily of mountain laurel, witch hazel, highbush blueberry, lowbush blueberry *(Vaccinium angustifolium*) and sweet pepperbush, with tall huckleberry (*Gaylussacia frondosa*) also present in some areas. The dominant groundcover species are lowbush blueberry, sweet pepperbush seedings, Canada mayflower, cinnamon fern, and greenbrier.

The upland soil core recorded at the delineation plot in the western edge of Wetland 1 had a three inch layer of subsurface organic duff, followed by a 6 inch layer of dark gray fine sandy loam (10YR 4/1). Below this was a 7 inch layer of grayish brown fine sandy loam (10YR 5/2). From 16 to 30 inches below the surface, the soil was a light yellowish brown silty fine sand (10YR 6/4). This horizon also featured approximately 10% brownish yellow redoximorphic features (10YR 6/8).

The upland soil core recorded at the delineation plot in the eastern edge of Wetland 1 had a one inch layer of subsurface organic duff, followed by a 1 inch layer of dark yellowish brown clayey loam (10YR 3/6). From 2 to 18 inches below the surface, the soil was a yellowish brown clayey loam (10YR 5/6), and from 18 to 29 inches below the surface was a yellowish brown find sandy clayey loam (10YR 5/6).

Wetland 2

Wetland 2 is located in the central-western project area, at approximate elevation 560 to 570 feet above sea level. Wetland 2 is set in a large topographic depression and drains down-gradient to the north. The western branch of Wetland 2 drains via the perennial stream located in that branch of the wetland. Wetland 2 is located to the southeast of the existing Algonquin ROW, and the center of Wetland 2 is located approximately 1,500 feet to the southwest of the Burrillville Compressor Station.

The primary surface hydrologic feature of this wetland is an unnamed perennial stream which flows through the western branch of Wetland 2 in a generally northeasterly direction toward Dry Arm Brook. In its reach through the proposed project site, this stream is a small lower perennial stream with a sandy and muddy bottom (R2). Where it passes through the proposed project area, this stream averages significantly less than 10 feet wide; it therefore has an associated 100 foot Riverbank Wetland per the RIDEM Wetland Regulations.

Three other small intermittent streams (R4) were identified within Wetland 2. Two of these streams meet the unnamed perennial tributary to Dry Arm Brook located in the western branch of Wetland 2. The third is a small channel that flows north across the woods road through the eastern branch of Wetland 2. Beyond the woods road the flow becomes highly diffuse with no obvious channel present. Each of these streams average significantly less than 10 feet wide in their reaches through the project area, and therefore have associated 100 foot Riverbank Wetlands per the RIDEM Wetland Regulations. The locations of these streams are given in Figure 3.

Surface saturation is present throughout much of Wetland 2. Soils were saturated within 8 to 12 inches of the surface at each of the three wetland edge delineation data form plots and are saturated at the surface throughout most of the interior wetland. The plot located along the eastern edge of the eastern branch of Wetland 2 also featured a high water table, with free water present at 10 inches below the ground surface. Other indicators of hydrology present throughout Wetland 2 include water-stressed trees, water-stained leaves, drainage pathways, and mound-and-pool microtopography.

Wetland 2 is classified as a seasonally flooded/saturated palustrine needle-leaved evergreen forest and a seasonally flooded/saturated palustrine broad-leaved deciduous forest (PFO4/1E). The eastern branch of Wetland 2 is a mature forest, with trees approximately 18 to 24 inches dbh and 50 to 60 feet tall. The western branch is somewhat of a younger forest, with trees approximately 10 to 14 dbh and 40-50 feet tall. The primary tree species in Wetland 2 are red maple, red oak, yellow birch (*Betula alleghaniensis*), black birch (*Betula lenta*), and white pine. The shrub layer of Wetland 2 is similar to that of Wetland 1, and is composed primarily of sweet pepperbush, highbush blueberry, witch hazel, and mountain laurel. The groundcover layer is also similar to that of Wetland 1, and is made up of sweet pepperbush seedlings, cinnamon fern, New York fern, threeleaf goldthread, and peat moss.

A stand of mature eastern hemlocks (*Tsuga canadensis*) is present in the northeastern branch of Wetland 2. This area is characterized by relatively low floral species diversity due to the dense shading of the understory; mountain laurel and peat moss are the only other primary plant species in this area.

Wetland 2 extends across the existing Algonquin ROW. Within the Algonquin ROW, Wetland 2 is a scrub-shrub/emergent wetland characterized by a plant community that includes highbush blueberry, sweet pepperbush, maleberry (*Lyonia ligustrina*), meadowsweet (*Spiraea tomentosa*), broom sedge (*Carex scoparia*), shallow sedge (*Carex lurida*), slender rush (*Juncus tenuis*), Canadian rush (*Juncus canadensis*), false oat-grass (*Arrhenatherum elatius*), deer-tongue (*Dichanthelium clandestinum*), and round-leaved sundew (*Drosera rotundifolia*). The ROW is subject to periodic vegetation maintenance. Groundwater discharge from fractured bedrock (blasted during the pipeline installation) is common and supports flow within a poorly defined intermittent channel.

Wetland 2 is located primarily in two soil map units, both of which are classified as hydric: Ridgebury, Whitman, and Leicester extremely stony fine sandy loams and Freetown muck. Fringe portions of Wetland 2 are also mapped by NRCS as non-hydric map units including Sutton very stony fine sand loams, Woodbridge very stony fine sandy loam, and Canton and Charlton very stony fine sandy loams. Soil data was recorded at three data points within Wetland 2.

The wetland soil core recorded at the delineation plot in east edge of the western branch of Wetland 2 contained a 2 inch layer of subsurface organic duff material. From 2 to 8 inches below the surface, the soil was a black fine sandy loam (2.5/N). From 8 to 15 inches below the surface, the soil was a light gray silty fine to medium sand (10YR 7/2) with 10% yellow redoximorphic features (10YR 7/8). From 15 to 22 inches below the surface, the soil was a light gray silty fine to medium sand (10YR 7/2) with 20% yellow redoximorphic features (10YR 7/8). The hydric soil indicators present in this soil core are A11 and F3.

The wetland soil core recorded at the delineation plot in the west edge of the eastern branch of Wetland 2 had a 4 inch layer of organic duff material below the surface. From 4 to 10 inches below the surface, the soil was a black fine sandy loam (2.5/N). From 10 to 19 inches below the surface, the soil was a dark grayish brown fine to medium sandy loam (10YR 4/2). From 19 to 23 inches below the surface, the soil was a gray fine to medium sandy loam (10 YR 6/1) with 20% yellow redoximorphic features (10YR 7/6). The hydric soil indicators present in this soil core are A11 and F3.

The wetland soil core recorded at the delineation plot in the east edge of the eastern branch of Wetland 2 had a 2 inch layer of subsurface organic duff. From 2 to 7 inches below the surface, the soil was a black fine sandy loam (2.5/N). From 7 to 18 inches below the surface, the soil was a gleyed, greenish

gray medium to coarse sand (5/10Y). The hydric soil indicators present in this soil core are A11 and F2 (described below).

> F2: Loamy Gleyed Matrix - A gleyed matrix that occupies 60 percent or more of a layer starting within 12 inches of the soil surface.

Primary tree species in the upland areas adjacent to Wetland 2 are red oak, white pine, black oak, red maple, yellow birch, black birch, and black gum. Similar to other portions of the proposed project site, the shrub layer is dominated by mountain laurel, witch hazel, sweet pepperbush, and highbush blueberry. Primary groundcover species are sweet pepperbush seedings, partridgeberry (*Mitchella repens*), Canada mayflower, sessile-leaved bellwort (*Uvularia sessilifolia*), and northern starflower (*Trientalis borealis*).

The upland soil core recorded at the delineation plot in east edge of the western branch of Wetland 2 contained a 1 inch layer of subsurface organic duff. From 1 to 4 inches below the surface, the soil was very dark gray fine sandy loam (10YR 3/1). From 4 to 11 inches below the surface, the soil was a dark yellowish brown silty loam (10YR 4/6). From 11 to 23 inches below the surface, the soil was a brownish yellow fine sandy silty loam (10YR 6/6) with 10% dark yellowish brown redoximorphic features (10YR 4/6).

The upland soil core recorded at the delineation plot in west edge of the eastern branch of Wetland 2 contained a 1 inch layer of subsurface organic duff. From 1 to 2 inches below the surface, the soil was a very dark gray fine sandy loam (10YR 3/1). From 2 to 6 inches below the surface, the soil was a dark brown fine sandy loam (7.5YR 3/3). From 6 to 9 inches below the surface, the soil was a yellowish brown fine to medium sandy loam (10YR 5/6). From 8 to 12 inches below the surface, the soil was a brownish yellow medium to coarse sandy loam (10YR 6/8).

The upland soil core recorded at the delineation plot in the eastern branch of Wetland 2 contained a two inch layer of subsurface organic duff. From 2 to 4 inches below the surface, the soil was a dark yellowish brown silty loam (10YR 4/6). From 4 to 11 inches below the surface, the soil was a yellowish brown loam with trace gravel (10YR 5/6). From 11 to 18 inches below the surface, the soil was a very pale brown fine to medium sandy loam (10YR 7/3).

Wetland 3

Wetland 3 is located in the northwestern project area, at approximate elevation 640 to 650 feet above sea level. Wetland 3 is set in a perched hillside depression and drains down-gradient to the northeast, east, and southeast. Wetland 3 is located between the existing Algonquin ROW and the existing Killingly-Sherman Road Transmission Line Right-of-Way (Killingly-Sherman ROW), approximately 3,000 feet northwest of the Burrillville Compressor Station.

Surface saturation is present at Wetland 3 and was observed at the wetland edge delineation form plot (Figures 3 and 4). Other indicators of hydrology present at this wetland include water-stained leaves and drainage pathways. No surface waterbodies are associated with Wetland 3. Wetland 3 featured pronounced mound-and-pool microtopography, and skidder ruts (evidence of past logging activity) were also present.

Wetland 3 is classified as a seasonally flooded/saturated palustrine broad-leaved deciduous forest (PFO1E). Primary tree species located within this wetland are red maple, red oak, and gray birch

(Betula populifolia). The dominant species in the shrub layer are sweet pepperbush, highbush blueberry, and witch hazel. The groundcover is composed primarily of sweet pepperbush and sassafras along with peat moss.

Wetland 3 is located within the soil map unit Sutton very stony fine sandy loam, which is non-hydric. The wetland appears to be an inclusion of Ridgebury soils which was too small to be mapped by NRCS. The wetland soil core recorded at the delineation plot within Wetland 3 is shown in Figure 3. The soil core had a five inch layer of black fine sandy loam (2.5/N) beginning at the soil surface. From 5 to 10 inches below the surface, the soil was a gray fine to medium sandy loam (10YR 5/1). From 10 to 22 inches below the surface, the soil was a gray fine to medium sandy loam (5Y 5/1). The hydric soil indicators present in this soil core are A11 and F3.

The upland areas adjacent to Wetland 3 are characterized by an overstory of red maple, black oak, and gray birch; a shrub layer of witch hazel, red maple, gray birch, and white pine; and a groundcover layer of lowbush blueberry, sweet pepperbush seedlings, and partridgeberry.

The upland soil core recorded at the delineation plot within Wetland 3 had an A horizon to 4 inches below the surface of black fine sandy loam (10YR 2/1). The E horizon from 4 to 7 inches below the surface was a dark gray fine sandy loam (10YR 4/1). The B horizon from 7 to 15 inches below the surface was a yellowish brown fine to medium sandy loam (10YR 5/6). The B horizon 15 inches and deeper was a light yellowish brown fine to medium sandy loam (10YR 6/4).

Wetland 4

Wetland 4 is located in the central-western project area, between Wetlands 2 and 3, at approximate elevation 600 to 610 feet above sea level. Wetland 4 is a small, isolated wetland set in a perched hillside depression. However, the wetland does not appear to have sufficient hydrology to support vernal pool dependent wildlife. Subsurface hydrology drains down-gradient to the southeast. Wetland 4 is located between the existing Algonquin ROW and the existing Killingly-Sherman ROW, approximately 2,250 feet southwest of the Burrillville Compressor Station.

No prolonged surface water features are present in Wetland 4. Surface saturation was observed at Wetland 4, along with other indicators of hydrology including water-stained leaves and microtopographic relief. Skidder ruts are present within Wetland 4.

Red maple and black birch are the dominant tree species within Wetland 4. The shrub and herbaceous layers are sparse and included witch hazel, highbush blueberry, and sweet pepperbush in the shrub layer and New York fern, swamp dewberry (*Rubus hispidus*), cinnamon fern, and Sphagnum sp.

Wetland 4 is located within the soil map unit Sutton very stony fine sandy loam, which is non-hydric. The wetland appears to be an extension of the adjacent Ridgebury mapping unit but was too small to be mapped by NRCS. Soils within the wetland are shallow and stony in this wetland, however, evidence of a depleted matrix was evident near the soil surface.

The primary tree species in the upland surrounding Wetland 4 are white oak, black oak, and scarlet oak (*Quercus coccinea*). The shrub layer is similar to that found within Wetland 4.

Soils in the upland areas adjacent to Wetland 4 were also shallow are very rocky. The upper layers of the soil were medium brown in color. The soil did not display any indicators of hydrology.

Special Aquatic Sites

During additional field investigations in spring 2016, two small, man-made, depressional features were discovered approximately 1,400 feet southeast of the Spectra compressor station (Figure 3). Both depressions contained 12-18 inches of water and a relatively marginal number of spotted salamander egg masses. Site conditions and historical aerial photographs indicate that this area was highly disturbed in the past both for access to a small gravel removal operation associated with the compressor station and also as a yarding area for past logging operations. These two depressional features are likely the result of excavation or other earth work activities that occurred at a result of this past disturbance. They have been designated "Special Aquatic Sites" pursuant to the Rule 4 of the Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act which states that this type of wetland may be either natural or man-made. Each of the two Special Aquatic Sites (SAS1 and SAS2) are described below.

SAS 1 is an abrupt depression of approximately 850 square feet that does not exhibit natural wetland characteristics. It is located along the southern side of an existing woods road that crosses the former gravel pit area. Observations recorded during spring and summer of 2016 suggest that SAS 1 may have a brief hydroperiod that is limited to early spring and/or large storm events. This depression is surrounded by mostly upland plant species such as oaks and mountain laurel. The bottom consists of a thin layer of leaf litter underlain by sandy soils. SAS 1 also has very few egg mass attachment sites and therefore, in combination with a brief and inconsistent hydroperiod, likely does not provide high value amphibian breeding habitat.

SAS 2 is a depressional feature that also appears to have been the result of historic land disturbance activities and occurs in two sections. The portion of SAS 2 in which standing water was observed is a linear cart path approximately 150 feet long and 15 feet wide. Site conditions suggest that vehicle traffic along the cart path has compacted the soil and caused standing water to be perched during the spring and/or during storm events. SAS 2 appears to have a longer hydroperiod than SAS 1, as standing water was observed within the cart path at SAS 2 later in the spring after SAS 1 had gone dry. At its north end, the cart path opens up to a portion of the former gravel pit/staging area that has developed some forested wetland characteristics. This area does not have standing water, but it is dominated by a wetland plant community including red maple, sweet pepperbush and royal fern.

PROPOSED WETLAND IMPACTS

Generation Facility and Access Road Wetland Impacts

The Facility, new 345 kV overhead transmission line ROW, gas line, water supply and wastewater pipelines have been designed and sited to be located outside delineated wetland areas to the greatest extent practicable. Construction of the CREC will result in relatively small permanent wetland impacts (in comparison to the overall size of the Facility). Nearly all of the wetland impacts attributable to the CREC Facility and access road result from the widening of the existing woods road in order to accommodate construction vehicles and operational traffic associated with the proposed facility. Widening of the existing woods road would entail the placement of approximately 0.61 acres of permanent fill within Wetland 1 and SAS 1. An additional 1.28 acres of perimeter wetland and 0.51 acres of riverbank wetlands will be directly impacted. A small portion of the avoidable impact to perimeter wetland is necessary to construct and maintain the stormwater management infrastructure. Retaining walls are proposed along the entire length of the new access road to both minimize encroachment into wetland resource areas and serve as a guide

to direct wildlife to a series of large three-sided box culverts proposed under the new roadway. During final design of the access road, it may become possible to restore a portion of the wetlands impacted along the toe of the retaining wall further reducing the amount of permanent impact. Clear River Energy LLC has carefully evaluated lay-down options within the property and as a result has designed the project to avoid any additional encroachment into either biological or perimeter wetlands. Wetland impacts associated with the Facility and new access road are summarized in the following table.

Summary of Generation Facility and Access Road Wetland Impacts

	Biological Wetland	Perimeter Wetland	100' Riverbank Wetland	200' Riverbank Wetland
Wetland ID	Acres	Acres	Acres	Acres
Wetland 1	0.59	1.24	0.12	0.39
Wetland 2	-	0.04	-	NA
Wetland 3	-	-	NA	NA
SAS 1	0.02	NA	NA	NA
SAS 2	-	NA	NA	NA
Totals (ac)	0.61	1.28	0.12	0.39

EVALUATION OF WETLAND FUNCTIONS, VALUES AND IMPACTS

Army Corps of Engineers Methodology

A functional assessment of delineated wetlands was completed to identify key wetland functions and values that exist within the project limits. The functional assessment was completed using the USACE Highway Methodology Workbook Supplement. Wetland Functional Assessment forms are located in Appendix A.

Groundwater Recharge/Discharge

This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either. This function is provided by all wetlands within the Project Area and is a principal function of Wetlands 1 and 2. Designated groundwater recharge areas and aquifers exist downstream of the proposed CREC site. Wetlands 1 and 2 also each include a perennial stream.

Floodflow Alteration

This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas. Floodflow alteration is provided by all wetlands within the Project Area to some degree. It is a principal function of the larger Wetlands 1 and 2.

Fish and Shellfish Habitat

This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat. Of the wetlands evaluated, only Wetlands 1 and 2 have associated watercourses, both of which are perennial, and therefore only these two wetlands provide fish and shellfish habitat. It is a principal function of Wetland 1, because of Iron Mine Brook's size and proximity to Wilson Reservoir.

Sediment/Toxicant/Pathogen Retention

This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas. This is a function of Wetlands 1 and 2. Due to the presence of loner retention times, dense vegetation and a perennial streams, this is a principal function of Wetlands 1 and 2.

Nutrient Removal/Retention/Transformation

This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries. This is a principal function of Wetlands 1 and 2. Wetlands 1 and 2 are relatively large and have high potential for nutrient attenuation.

Production Export

This function evaluates the effectiveness of the wetland to produce food or usable products for humans or other living organisms. Wetlands 1 and 2 provide this as a principal function due primarily to their size and association with a perennial stream.

Sediment/Shoreline Stabilization

This function considers the effectiveness of a wetland to stabilize streambanks and shorelines against erosion. Only Wetlands 1 and 2 have the potential to provide this function as other wetlands within the Project Area do not have associated watercourses. Wetland 1 provides sediment and bank stabilization to Iron Mine Brook while Wetland 2 provides these functions to Dry Arm Brook.

Wildlife Habitat

This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species were considered. All wetlands within the Project Area function principally as habitat for wildlife. The proposed CREC site is located within a contiguous forest patch greater than 500 acres (as designated in the 2015 Rhode Island Wildlife Action Plan), and therefore all wetlands onsite are generally considered to have high wildlife habitat value. In addition, Iron Mine Brook located in Wetland 1 represents the focal point of a wildlife habitat corridor.

Recreation

This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Nonconsumptive opportunities do not consume or diminish these resources of the wetland. Recreation is not a function provided by wetlands within the Project Area as they are located on private property and do not have open water areas.

Educational/Scientific Value

This value considers the suitability of the wetland as a site for an "outdoor classroom" or as a location for scientific study or research. Wetlands 1-4 do not provide educational/scientific value due to their location on private property and lack of access.

Uniqueness/Heritage

This value considers the effectiveness of the wetland or its associated waterbodies to provide certain special values. These may include archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location. These functions are clearly valuable wetland attributes relative to aspects of public health, recreation, and habitat diversity. Wetlands within the CREC site are not considered to provide this value.

Visual Quality/Aesthetics

This value considers the visual and aesthetic quality or usefulness of the wetland. Factors present that could otherwise contribute the aesthetics wetlands value include the fact that the wetlands are considered to be a valuable wildlife habitat, lack of trash, debris, and signs of disturbance and the forested wetlands dominated by red maple that provides vibrant fall foliage. However, since access is not available to the CREC site, these wetlands are not considered suitable.

Endangered Species Habitat

This value considers the suitability of the wetland to support threatened or endangered species. Surveys and existing data have yielded no indication that state or federally listed species are utilizing wetlands within the Project Area.

Wildlife and Wildlife Habitat

As required under Rule 10.02 E(a) ESS has prepared a comprehensive assessment of wildlife and wildlife habitat functions provided by wetlands and adjacent uplands within the Project limits. All wetlands within the Project area function principally as habitat for wildlife. The proposed CREC site is located within a contiguous forest patch greater than 500 acres (as designated in the 2015 Rhode Island Wildlife Action Plan), and therefore all wetlands onsite are generally considered to have high wildlife habitat value. In addition, Iron Mine Brook located in Wetland 1 represents the focal point of a wildlife habitat corridor.

Indirect Impacts

The project is expected to have indirect effects on natural communities and populations of wildlife and plants. An evaluation of indirect environmental impacts on wildlife and their habitats including but not limited to: hydrological changes; fragmentation of habitat and populations; edge effects; noise and vibration; and restrictions to wildlife mobility, and an evaluation of impacts to migratory birds and their habitats, is included. While generally not quantifiable, indirect impacts are defined as the consequences of an action's direct impacts. These impacts change the quality or functions of a resource and may occur over a larger area or over a longer time than the direct impacts. Short-term temporary indirect effects may be caused by disturbance from land clearing and earth moving during construction. Indirect effects may include habitat fragmentation and associated edge effect, increased competition, decreased genetic diversity, and physical or psychological changes to wildlife movements caused by some feature which wildlife are reluctant or incapable of crossing.

The Wildlife Action Plan (2015) defines fragmentation the disruption of extensive habitats into isolated and small patches with two negative components for biota; the loss of a total habitat area; and, the creation of smaller, more isolated patches of habitat remaining. When a disturbed or developed area is created adjacent to a natural and/or forested area, the transition between types of habitats is linked with edge effects. Edge effects may contribute to a decrease in species dependent on core and/or undisturbed habitat or the spread of invasive species. Viewed as harmful to native plant and animal species population and composition, habitat fragmentation increases the amount of edge relative to the amount of interior habitat. A potential indirect effect is the introduction of non-native invasive plant species along the perimeter of disturbed land.

It is assumed increased light, wind and temperature are likely to occur within 115 feet of the cleared edge of the of the plant location. The narrow canopy gap associated with the access road and greenfield transmission line would limit the potential increase in ambient light within the understory area due to the shape and orientation of the clearing. It is assumed increased light, wind, and temperature are likely to occur within 30 feet of the cleared edge of the access road and proposed greenfield transmission line. The proposed project is not anticipated to produce non-point source discharges of pollutants to surface waters, and therefore is not considered to have an adverse impact on aquatic communities. The construction of the access road through the existing wetlands has been designed to include culverts that not only allow for unrestricted hydrologic flow, but also wildlife movement along stream and wetland corridors. Due to the low presence of observed invasive species, it is not anticipated the introduction of invasive species will occur from the proposed project.

As an indirect effect, predation of avian nest sites may increase as opportunistic predators such as crows and raccoons use the edge adjacent to the project area. In addition, if brown-headed cowbirds colonize the project area and associated edge, increased brood-parasitism on songbirds may occur. Indirect impacts resulting from fragmentation may include increased predation on small mammals due to lack of cover, disturbance immediately adjacent to the project areas, and interruption of migration routes. Indirect impacts include changes in vegetative cover, light and temperature regimes, as well as changes to overwintering, denning and foraging habitats. There may be minor indirect impacts to small mammals; however, due to small home ranges, population stability should not be affected. Access to the proposed plant location by medium and large mammals would be prohibited due to the required security fencing. It is anticipated that displaced mammals would be able to utilize the immediately adjacent undisturbed portions of the Spectra Property as well as adjacent 3,000 acre George Washington Management Area. Habitat fragmentation may create barriers to movement for reptiles and amphibians due to the presence of physical impediments and/or the increased risk of mortality due to predation or other causes due to changes in vegetative cover type or increases in impervious surfaces. This effect may be especially significant for reptiles and amphibians, which, unlike birds or medium- to large-bodied mammals, face serious barriers to movement from even minor human-caused changes in the landscape, such as roads, retaining walls, fences, etc. The installation of large three-sided culverts with retaining walls serving as guiding structures along the access road is expected to help minimize the risk of vehicle collision with reptiles and amphibians. The proposed culverts and retaining walls along the access road may impede the travel of larger mammals.

Existing literature indicates most analysis conducted on noise and wildlife involves assessing indirect impacts from roads and aviation activities. High-density roads have been found to indirectly impact avian communities by interfering with communication during courtship and brood-rearing. However, the

noise resulting from highways is likely to be substantially different from the noise produced by proposed project.

Indirect Impact GIS Analysis

The 2015 Wildlife Action Plan was used as a supplemental method of evaluating indirect impacts to biodiversity. The WAP identifies and depicts priority areas on the landscape that offer the best opportunities and potential for conservation. The largest of these areas is the unfragmented forest blocks of 500 acres or greater.

An unfragmented forest impact analysis was conducted for the proposed project area as well as an additional indirect impact extending an additional 100 feet beyond the anticipated limit of work within jurisdictional wetlands. The unfragmented forest blocks of 500 acres or more GIS data layer available from RIDEM was used for this analysis. The results of the analysis indicate that the approximately 35-acre limit of disturbance associated with only the CREC generation facility and access road is located within an unfragmented forest block of 500 acres or greater, of which, only approximately 2.4 acres is within jurisdictional wetlands (biological, perimeter, and riverbank) which would be impacted by clearing and/or fill. In addition to the direct impacts to approximately 2.4 acres of unfragmented forested wetland habitat (within jurisdictional freshwater wetlands), an additional 29 acres of unfragmented forest (within jurisdictional freshwater wetlands), may be impacted indirectly due to the removal of tree canopy within the limits of disturbance (Figure 6).

While the WAP assesses indirect impacts 100 feet from the nearest disturbance, existing scientific literature suggests indirect impacts may extend beyond 100 feet. Specifically, Rosenberg et al. (1999), suggest the effects of an edge can extend from 150 to 300 feet (45 to 90 m) into the forest interior from the nearest disturbance that would cause a break in the forest canopy. A forest interior impact analysis assuming indirect impacts extending 300 feet beyond the anticipated limit of work was conducted. The results of the conservative analysis indicate that, beyond the approximately 2.4 acres of direct unfragmented forest jurisdictional wetland habitat that would be impacted directly by the project's limit of disturbance, an additional 39 acres (a total of 68 acres) of unfragmented forest (within jurisdictional freshwater wetlands) may be impacted indirectly due to the removal of tree canopy within the limits of disturbance (Figure 6).

Direct Impacts

Direct impacts would result from constructing the power plant and other supporting elements. Construction would include removing vegetation and grading to accommodate access road and facility location. Constructing the power plant infrastructure could result in different types of direct or indirect impacts. This construction could result in more substantial loss of habitat, fragment large habitat blocks, and create barriers to animal movement, particularly where no such barriers currently exist.

Although the proposed project will result in direct permanent impacts at the Project site, the impacts associated with the project will not change the overall character or species composition of the ecoregion relative to the USFS, TNC, or EPA classification systems. The direct permanent impacts associated with the proposed project will not significantly alter the character of the Bird Conservation region within which the project site is located. There are no Important Bird and Biodiversity Areas located within the proposed project site. Approximately 35 acres of existing habitats will be altered as a result of the construction of the generation facility and access road only. Some of these areas will be filled and converted to impervious surfaces, while others (e.g., staging areas) will be temporally cleared and over

time restored to a forested community. No habitats with high ecological value and high vulnerability have been identified within the project area. No federally listed threatened or endangered species or hibernacula and/or maternity roost trees associated with Northern Long Eared Bat would be impacted by the Project.

Direct impacts to wildlife will primarily be related to the alteration of existing habitats within the limit of disturbance of the Facility; however, other potential direct impacts may occur, including collision with the Facility or with vehicles using the access road. Clearing and construction associated with the Project will result in the loss of habitat currently used by a variety of bird, mammal, reptile, and amphibian species, including the portion of the site in which the state-threatened black-throated blue warbler had been observed displaying breeding behavior during the spring and summer of 2015.

During the construction phase, direct impacts are expected to be most severe to species with limited mobility to leave the area of active construction, and individual mortality of these species may occur. Mobile species which are able to leave the area of active construction are expected to use adjacent areas of similar habitat.

During the operational phase of the proposed project, direct impacts to wildlife may include collision with the facility (especially the stacks and storage tanks) by bird and bat species, especially during migratory periods in the spring and fall, or during inclement weather events. Vehicle collision along the facility access road may also result in direct mortality of individual birds, mammals, reptiles, and amphibians; however, the installation of large three-sided culverts under this road is expected to minimize this effect for the latter three taxa. The proposed project has taken site constraints into consideration to locate the proposed Facility. While the proposed project would result in clearing of primarily forested upland areas (32.7 acres) and forested state jurisdictional wetland areas (2.4 acres) the avoidance and minimization measures integrated into the design minimize those impacts and would allow the existing jurisdictional wetlands to provide and maintain wildlife habitat to wildlife species.

The currently proposed configuration of the project will result in the placement of direct permanent fill associated with the Facility within the entirety of SAS 1. Permanent fill will not be placed within the limits of SAS 2; however the upland habitats directly adjacent to the special aquatic site will be cleared for installation of the project's stormwater basin and a temporary construction staging area. Following completion of construction activities, the area cleared for the staging area will be re-planted. However, the ability of SAS 2 to provide suitable amphibian breeding habitat would likely be further degraded. If desired, the limited amphibian breeding habitat provided by both man-made areas could be replicated and improved within more suitable habitat elsewhere on the property.

Recreation and Aesthetics

Wetlands within the Project limits are generally not considered to provide important recreational value for such opportunities as hiking, canoeing, boating, fishing, hunting, and other active or passive recreational activities as they are located on private property without public access and do not contain open water areas. The aesthetics value considers the visual and aesthetic quality or usefulness of the wetland. Important qualifiers absent for the majority of wetlands within the Project limits include:

- Multiple wetland classes are visible from primary viewing locations;
- Emergent marsh and/or open water are visible from primary viewing locations;

- Wetland is easily accessed;
- Low noise level at primary viewing locations; and
- Relatively unobstructed sight line exists through wetland.

Factors present that could otherwise contribute the aesthetics wetlands value include the fact that the wetlands are considered to be a valuable wildlife habitat, lack of trash, debris, and signs of disturbance and the forested wetlands dominated by red maple that provides vibrant fall foliage. While the land use surrounding the wetlands is generally considered to be undeveloped as seen from the viewing locations along Wallum Lake Road, this condition will remain following construction of the Facility. As a result no impacts to recreation and aesthetics wetland values are anticipated.

Flood Protection

This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas. Floodflow attenuation is provided by all wetlands within the Project Area to some degree. It is a principal function of the larger Wetlands 1 and 2. The design of the Facility has taken this function into consideration to avoid adverse impacts. No activities are proposed that will result in the loss of floodplain or area subject to flooding so no compensatory flood storage is proposed.

Hydrologic and Hydraulic Analysis

Proposed post-construction BMPs for the CREC facility have been sized and designed to meet the hydrologic and hydraulic standards in RISDISM. Additional discussion of post-construction BMP sizing and design is provided in Section 2.2 of *Preliminary Stormwater Management Plan for Clear River Energy Center* (provided under separate cover). The following section discuss our hydrologic and hydraulic analysis approach and general results of the analysis.

Points of Analysis

Portions of the project site proposed for improvement have been analyzed in accordance with guidance presented in Appendix K of the RISDISM. Five Points of Interest (POIs) have been established, POI A though POI E. Each point of interest is common in pre- and post-development conditions. There are minor existing roadway culverts within the project area which are proposed for removal or replacement; there are no known existing other drainage facilities in any POI's drainage area. All cover types within all drainage areas are currently forested.

POI A is at the proposed discharge structure from the powerblock's detention facility. POI A drains to Iron Mine Brook, and is set in existing wetlands.

POI B is set at the downstream end of the proposed culvert (and approximately location of a culvert for the existing wood road). POI B discharges to Iron Mine Brook.

POI C has been established immediately south of Wallum Lake Road at the downstream end of a proposed roadway culvert. POI C discharges to Iron Mine Brook.

POI D is an off-site point of interest, needed to determine the peak runoff reduction caused by the project at this off-site area. The proposed grading plan results in a small amount of area tributary to POI D being diverted to POIs A and B.

POI E is at the existing road culvert for Iron Mine Brook. POI E is needed to perform the downstream analysis discussed below.

Channel Protection (1-Year, 24-Hour, Type III Storm)

The channel protection volume (CPv) is the 24-hour extended detention of the post-development runoff volume from the 1-year, 24-hour Type III design storm event.

For facility sizing criteria, the basis for hydrologic and hydraulic evaluation of the project site are as follows:

- The NRCS TR-20 model was used to determine the CPv (in accordance with Section 3.3.4 of the RISDISM guidance).
- Conveyance systems were sized using the NRCS TR-55 (swales and storm sewers).
- Off-site areas draining to proposed facilities were modeled as "present condition" for the one-year storm event.
- The length of sheet flow used in time of concentration (tc) calculations was limited to no more than 100 feet for post-development conditions.
- The CPv shall be released at roughly a uniform rate over a 24-hour duration.

The RISDISM guidance document requires computation of the CPv using methodology developed by Harrington in 1987. For the proposed project, the runoff volume associated with the 1-year, 24-hour Type III storm event was computed for each drainage area, and the CPv determined by multiplying the runoff volume for each area by 0.65 with the results summarized below:

Summary of Channel Protection Volumes (CPv)			
Area	**Calculated CPv, cf**	**Calculated average release rate, cfs**	**Provided average release rate, cfs**
Powerblock	260,220	3.01	2.64
Access Road	26,678	0.31	0.26

As presented above, the powerblock drainage area's detention pond has been designed to meet Channel Protection criteria. The access road's detention basin has also been designed to meet these criteria.

Overbank Flood Protection (10- and 100-Year, 24-Hour, Type III Storm)

Peak flow attenuation is required for the 10-year and 100-year, 24-hour Type III design storm events. The primary purpose of this sizing criterion is to prevent an increase in the frequency and

magnitude of out-of-bank flooding (i.e., flow events that exceed the bank-full capacity of the channel, and therefore, must spill over to the floodplain). One of the key objectives of an out-of-bank flooding requirement is to protect downstream structures (houses, businesses, culverts, bridge abutments, etc.) from increased flows and velocities from upstream development. The intent of this criterion is to prevent increased flood damage from infrequent but very large storm events, maintain the boundaries of the predevelopment floodplain, and protect the physical integrity of a stormwater management practice itself.

For facility sizing criteria, the basis for hydrologic and hydraulic evaluation of the project site are as follows:

- The TR-20 model was used for determining the required storage and outlet structures for attenuating the peak flows from the 10-year and 100-year, 24-hour Type III design storms.
- The standard for characterizing pre-development land use for on-site areas was woods (entire proposed drainage area is wooded).
- For purposes of computing runoff, all pervious lands prior to development were assumed to be in good condition regardless of conditions existing at the time of computation.
- Off-site areas that drain to a proposed facility were modeled as "present condition" for peak-flow attenuation requirements.
- Off-site areas drain to the proposed stormwater management BMPs. The calculations in Appendix A of the *Preliminary Stormwater Management Plan for Clear River Energy Center* demonstrate safe passage of the 100-year event based on actual conditions upstream.
- The length of sheet flow used in tc calculations is limited to no more than 150 feet for pre-development conditions and 100 feet for post-development conditions.
- The proposed site design demonstrates that the 100-year event will be safely conveyed through the proposed ponds (two detention facilities—one at the powerblock drainage area and one at the proposed access road drainage area), which have been designed to manage the 100-year event.

The detention basin at the south side of the powerblock area and detention basin serving the proposed access road have been designed to meet these criteria and that of Minimum Standard 5. The results are summarized below:

Summary of Overbank Flood Protection (Qp), cfs				
POI	**10-year pre-development runoff rate, cfs**	**10-year post-development runoff rate, cfs**	**100-year pre-development runoff rate, cfs**	**100-year post-development runoff rate, cfs**
A	19.52	17.92	45.19	39.82
B	77.91	66.18	180.53	152.67
C	901	8.12	20.58	18.06
D	140.96	137.55	327.06	319.56

Downstream Analysis (10- and 100-Year, 24-Hour, Type III Storm)

A downstream analysis is required for projects meeting the project size and impervious cover characteristics specified in the RISDISM or when deemed appropriate by the approving agency when existing conditions are already causing a problem (e.g., known drainage or flooding conditions or existing channel erosion is evident), to determine whether peak flow impacts are fully attenuated by controlling the 10- and 100-year events. The criterion used for the limit of the downstream analysis is referred to as the "10% rule." Under the 10% rule, a hydrologic and hydraulic analysis is extended downstream to the point where the site represents 10% of the total drainage area. For example, a 10-acre disturbed area within the same subwatershed would be analyzed to the point downstream with a drainage area of 100 acres.

This project's disturbance area within the watershed and proposed impervious cover percentage require the preparation of a Downstream Analysis in accordance with Section 3.3.6 of the RISDISM. Such an analysis has been prepared, and the site's proposed stormwater management BMPs meet the requirements of RISDISM Section 3.3.6 related to Downstream Analysis.

Groundwater and Surface Water

This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either. This function is provided by all wetlands within the Project Area and is a principal function of Wetlands 1 and 2. Designated groundwater recharge areas and groundwater reservoirs exist downstream of the proposed CREC site. Wetlands 1 and 2 also each include a perennial stream which is an indicator of groundwater discharge. Stormwater management within the Facility is designed to avoid diversion of surface waters which could adversely affect wetland hydrology. Additionally, the operation of the proposed non-community water system will not have a significant impact on any water resources located on or proximal to the Project Site, including Dry Arm Brook and Iron Mine Brook and their associated wetland areas due to the limited amount of potable water that will be required.

Water Quality

The discussion below addresses general water quality at the project site and appropriate post-construction water quality management BMPs to meet standards in the Freshwater Wetlands Regulations. Discussions are separated into analysis of the proposed CREC facility and along the proposed water and sanitary sewer line extensions.

Clear River Energy Center

The *Stormwater Management Plan for Clear River Energy Center*, and the *Soil Erosion and Sediment Control Plan for Clear River Energy Center* (provided under separate cover), have been drafted to provide discussion of post-construction BMPs. It is our understanding that the project will be permitted by RIDEM as "new development"; therefore, post-construction water quality best management practices (BMPs) have been sized to manage one inch of runoff over the impervious surface. At this time, a pollutant loading analysis has not been completed, but will be completed as part of the final freshwater wetlands permit application.

The Clear River Energy Center site is located in a forested, predominantly rural area. There is no existing drainage system on site. The majority of the site's received runoff is from offsite areas. The hydrology of the site is described further in the sections below.

The primary surface hydrologic feature, Iron Mine Brook, is located east of the CREC site. Iron Mine Brook is a perennial stream that flows in a northeasterly direction through the southern portion of wetlands. Iron Mine Brook is a lower perennial stream (R2) with a sandy bottom. Iron Mine Brook flows beneath Wallum Lake Road to the east of the proposed CREC via culvert and eventually discharges to the Clear River. Iron Mine Brook is a RIDEM Category 3 river, meaning that there is insufficient or no data to identify its designated uses, and is classified as a Class-B waterbody. A Class-B waterbody can be considered for bathing, fish and wildlife habitat, recreational use, agricultural use, industrial supply and other legitimate uses, including navigation. Iron Mine Brook is approximately 10 to 12 feet wide; it therefore has an associated 200-foot Riverbank Wetland per the RIDEM Wetland Regulations.

Two unnamed intermittent streams are present in the eastern Project area. Both of these streams originate north of the Project area, and flow under Algonquin Lane via culverts. The two streams meet in the northeastern portion of Wetland 1 and flow south, passing through a metal pipe culvert under the woods road, until ultimately reaching Iron Mine Brook. These streams average less than 10 feet wide in their reach through the proposed Project site; they therefore have an associated 100-foot Riverbank Wetland per the RIDEM Wetland Regulations.

The primary surface hydrologic feature in the western portion of the proposed project area is an unnamed perennial tributary to Dry Arm Brook. This perennial stream is designated as a Class-B waterbody. In its reach through the proposed Project site, this stream is a lower perennial stream with a sandy and muddy bottom (R2). Where it passes through the proposed Project area, this stream averages less than 10 feet wide; it therefore has an associated 100-foot Riverbank Wetland per the RIDEM Wetland Regulations.

Two unnamed intermittent streams are located in the western portion of the proposed Project site, which discharge into the unnamed perennial tributary to Dry Arm Brook. A fifth unnamed intermitted stream is located in the central Project area and flows through a forested wetland. Each of these streams average less than 10 feet wide in their reach through the proposed Project site; they therefore have an associated 100-foot Riverbank Wetland per the RIDEM Wetland Regulations.

The majority of the project site qualifies as a Land Use with Higher Potential Pollutant Loads (LUHPPL) in accordance Section 3.0 of the RIDEM Stormwater manual. The proposed site use in the powerblock area is a power generation facility (industrial site as defined in RIPDES Rule 31(b)(15)). The site does not qualify for a No Exposure Certification for Exclusion from RIPDES Stormwater Permitting. Only the drainage area comprised of the project's access road is not considered a LUHPPL. Infiltration BMPs will be used to the extent practicable in areas outside of the powerblock. Lined detention and water quality ponds area are proposed for the powerblock.

Wastewater Sewer Pipeline

Clear River Energy LLC is providing a draft SESC plan which was prepared to fully comply with RIDOT utility permitting standards. (See *Soil Erosion and Sediment Control Plan for Clear River Energy Center – Water & Sewer Transmission Main,* provided under separate cover.) The utility extension will be reviewed under a utility permit application by the Rhode Island Department of Transportation (RIDOT) and will not require RIDEM review.

A sewer utility line extension will be required for the CREC facility to function. The proposed utility extension will occur within State Route 100. The site area of the utility extension is an existing road; therefore, no wetlands exist within the project area. The length of the extension will be excavated during the project and restored to the preproject condition. No offsite impacts to wetlands are anticipated.

The sewer utility line extension project site is adjacent to the Wilson Reservoir, Iron Mine Brook, and Leland Brook. Due to the location of the work within the existing road, it is unlikely that stormwater from the construction will impact the water bodies despite the proximity of the proposed work to the water bodies. Two stream crossings are proposed for this project, however, directional drilling is proposed for both stream crossings and it is anticipated that directional drilling will not impact either of the streams.

The Clear River and its tributaries, as well as the Pascoag River, were part of a statewide TMDL for bacteria-impaired waters in 2011. These water bodies have been identified to be impaired by enterococcus bacteria. Impervious cover accounts for 4.7% and 4.5% of the Clear River and Pascoag River watershed areas, respectively. As stated in Section 6.3 of the Core TMDL Document, it is a general rule that impaired streams with watersheds having less than 10% impervious cover are assumed to be caused by sources other than urbanized stormwater runoff.

The site area of the utility extension is an existing road, which will be restored to its predevelopment condition; therefore, no impact or change in pollutant loading is anticipated. The site area of the utility extension is an existing road and is not a LUHPPL. Stormwater from the majority of Wallum Lake Road will follow the existing drainage pattern, flowing along the existing roadway and eventually into the adjacent wooded/vegetated areas or drainage swales located along both sides of the road. There are several existing drain pipe crossings located across Wallum Lake Road that may also capture some stormwater. The drain crossings on Wallum Lake Road appear to discharge in the direction of Wilson Reservoir. Existing catch basins and drainage are located between Pocino Drive and Crystal Terrace and in proximity to Old Wallum Lake Road.

Soil Erosion and Sedimentation Control

Clear River Energy Center

Clear River Energy LLC is providing (under separate cover) draft reports entitled *Stormwater Management Plan for Clear River Energy Center*, and *Soil Erosion and Sediment Control Plan for Clear River Energy Center* to provide discussion of proposed soil erosion and sediment control BMPs at the CREC facility.

The proposed project site is located in a rural area of Burrillville, Rhode Island, in Providence County, in the northwestern part of the state. The area is close to the borders of both Connecticut (approximately 2 miles to the west) and Massachusetts (approximately 3 miles to the north). The site is in an upland area. The property is located along Wallum Lake Road (State Route 100) in Burrillville. The property is bisected by the Algonquin natural gas pipeline, which runs in a WSW - ENE direction. The only buildings or structures on the property at present are associated with Spectra Energy's Algonquin Gas Compressor Station and accompanying access road.

According to elevation data collected in 2011 with light detection and ranging technology and obtained from the Rhode Island GIS database, the elevation of the proposed site varies from approximately 515 to 712 feet above sea level.

The soil at the site consists of the following soil types (National Resource Conservation Service, Web Soil Survey):

- Canton and Charlton fine sandy loams, very rocky, 3 to 15 percent slopes (CeC)
- Canton fine sandy loam, 15 to 35 percent slopes, rocky (CrD)
- Freetown muck (FeA)
- Ridgebury, Whitman, and Leicester extremely stony fine sandy loams (Rf)
- Sutton very stony fine sandy loam, 0 to 8 percent slopes (SuB)
- Woodbridge very stony fine sandy loam, 0 to 8 percent slopes (WoB)

None of the soils on the property are listed as prime farmland soils.

The Clear River Energy Center (CREC) site is located in a forested, predominantly rural area. There is no existing drainage system on site.

An inventory of Critical Erosion Areas includes:

- Floodplains: there are no FEMA-mapped floodplains on site or within the limits of disturbance.
- Steep slopes (>15%): According to elevation data collected in 2011 with light detection and ranging (LiDAR) technology and obtained from the Rhode Island GIS database, the elevation of the proposed site varies from approximately 530 to 590 feet above sea level, with the parcel sloping downward from southwest to northeast. The average grade on the property is 5.5%, but the hill in the southwestern portion of the Site has steeper slopes. This hill (area of steep slopes) has been avoided to preclude future slope stability issues.

- Erodible soils: the preliminary geotechnical report prepared for the project site did not note specific erodible soils.

Due to the existing and proposed grading of the Project site, two sediment basins are proposed. Each sediment basin is anticipated to control the runoff from common drainage locations serving five or more acres. Sediment basins are proposed in the future location of detention/retention BMPs. In the proposed temporary construction laydown areas, temporary sediment basins will be provided where attainable until final stabilization of the site is complete. Temporary sediment basins are designed in accordance with the Handbook.

Wastewater Sewer Pipelines

Clear River Energy LLC is providing (under separate cover) a draft report entitled Stormwater Management Plan for Clear River Energy Center – Sewer Transmission Main which has been prepared to fully comply with RIDOT utility permitting standards. Land disturbance will be limited to trenching in existing paved roadways for the utility extension. The road width will be milled and repaved, without disturbing the soil subgrade.

Under current site conditions the utility extension is an existing road.

Stormwater from the majority of Wallum Lake Road will follow the existing drainage pattern, flowing along the existing roadway and eventually into the adjacent wooded/vegetated areas or drainage swales located along both sides of the road. There are several existing drain pipe crossings located across Wallum Lake Road that may also capture some stormwater. The drain crossings on Wallum Lake Road appear to discharge in the direction of Wilson Reservoir. Existing catch basins and drainage are located between Pocino Drive and Crystal Terrace and in proximity to Old Wallum Lake Road.

There are no critical erosion areas at the project site.

Soil erosion and sediment control practices are described in detail in the draft SESC plan. Generally, they include silt fence, silt socks, covers and perimeter controls for stockpiles, water and calcium chloride for dust control, and road sweeping as needed.

MITIGATION MEASURES

The proposed generation facility and access road have been designed to avoid and minimize impacts wherever possible. The Facility has been designed and sited to be almost entirely outside of delineated wetland resources areas. Additional mitigation measures are designed to minimize Project impacts on the natural and social environments. Mitigation measures have been designed for the Project to reduce impacts associated with each phase of construction. These site specific measures are designed to meet the needs of this particular Project. These measures are described in the following sections.

Design Phase

In order to reduce the impacts associated with the construction and operation of the Facility, Clear River Energy LLC has incorporated design measures to avoid and minimize the impacts of the Project. These measures, which include facility design and configuration and the use of existing access road where possible, have resulted in the avoidance and minimization of land use changes, wetland/water resource impacts, and soil disturbance to the greatest extent practicable. Land use impacts are minimized by locating the proposed project on private property and siting transmission lines in the existing ROW. The

design and construction of the proposed facility incorporates measures which minimize impacts to wetlands and water resources and other natural features within the property. To evaluate the facility design and configuration, multiple versions were developed, reviewed and refined. These reviews resulted in recommendations regarding shifting the locations of certain components of the Facility to avoid and/or reduce impacts to wetlands, watercourses, cultural resources, and other physical constraints that were observed in the field.

The proposed improvement of the existing woods road to serve as the Facility access road will also avoid wetland impacts that would otherwise occur as a result of the development of an entirely new road crossing through wetlands. Algonquin Road is owned by Spectra, which has indicated that they will not allow Clear River Energy LLC to use the road during construction or operation of the CREC due to concerns regarding conflicts with the use of the roadway to support their own facility. Accordingly, access to the proposed site is only available via Wallum Lake Road. To avoid impacts to undisturbed wetlands, the proposed access road was designed to follow, to the extent possible, the alignment of an existing woods roads which currently includes several small culverts at existing wetland crossings.

The general siting of the Facility within the Spectra property was carefully evaluated early in the project design. Figure 5 demonstrates site constraints within the Spectra property with respect to wetlands, topography, and access. Given these constraints, Clear River Energy LLC and AGT collectively determined the proposed location as being the best for the following reasons;

1. Parcel will have frontage on Wallum Lake Road;
2. There will not be a need to have a new Facility access road crossing over the pipe line;
3. Suitable buffer to nearby residential properties and to the AGT compressor station; and
4. Far fewer wetland impacts and represents the least damaging practicable alternative.

Where wetland or watercourse crossings are required for the access road, three-sided culverts are proposed to allow for aquatic habitat connectivity. Clear River Energy LLC sought a Project configuration that would maximize the use of upland areas that does not contain sensitive environmental features. Further, construction BMPs will be implemented during and following construction to minimize impacts associated with the Project, and a compensatory wetland mitigation plan is being developed to address federal and state mitigation requirements.

The following sections detail the various measures implemented during the design phase of the Project to reduce impacts to the natural and social environment.

Mitigation of Natural Resource Impacts

The design of the generation facility has been developed to reduce wetland impacts through avoidance, minimization, and mitigation compensation. Clear River Energy LLC evaluated five alternative sites within the SEMA/RI zone which includes Rhode Island and southeastern Massachusetts. The areas of interest were limited to Rhode Island locations that contained existing gas pipelines and Massachusetts locations within SEMA, that had existing gas pipelines, and electric transmission that was above 115 kV. AGT's total acreage is approximately 730 acres and includes not only the AGT pipeline but also a double circuit 345 kV transmission line making it an ideal location for a power plant as no additional Rights of Way are needed (beyond those the Project will need from AGT), avoiding environmental

impacts associated with clearing lengthy greenfield rights of way. All the alternative sites failed to meet one or more of the above metrics and in all cases did not have the required zoning that would accommodate a new power generation facility.

Clear River Energy LLC and their consultants also evaluated many alternative site layouts in an attempt reduce impacts to wetlands while still achieving the project purpose. These design modifications included:

- Relocation of the perimeter road closer to the buildings to avoid all impacts to the perimeter wetland from the perimeter road;
- Evaluated three access road alignments with each alignment decreasing the overall wetland impact (as discussed above);
- Relocation of Unit 1 and Unit 2 stacks closer together by 50 feet to further reduce footprint and wetland impacts;
- Incorporation of retaining walls along the access road and various places around the site to reduce grading extents;
- Relocation of stormwater BMP's and associated piping; and
- Use of oversized three-sided box culvert to avoid impacts to the unnamed tributary to Iron Mine Brook.

As a result of these actions, unavoidable wetland impacts associated with the construction of the generation facility and access road have been limited to approximately 2.4 acres of permanent total wetland disturbance (0.61 acres of biological wetlands). Mitigation for these alterations of wetland will be provided in order to comply with federal wetland regulations.

The RIDEM requires compensation for any loss of 100-year flood storage. In accordance with these requirements, Clear River Energy LLC will provide, as necessary, floodplain compensation for fills related to the Project. However, the facility and access road does not encroach into floodplain. Soil erosion and sediment controls will be installed along the perimeter of the work areas to avoid sedimentation of the adjacent wetlands. Following construction, all temporarily impacted areas will be restored, seeded and/or mulched.

Measures to mitigate unavoidable direct and indirect impacts to wildlife will be developed. Wildlife impacts in the short-term will be mitigated by limiting ground disturbances and restoring and/or stabilizing areas following construction. Vehicle and equipment traffic will be limited to established access roads as much as practical. Long-term mitigation efforts will include minimizing permanent wetland disturbance and maintaining wetland functions following construction. These measures are anticipated to benefit a wide range of species and to enhance the ability of jurisdictional wetlands to provide wildlife habitat and provide aquatic habitat. In addition to other mitigation measures not yet identified, these measures could include:

- Enhancing or replacing habitat.

- Preserving off-site important habitat areas.
- Developing construction-phasing schedules to protect species.

Timing of construction may affect the extent of impacts to wildlife species. Disturbance of habitat during the breeding season may have greater short term or individual effects on reproductive success. While short-term effects are not likely to have long-term impacts, to avoid potential short-term effects to breeding wildlife, measures will be considered to minimize clearing activities during construction in potential habitat areas during the breeding season (April through June) where possible. Construction impacts to aquatic resources will be mitigated by the appropriate use of sediment and erosion control measures to minimize and eliminate sedimentation of jurisdictional wetlands. Sediment and erosion controls would be installed before construction begins, properly maintained, and removed after disturbed areas have stabilized.

The existing property includes a network of existing woods roads. As discussed with RIDEM during a pre-application meeting, use of existing woods road to provide access to the site was the preferred option once use of the existing Algonquin Lane became unavailable. Clear River Energy LLC proposes to use the existing woods road to the greatest extent possible, incorporating improvements to these roads to accommodate the required vehicles and equipment to construct and operate the new Facility. As further mitigation, the proposed access route has been situated to cross streams and wetlands at locations of existing disturbance to minimize new wetland disturbance. The alignment of the access road was thoroughly scrutinized for consistency with the Rhode Island Stormwater Design and Installation Standards Manual, the Rhode Island Wetland BMP Manual: Techniques for Avoidance and Mitigation, and the Rhode Island Freshwater Wetland Rules and Regulations. The location of the proposed facility access road was determined by what is necessary to gain required access and to safely construct and operate the proposed generation facility. The Freshwater Wetland Rules require that the project proponent demonstrate that impacts to freshwater wetlands will not be a random, unnecessary, or undesirable alteration. Each location was selected to traverse the wetland fringe or a previously impacted area within the wetland. Wetland and watercourse crossings will be accomplished using enlarged three-sided culverts to replace existing undersized culverts. Proposed mitigation for transmission line facilities will be addressed in a separate RIEFSB application.

Mitigation of Social Resource Impacts

In addition to avoiding and minimizing impacts to the natural environment, several design practices have been incorporated to minimize or avoid impacts to the surrounding social environment. To minimize impacts to adjacent residences and undisturbed areas, Clear River Energy LLC will locate the Project adjacent to an existing large compatible land use (Spectra's compressor station). In addition, the Facility will be substantially set back from Wallum Lake Road to minimize the potential for visual impact. Vegetation removal will be limited so that the maximum practical visual buffer between residences and the Project is maintained.

Construction Phase

Clear River Energy LLC will implement several measures during construction which will minimize impacts to the environment. These include the use of the existing woods road, installation of soil erosion and sediment controls, supervision and inspection of construction activities within resource areas by an environmental monitor and minimization of impacted areas. The following section details various mitigation measures which will be implemented to minimize construction-related impacts.

Mitigation of Natural Resource Impacts

Wetlands and Watercourses

Throughout the planning and design process for the Project, wetland impacts have been minimized to the greatest extent possible. However, given the scale of the Project, certain wetland and watercourse resource impacts associated with the development of the Project cannot be avoided. In order to offset environmental impacts associated with the Project, appropriate compensatory mitigation (in collaborative consultation with local, state, and federal resource agencies and other stakeholders) will be provided, as a component of the final Project design.

Best management practices, will be employed to minimize disturbances to wetlands during construction of the Project. The boundaries of the wetlands adjacent to prosed work limits would be clearly demarcated by a qualified wetland scientist prior to the commencement of work. When working in or traversing such wetlands, Clear River Energy LLC would:

- Install, inspect, and maintain soil erosion and sediment controls and other applicable construction BMPs.
- Limit grading in wetlands to the amount necessary to provide a safe workspace.
- Install temporary swamp matting or geotextile and stone pads for access roads across wetlands or to establish safe and stable construction work areas within wetlands, where necessary. The type of stabilization measures to be used in wetlands will depend on soil saturation and depth of organic matter.
- Restore temporary impacts to wetlands, after facility construction, to pre-construction configurations and contours to the extent practicable.
- Comply with the conditions of federal and state permit conditions related to wetlands.
- Pile cut woody wetland vegetation so as to avoid blocking surface water flows within or otherwise to adversely affect the integrity of the wetland.
- Cut forested wetland vegetation without removing stumps unless it is determined that intact stumps pose a safety concern for the installation of structures, movement of equipment, or the safety of personnel.
- Avoid or minimize access through wetlands to the extent practical. Where access roads must be improved or developed, the roads would be designed, where practical, so as not to interfere with surface water flow or the functions of the wetland.
- Install temporary soil erosion controls around work sites in or near wetlands to minimize the potential for soil erosion and sedimentation.
- Refuel construction equipment (apart from equipment that cannot practically be moved) 100 feet or more from a wetland. If refueling must occur within a wetland, secondary containment will be used.
- Store petroleum products at least 100 feet from a wetland.

- Restore work sites in wetlands following the completion of line installation activities.

Clear River Energy LLC would implement the following mitigation measures to minimize the potential impacts of construction activities in or near watercourses:

- Maintain ambient water flows (if water is present at the time of construction) and not constrain or interrupt the flow at any time during construction.
- Installing new culverts at currently day-lighted stream reaches will be avoided to the greatest extent feasible.
- Maintain existing riparian zone vegetation, to the extent feasible, along the banks of the watercourse.
- Install controls to prevent or minimize turbidity and sediment loading into watercourses. These controls may include the use of crushed stone approach aprons onto mat bridges, stone check dams, water bars, diversion channels, soil erosion controls, turbidity curtains and floating booms.

Clear River Energy LLC has identified the following types of measures that may be implemented to minimize adverse Project impacts on vernal pools (special aquatic sites):

- Where feasible in areas proximate to vernal pools, adhere to the seasonal windows for tree removal to avoid negative impacts on amphibians during migration periods.
- Locate work outside of productive vernal pools and amphibian breeding habitats to the extent practical.
- Install appropriate soil erosion and sediment controls around distinct work sites and access roads to minimize the potential for sediment deposition into vernal pools, and remove such controls promptly after final site stabilization.
- During tree and vegetation removal, access through vernal pools will be avoided to the extent feasible. Minimize the removal of low-growing vegetation surrounding vernal pools.
- To the extent practicable trees to be removed will not be directly felled into vernal pool depressions. Directional felling using mechanized equipment (feller/buncher) allows complete control of trees during felling. The feller/buncher lifts the tree from the stump, allowing careful removal. Aerial cable winching and other forestry practices will be utilized as appropriate. If trees are felled within a vernal pool, whether out of necessity or inadvertently, and removal is likely to cause more harm than good (as determined by the environmental monitor), some slash may be left in place to serve as coarse woody debris.
- During the operation and maintenance of the facility, incorporate measures to protect remaining vernal pools (e.g., maintain as much vegetative cover within and around vernal pools as possible) into the vegetation management program. The specific measures that would be implemented to protect amphibians would be defined in consultation with the involved regulatory agencies.

Compensatory wetland mitigation, for the unavoidable impacts to wetlands, streams, and/or other aquatic resources, as a result of the proposed Project, is necessary in order to meet environmental criteria for activities to be permitted under the federal requirements (i.e., Sections 401 and 404 of the New England District Compensatory Mitigation Guidance, dated July 20, 2010, for use in reviewing all mitigation for unavoidable impacts to aquatic resources. Clear River Energy LLC will comply with all applicable wetland regulatory permit requirements and conditions, as well as the associated Project plans and specifications submitted in support of these permit applications.

Surface Water and Groundwater Resources

Clear River Energy LLC will require its contractor to adhere to BMPs regarding the storage and handling of oil and potentially hazardous materials during construction of the Project. Further, Clear River Energy LLC will require its contractors to adhere to a standard emergency response plan or a Project-specific spill prevention, containment, response, and reporting plan. Equipment refueling and equipment/material storage will not be permitted within 100 feet of any wetland or waterbody, with the exception of equipment that cannot be feasibly moved from its working location (e.g., drilling equipment, dewatering pumps). Secondary containment will be used at these refueling locations. Contractor staging areas and contractor yards typically will be located at existing developed areas (parking lots, existing yards), where the storage of construction materials and equipment, including fuels and lubricants, would not conflict with protection of public surface water supplies or wetland resources. If blasting is required, Clear River Energy LLC will follow RIDEM's recommendations with respect to perchlorate within groundwater recharge areas.

Dewatering may be necessary during excavations adjacent to wetland areas. Details on proposed BMPs for this work are provided in the draft report entitled *Stormwater Management Plan for Clear River Energy Center* (provided under separate cover). The pump intake hose will be suspended above the bottom of the excavation throughout dewatering. The basin and all accumulated sediment will be removed following dewatering operations and the area will be seeded and mulched.

Rare, Threatened, and Endangered Species

No federally listed threatened or endangered species or hibernacula and/or maternity roost trees associated with Northern Long Eared Bat would be impacted by the Project Facility or access road. Clearing and construction associated with the Project will result in the loss of habitat currently used by a variety of bird, mammal, reptile, and amphibian species, including the portion of the site in which the state-threatened black-throated blue warbler had been observed displaying breeding behavior during the spring and summer of 2015.

As a mitigation measure, Clear River Energy LLC will conduct pre-construction reconnaissance sweeps/surveys to locate any populations of these plant species within the ROWs. Any identified plant locations will be marked for avoidance during construction. If avoidance is not possible, Clear River Energy LLC, in consultation with the RIDEM and RINHS, would seek alternative access routes, transplant the affected plants to a protected location outside of the construction area, or undertake other mitigation.

Clear River Energy LLC will be coordinating with the RIDEM to determine whether avoiding certain construction activities (e.g., tree-clearing) during the breeding season (April through June), if possible, would be viewed as an important mitigation strategy.

Soil Erosion and Sediment Control

Soil erosion and sediment control devices will be installed along the perimeter of identified wetland resource areas prior to the onset of soil disturbance activities to ensure that excess soil piles and other impacted soil areas are confined and do not result in downslope sedimentation of sensitive areas. Soil erosion controls will be inspected on a regular basis and maintained or replaced as necessary. The soil erosion and sediment control measures selected will be appropriate to minimize the potential for soil erosion and sedimentation in areas where soils are impacted. Clear River Energy LLC has prepared draft project-specific Stormwater/Erosion and Sedimentation Control Plans, in compliance with the Rhode Island Soil Erosion and Sediment Control Handbook, the Rhode Island Stormwater Design and Installation Standards Manual, and the Wetland BMP Manual: Techniques for Avoidance and Mitigation. Typically, temporary soil erosion controls would be installed based on the specifications in the Stormwater/Erosion and Sediment Control Plan.

Supervision and Monitoring

Throughout the entire construction process, Clear River Energy LLC will retain the services of an environmental monitor. The primary responsibility of the monitor will be to oversee construction activities including the installation and maintenance of soil erosion and sediment controls, on a routine basis to ensure compliance with all federal, state, and local permit commitments. The environmental monitor will be a trained environmental scientist responsible for supervising construction activities relative to environmental issues. The environmental monitor will be experienced in soil erosion control techniques and will have an understanding of wetland resources to be protected.

During periods of prolonged precipitation, the monitor will inspect all locations to confirm that the environmental controls are functioning properly. In addition to retaining the services of an environmental monitor, Clear River Energy LLC will require the contractor to designate an individual to be responsible for the daily inspection and upkeep of environmental controls. This person will also be responsible for providing direction to the other members of the construction crew regarding matters of wetland access and appropriate work methods. Additionally, all construction personnel will be briefed on project environmental compliance issues and obligations prior to the start of construction. Regular construction progress meetings will provide the opportunity to reinforce the contractor's awareness of these issues.

Mitigation of Social Resource Impacts

Clear River Energy LLC will minimize social resource impacts during construction by incorporating several standard mitigation measures. Construction generated noise will be limited by the use of mufflers on all construction equipment. Dust will be controlled by wetting and stabilizing access road surfaces, as necessary, and by maintaining crushed stone aprons at the intersections of access roads with paved roads.

In order to mitigate impacts to social resources, Clear River Energy LLC will designate an ombudsman for the Project who will be responsible for outreach during construction and who will provide a consistent point of contact for the public. By notifying landowners and abutters of planned construction activities before and during Project construction, Clear River Energy LLC will minimize the potential for disturbance from construction, or be positioned to address concerns expressed by local residents.

Some short-term impacts are unavoidable, even though they have been minimized. By carrying out the construction of the line in a timely fashion, Clear River Energy LLC will keep these impacts to a minimum. The construction of the Project may cause some temporary disturbance to the abutting property owners.

Clear River Energy LLC will minimize impacts associated with increased construction traffic on local roadways.

If cultural or archaeological resources or properties are discovered during construction, Clear River Energy LLC will consult with the RIHPHC and THPOs. Removal or alteration of stone walls will be minimized to the extent practical. As appropriate, stone walls that are removed or breached by construction activities will be repaired or rebuilt. Rebuilt stone walls shall be placed on the same alignment that existed prior to temporary removal, to the extent that it will not interfere with transmission line operation or maintenance. An archaeologist will monitor tree removal and construction activities that occur within a 50-foot radius of any identified cultural resource sites.

Post-Construction and Operation Phase

Following the completion of construction, Clear River Energy LLC will implement the following standard and site specific mitigation measures to minimize the impact of the Project on the natural and social environment.

Mitigation of Natural Resource Impacts

Restoration efforts, including final grading and installation of permanent soil erosion control devices, and restoration of temporarily impacted areas, will be completed following construction. Construction debris will be removed from the Project site and properly disposed of. Pre-existing drainage patterns and stone walls will be restored to their former condition, where appropriate. Permanent slope breakers and soil erosion control devices will be installed in areas where the impacted soil has the potential to impact wetland resource areas.

Wetland areas that are temporarily impacted as a result of the placement of temporary fill will be restored to conditions comparable to those that existed before construction following completion of construction activity in that area. Restoration activities will include the removal of all temporary fill, construction debris, and equipment from wetland areas; removal of temporary erosion controls; re-grading as necessary to re-establish wetland hydrology; and re-establishing any disturbed vegetative communities including through plantings of native wetland tree and shrub species and spreading of a wetland seed mix. Additional information on restoration will be included in the application to alter freshwater wetlands. While restoration plans are being developed, it anticipated restoration planting will generally consist of locally sourced trees and shrubs planted 10-foot on center utilizing a triangular grid pattern. The project proponent will commit to a ten-year monitoring and management plan for both wetland and upland restoration activities. Restoration work following installation of the transmission new line will include:

- Removal of swamp mats,
- Clean up and removal of construction materials and debris,
- Reseeding of work pad and other disturbed areas, and
- Natural regrowth of vegetation.

Restoration success shall be measured based on the following criteria:

- Completion of wetland plantings in accordance with the approved plans and specifications
- Stabilization of all disturbed soils within the wetland mitigation areas
- Maintenance of at least an 85% survival rate of planted over two consecutive monitoring periods as documented during monitoring events
- Maintenance of at least 80% aerial cover of the entire site by native plant species (excluding open water and emergent marsh zones)
- Maintenance of a low occurrence of non-native, invasive species (as defined in the New England District Compensatory Mitigation Guidance)
- Proposed areas of wetland establishment meet the definition of a jurisdictional wetland by the end of the monitoring period based on presence of surface and sub-surface hydrology, hydric soils, and a preponderance of hydrophytic vegetation

Certain adaptive management strategies may need to be implemented at the restoration sites. A summary of potential issues affecting the long-term success of the restoration areas which may occur, as well as proposed responses includes:

Deficiency	Remedial Measures
Final elevations not as planned	Regrade as necessary
Inadequate soil saturation/inundation within wetland establishment areas	Regrade only if there is not a predominance of OBL, FACW, and FAC species
Less than 50% hydrophytes	Supplement seeding/planting
Inadequate species composition	Supplement seeding/planting
Inadequate plant density	Fertilize, supplement seeding
Significant erosion	Install erosion control blankets or similar materials
Less than 85% survival of saplings over two consecutive biannual monitoring periods (4 years)	Replant as necessary
Marginal tree/shrub vigor	Fertilize
Substantial human disturbance	Access control, legal remedies
Significant wildlife damage	Additional wildlife deterrents/replanting
Significant presence of invasive plant species	Biocontrol, manual removal, systemic herbicide control
Presence of archaeological resources	Notify SHPO and contract with an archaeological consultant to conduct investigation
Presence of hazardous waste	Notify RIDEM and contract with a hazardous waste firm to determine extent of contamination

Clear River Energy LLC will restrict access to the property. Locking gates will be installed at access points to prevent unauthorized activities.

To minimize impacts to water supply and wastewater the Facility will use ACCs for cycle heat rejection, which will significantly reduce water use and the production of wastewater. Wastewater generated

within the Facility will be segregated by area into separate wastewater streams according to the source of the wastewater. The primary sources of wastewater include process wastewater (primarily from the water treatment processes), general service water (general housekeeping floor and equipment drains) and sanitary wastewater.

Process wastewater sources needing pH adjustment will be treated by a wastewater neutralization system and wastewater from the general service system will collected and treated through an oil/water separator to remove oil that might be in drains from various pieces of equipment. Wastewaters generated from process wastewater and general service water sources will be collected and stored in an on-site wastewater storage tank.

Stormwater management at the Facility will comply with the requirements of the *Rhode Island Stormwater Design and Installation Standards Manual* (as amended March 2015) (RISDISM). The Facility will meet the Minimum Stormwater Management Standards outlined in the referenced guidance document to the extent practicable. The proposed Project is new development and, therefore, Minimum Standard 6 (Redevelopment and Infill Projects) does not apply. Minimum Standards 1-5 and 7-11 will be met by the Facility's stormwater management program described below.

The majority of the Facility's improved surface area qualifies as a "Land Use with Higher Potential Pollutant Load (LUHPPL)" as defined in RIPDES Rule 31(b)(15)(vi) – Steam electric power generating facilities. Because of the required site arrangement, the Facility is ineligible for a No Exposure Certification for Exclusion from RIPDES Stormwater Permitting and accordingly a stormwater management program will be developed to comply with the criteria of the LUHPPL classification (where appropriate). Areas to be classified as LUHPPL will drain stormwater to a lined gravel wet vegetated treatment system. Infiltration practices will not be proposed in LUHPPL areas.

The site access road is not considered a LUHPPL and will drain to a dry swale and attenuation pond.

Low impact development (LID) strategies will be employed to the maximum extent practicable to reduce the generation of stormwater runoff from the Facility. Conveyance facilities, natural channels, and overbanks will be sized and designed to protect them from stormwater flows in accordance with RISDISM.

Source control and pollution prevention measures will be employed to minimize adverse water quality impacts from Facility runoff. A Soil Erosion and Sediment Control (SESC) Plan will be developed in accordance with provisions of the *Rhode Island Soil Erosion and Sediment Control Handbook* and best practices.

Illicit discharges are prohibited under a RIPDES. The Facility is designed to fully separate stormwater from other wastewaters including sanitary wastewater. Following construction, the Facility designs will be conformed to as-builts, in part, to ensure that no illicit connections occurred.

A stormwater management system operation and maintenance program will be developed and included as part of the stormwater management program. The operation and maintenance program will be implemented at the Facility following termination of coverage under construction stormwater permits.

Large three-sided box culverts will be utilized to allow unimpeded flow of water and free access for wildlife travel under the proposed access road. The height of each culvert will be a minimum of

approximately three feet with a width of approximately nine feet (final geometry to be determined in final design). The length of each culvert will vary depending on the location along the access road. Retaining walls proposed along both sides of the access road will guide wildlife to the structures to avoid collisions with motor vehicles.

Compensatory Mitigation

The current proposed footprint of the Clear River Energy Center facility has been designed and sited to avoid and minimize impacts to wetland resources to the extent practicable. It is anticipated that additional opportunities to further reduce project-related wetland impacts will arise as the project design advances. Despite these measures, some project activities will be located within wetlands and result in permanent, temporary and secondary impacts to state- and federally-regulated wetlands. Compensatory wetland mitigation, for the unavoidable impacts to wetlands, streams, and/or other aquatic resources, as a result of the proposed Project, is necessary in order to meet environmental criteria for activities to be permitted under the federal requirements (i.e., Sections 401 and 404 of the New England District Compensatory Mitigation Guidance, dated July 20, 2010, for use in reviewing all mitigation for unavoidable impacts to aquatic resources.

Federal jurisdiction is pursuant to Waters of the United States (i.e., those regulated under Sections 401 and 404 of the Federal Clean Water Act ("CWA") – 33 U.S.C. § 1341 and 33 U.S.C. § 1344). In addition to the CWA, the Project is subject to Rhode Island Fresh Water Wetlands Act Rules and Regulations.

Compensatory mitigation of unavoidable direct, indirect, and secondary impacts will be required to satisfy permit requirements. According to United States Army Corps of Engineers (USACE) regulations, the fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters of the United States (33 CFR 332.3(a)). The criteria for compensatory mitigation are set forth in the USACE's mitigation regulations, the U.S. Environmental Protection Agency's (USEPA's) companion CWA regulations (40 CFR 230) and in the USACE's New England District (NED) Compensatory Mitigation Guidance (July 2010). Both the USACE and the USEPA have established a national goal of no overall loss of wetland functions, as detailed in the agencies' 1990 Memorandum of Understanding and respective mitigation regulations (33 CFR Parts 325 and 332; 40 CFR 230)). The NED Compensatory Mitigation Guidance incorporates these mitigation requirements, as well as those contained in the USACE's Regulatory Guidance Letter No. 08-03: Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving Restoration, Establishment, and/or Enhancement of Aquatic Resources (October 10, 2008). While compensatory mitigation guidance is not included in the RI Fresh Water Wetlands Act Rules and Regulations, it is typically a component of formal applications following similar general goals and objectives.

The Final Compensatory Mitigation Rule (33 CFR 332) establishes a preference hierarchy for mitigation options in order to reduce risk and uncertainty and help ensure that the required compensation is provided. The most preferred options are mitigation banks and in-lieu fee program credits. Permittee-responsible mitigation is the third and only option available in Rhode Island, with three possible circumstances (in order of preference): (1) conducted under a watershed approach, (2) on-site and in-kind, and (3) off-site/out-of-kind.

According to the NED Compensatory Mitigation Guidance, compensatory mitigation sites should be located to provide the desired water resource functions, taking into consideration factors such as watershed location, aquatic habitat diversity, connectivity, and, for wetlands and streams, a balance of wetlands

and uplands. Wetland mitigation can include 1) the restoration or reestablishment of a former wetland, 2) the creation or establishment of a new wetland, 3) the enhancement or rehabilitation of a degraded wetland or 4) land preservation. The Final Compensatory Mitigation Rule (33 CFR 332) states, in part the following: Preservation may be used to provide compensatory mitigation when the resources to be preserved provide important physical, chemical, or biological functions for the watershed; contribute significantly to the ecological sustainability of the watershed; resources are under threat of destruction or adverse modifications; and when the preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust). Typically, where preservation is used to provide compensatory mitigation, it is done in conjunction with other forms of mitigation.

In providing compensatory mitigation, the project's overall goal is to provide no net loss of existing wetland functional values and statutory interests within the affected watersheds through the preservation, restoration, enhancement, and/or creation of wetlands. As detailed in the Compensatory Mitigation Guidance, the NED has developed standard compensatory mitigation ratios to provide a framework for all compensatory mitigation. The compensation ratios focus on direct permanent impacts, with additional mitigation required to address temporary fill impacts and secondary impacts, such as conversion of forested wetlands to scrub-shrub or emergent wetlands. While these ratios are the starting point for developing appropriate compensatory mitigation, there is flexibility on a project-by-project basis in order to achieve the most appropriate mitigation for a specific project. The following tables reproduce the USACE NED guidance regarding compensatory mitigation ratios for permanent and temporary / secondary impacts, respectively. Total project-related impacts to federally protected wetlands (excluding state-protected perimeter and riverbank wetlands) will be refined as the design advances. Currently these direct impacts are anticipated to be approximately 0.61 acres of forested wetlands for the generation facility and access road only.

USACE NED Recommended Compensatory Mitigation Ratios for Direct Permanent Impacts (Table 1 in the NED Compensatory Mitigation Guidance)

Mitigation/ Impacts	Restoration[1] (reestablishment)	Creation (establishment)	Enhancement (rehabilitation)	Preservation (protection/ management
Emergent Wetlands (ac)	2:1	2:1 to 3:1	3:1 to 10:1[2]	15:1
Scrub-shrub Wetlands	2:1	2:1 to 3:1	3:1 to 10:1[2]	15:1
Forested Wetlands (ac)	2:1 to 3:1	3:1 to 4:1	5:1 to 10:1[2]	15:1
Open Water (ac)	1:1	1:1	project specific[3]	project specific
Submerged Aquatic Vegetation (ac)	5:1	project specific[4]	project specific[5]	N/A
Streams[6] (lf)	2:1[7]	N/A	3:1 to 5:1[8]	10:1 to 15:1[9]
Mudflat (ac)	2:1 to 3:1	2:1 to 3:1	project specific	project specific
Upland[10] (ac)	≥10:1[11]	N/A	project specific	15:1[12]

[1] Assumes no irreversible change has occurred to the hydrology. If there has been such a change, then the corresponding creation ratio should be used.
[2] Based on types of functions enhanced and/or degree of functional enhancement.
[3] Might include planting submerged and/or floating aquatics and/or removal of invasive species.
[4] Rare cases, e.g., removal of uplands, old fill, etc.
[5] E.g., remove pollutant source such as an outfall, remove moorings.
[6] Note that this assumes both banks will be restored/enhanced/protected. If only one bank will be restored/ enhanced/protected, use half the linear foot credit.
[7] E.g., daylighting stream, elimination of concrete channel.
[8] Enhancement of denuded banks and channelized streams = 3:1. Enhancement of denuded banks when there is a natural channel = 4:1.
Enhancement when there are vegetated banks but the stream has been channelized = 5:1.
[9] Preserving buffer within the 100-foot minimum from channel = 10:1. Preserving additional buffer 100 to 250 feet from channel = 15:1.
[10] This is when upland is used for wetland mitigation, NOT mitigation for upland impacts, which are not regulated.
[11] Only applies if existing condition is pavement or structure AND should complement aquatic functions.
[12] 100' upland buffer recommended for restoration, creation, and enhancement sites would be credited here.
[13]

Recommended Compensatory Mitigation for Temporary and/or Secondary Impacts (Excerpted from Table 2 in the NED Compensatory Mitigation Guidance)

Impact	% Of Standard[13] Amount[14]
Temporary fill (swamp mats, fill over membrane) in forested wetlands; area to revegetate to forest.	10-25%
Temporary fill in emergent or scrub-shrub; area to revert to previous condition.	5-20%
Temporary fill in forest and will be permanently converted to scrub-shrub or emergent.	15-45%[15]
Permanent conversion of forested wetlands to other cover types.	15-40%
Removal of forested wetland cover for new corridor.	Project specific
Removal of forested cover of vernal pool buffer (w/in 250' of pool) when percentage of disturbance exceeds 25% of the	Project specific[16]
Streams – clearing of upland forest and/or scrub-shrub vegetation within 100' of stream bank or outermost channel	Project specific[17]

[14] "Standard" refers to amount of compensation that would be recommended under either the Corps' mitigation ratios for permanent fill (TABLE 1) or that required in In-lieu fee payments using the standard calculation.
[15] Percentages may be reduced if appropriate project-specific BMPs are incorporated into the project.
[16] For widening existing corridors only, not new. This does not take into account fragmentation impacts.
[17] Considerations in determining appropriate mitigation for secondary impacts to vernal pools should be on overall impact to the upland vernal pool buffer and how this affects the functions of the pool.
[18] Considerations in determining appropriate mitigation for secondary impacts to streams from loss of upland buffer should be on overall impact to the upland stream buffer and how this affects the functions of the stream.

As the project design advances, the project team will develop a Compensatory Wetland Mitigation Plan following the NED Compensatory Mitigation Guidance. The plan is anticipated to include a description of project impacts, objectives, mitigation site selection procedures, site protection information, and monitoring standards in addition to all required graphics and information. The project team will seek input from the relevant local, state and federal agencies, as well as other stakeholders in the initial identification of potential mitigation sites and in the selection of those elements selected to be part of the final mitigation package. It is anticipated that the final mitigation package will include some combination of restoration, creation, enhancement or rehabilitation and/or preservation.

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Tables

Table 4.2-1 List of Vegetation and Relative Abundance

Species/Stratum	Scientific Name	Wetland 1	Wetland 2	Wetland 3	Wetland 4	Special Aquatic Site 1	Special Aquatic Site 2	Staging Area	Other Upland
Trees									
ash, green	*Fraxinus pennsylvanica*		O						
aspen, bigtooth	*Populus grandidentata*								O
birch, black	*Betula lenta*	O	O	O					C
birch, grey	*Betula populifolia*			C	C				
birch, yellow	*Betula alleghaniensis*	O	O						
cherry, black	*Prunus serotina*								O
elm, american	*Ulmus americana*	O							
gum, black	*Nyssa sylvatica*	O	O		O				O
hemlock	*Tsuga canadensis*		O						O
hop hornbeam	*Ostrya virginiana*		O						
maple, red	*Acer rubrum*	A	A	A	A		F	O	C
oak, black	*Quercus velutina*							F	C
oak, red	*Quercus rubra*	F	F	C	C	O		C	C
oak, scarlet	*Quercus coccinea*				O				O
oak, white	*Quercus alba*	O	O					O	O
pine, white	*Pinus strobus*	C	C		C	O		C	C
sassafras	*Sassafras albidum*		O	O			O		O
Shrubs									
barberry	*Berberis thunbergii*						O		
birch, black	*Betula lenta*			O	C		C		
blueberry, highbush	*Vaccinium corymbosum*	F	C	C	C			C	F
blueberry, lowbush	*Vaccinium angustifolium*							O	O
chestnut, American	*Castanea dentata*							O	
chokeberry, red	*Aronia arbutifolia*		O						
greenbriar	*Smilax sp.*		O					O	
huckleberry	*Gaylussacia frondosa*						O	O	O
laurel, mountain	*Kalmia latifolia*	C	F	C		O		C	F
laurel, sheep	*Kalmia angustifolia*								O
maleberry	*Lyonia ligustrina*		O						
swamp azalea	*Rhododendron viscosum*		O				F		
sweet pepperbush	*Clethra alnifolia*	A	C	C	F			C	C
Virginia creeper	*Parthenocissus quinquefolia*			O					O
wild raisin	*Viburnum cassinoides*			O					
winterberry	*Ilex verticillata*	O	O		O				
pussy willow	*Salix discolor*	O	O						
witchhazel	*Hamamelis virginiana*	C	O	C				O	O
Herbs									
aster, New England	*Symphyotrichum novae-angliae)*		O						
beggar ticks	*Bidens sp.*	O	O						
bugleweed	*Lycopus uniflorus*	O	O						
Canada mayflower	*Maianthemum canadense*	O							
deer-tongue	*Dichanthelium clandestinum*		O						
dogwood, silky	*Cornus amomum*						O		
fern, bracken	*Pteridium sp.*								O
fern, cinnamon	*Osmunda cinnamomea*	F	C		C		O		
fern, hay-scented	*Dennstaedtia punctilobula*	O	O						
fern, marsh	*Thylepteris palustris*		O	O					
fern, New York	*Thylepteris noveboracensis*	O	O	C	O			F	
fern, royal	*Osmunda regalis*	C	O				O		
fern, sensitive	*Onoclea sensibilis*	O					C		
fern, wood spinulose	*Dryopteris carthusiana*	O						O	O
goldenrod, Canada	*Solidago canadensis*		O				O		
goldenrod, wrinkle-leaved	*Solidago rugosa*		O						
goldthread	*Coptis trifolia*	O							
woodgrass	*Brachyelytrum erectum*	O		C					O
greenbrier	*Smilax sp.*	C	O						
marsh dewberry	*Rubus flagellaris*			O					

marsh st. john's wort	*Triadenum viginicum*								
meadowsweet	*Spiraea latifolia*		O						
moss, haircap	*Polystricum spp.*								O
moss, sphagnum	*Sphagnum spp.*	C	C	C	C		C		
multiflora rose	*Rosa multiflora*						O		
oat-grass	*Arrhenatherum elatius*		O						
partridgeberry	*Mitchella repens*								O
poison ivy	*Toxicodendron radicans*	O							O
rush, Canadian	*Juncus candensis*		O						
rush, slender	*Junus tenuis*		O						
rush, soft	*Juncus effusus*		O						
sedge, fringed	*Carex crinata*	O	O				O		
sedge, broom	*Carex scoparia*		O						
sedge, Pennsylavania	*Carex pennsylvanica*								
sedge, shallow	*Carex lurida*	O					O		O
sedge, tussock	*Carex stricta*		O						
sessile-leaved bellwort	*Uvularia sessifolia*	O							O
skunk cabbage	*Symplocarpus foetidus*	O	O						
snakeroot	*Ageratina altissima*		O						
starflower	*Trientalis borealis*	O		O				O	O
steeplebush	*Spiraea tomentosa*		O				O		
sundew, roundleaved	*Drosera rotundifolia*		O						
swamp candles	*Lysimachia terrestris*								
swamp dewberry	*Rubus hispidus*	O	O		C		O		
wild grape	*Vitis sp.*		O				O		
woolgrass	*Scirpus cyperinus*		O						
* A=Abundant >75%, F=Frequent 50-75%, C=Common 15-50%, O=Occasional <15%									

Figures

Path: J:\1108 - Invenergy Burrillville\04 Graphics\GIS\00 MXD\EFSB Addendum\1108_ Figure_1_Project_Locus.mxd

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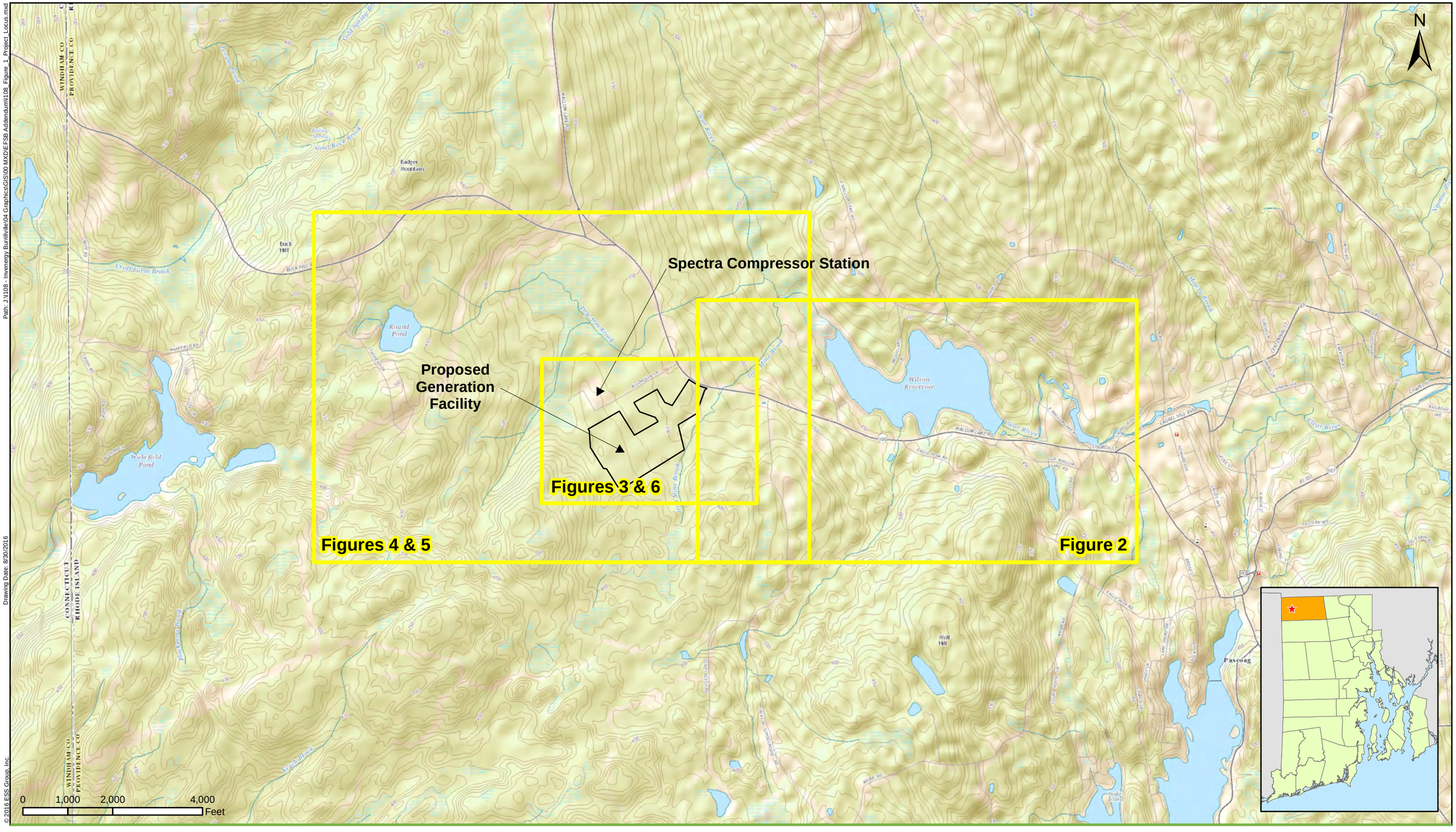


Clear River Energy, LLC
Clear River Energy Center

Burrillville, Rhode Island

1 inch = 2,000 feet

Source: 1) USGS, Topo Map, 2016
2) ESS, Limit of Disturbance, 2016

Clear River Energy Center
Project Locus Map

Figure 1

Path: J:\1108 - Inventergy Burrillville\04 Graphics\GIS\00 MXD\RIDEM 3rd Set\1108_Figure_3_Water_Mains.mxd

Drawing Date: 8/30/2016

Clear River Energy, LLC
Clear River Energy Center

Burrillville, Rhode Island

1 inch = 800 feet

Source: 1) ESRI, Imagery, 2016, 2) ESS, Site Location, 2016

CREC Property Boundary

Proposed Wastewater Main

Clear River Energy Center
Wastewater Main

Figure 2

Path: J:\1108 - Invenergy Burrillville\04 Graphics\GIS\00 MXD\RIDEM 3rd Set\1108_Figure_4_CREC.mxd

Drawing Date: 8/30/2016

Wetland 3

Dry Arm Brook

Wetland 4

Wetland 2

Spectra Compressor Station

Gas Line

345 kV Overhead Transmission Line

ALGONQUIN LN

WALLUM LAKE RD

Access Road

Temporary Construction Staging Area

Wetland 1

Generation Facility

Iron Mine Brook

SAS1

SAS2

N

0 200 400 800 Feet

Clear River Energy, LLC
Clear River Energy Center

Burrillville, Rhode Island

1 inch = 400 feet

Source: 1) USGS 2011 Imagery
2) RIGIS, Roads E-911 2016
3) ESS, Delineated Wetlands 2015

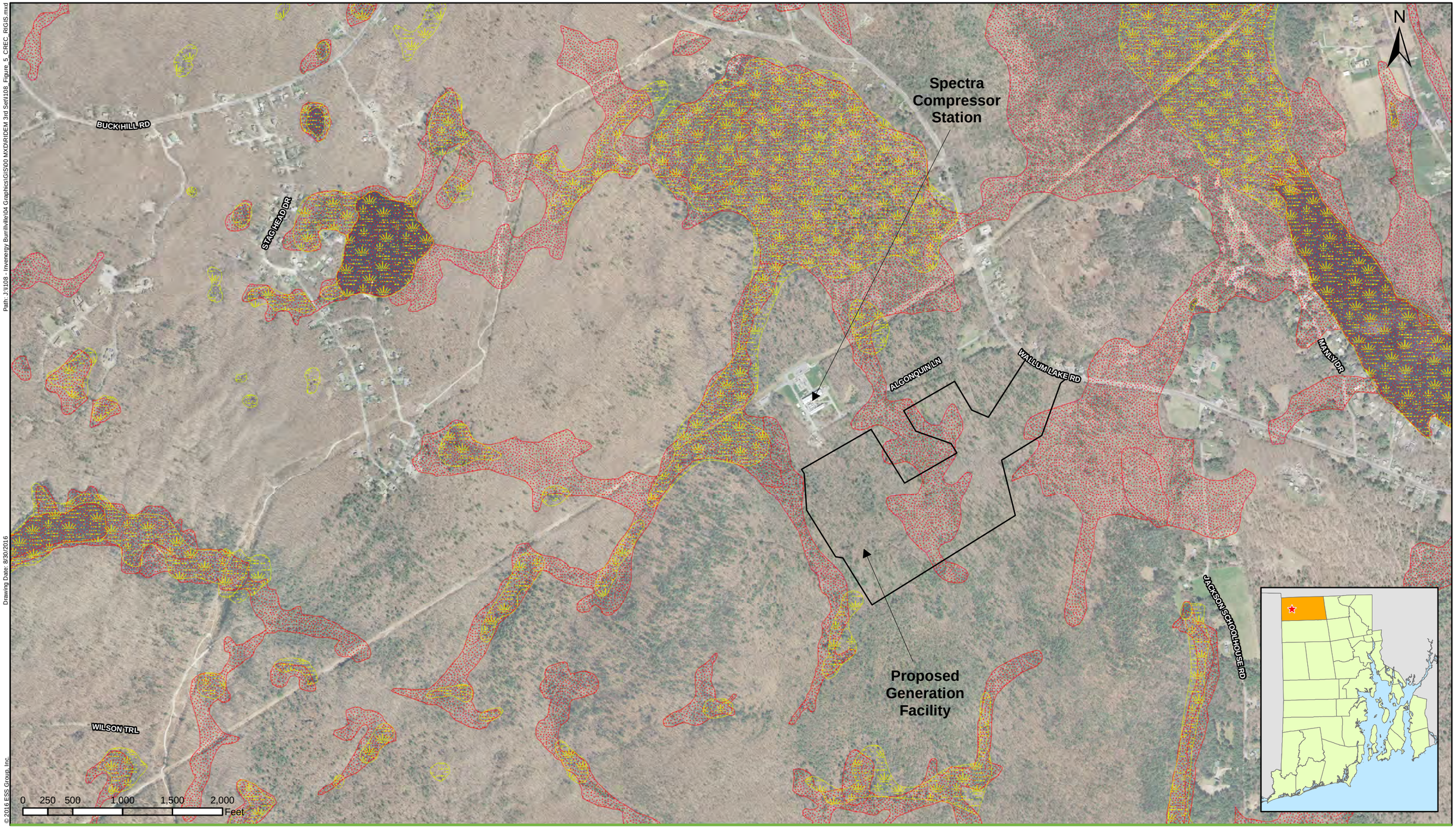
- Limit of Disturbance
- Limit of Disturbance
- Perennial Stream Centerline
- Perennial Stream Bank
- 200' Riverbank Wetland
- Intermittent Stream Centerline
- 100' Riverbank Wetland
- Wetland Edge
- 50' Perimeter Wetland
- Wetland Area

Clear River Energy Center
Proposed Layout

Figure 3

Path: J:\1108 - Invenergy Burrillville\04 Graphics\GIS\MXD\RIDEM 3rd Set\1108_Figure_5_CREC_RIGIS.mxd

Drawing Date: 8/30/2016



Clear River Energy, LLC
Clear River Energy Center

Burrillville, Rhode Island

1 inch = 900 feet

Source: 1) USGS 2011 Imagery
2) RIGIS, Roads E-911 2016
3) RIGIS National Wetlands Inventory 2015
4) RIGIS NRCS Hydric Soils 2014

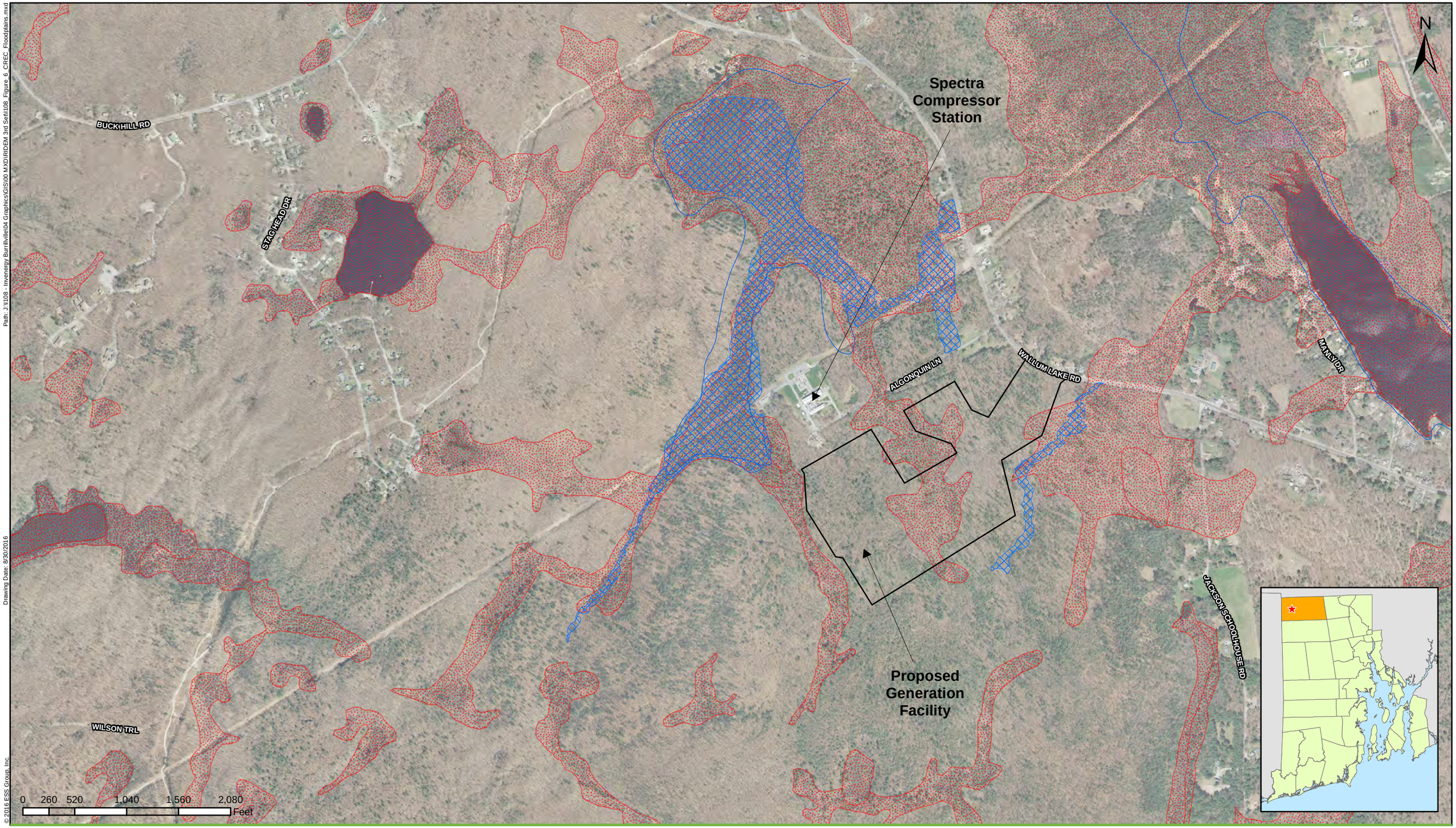
CREC Property Boundary
National Wetlands Inventory
Hydric Soils

Clear River Energy Center
Surrounding Area Wetlands Data

Figure 4

Path: J:\1108 - Inventergy Burrillville\04 Graphics\GIS\100 MXD\RIDEM 3rd Set\1108_Figure_6_CREC_Floodplains.mxd

Drawing Date: 8/30/2016



Clear River Energy, LLC
Clear River Energy Center

Burrillville, Rhode Island

1 inch = 900 feet

Source: 1) USGS 2011 Imagery
2) RIGIS, Roads E-911 2016
3) RIGIS National Wetlands Inventory 2015
4) RIGIS NRCS Hydric Soils 2014

- Flood Zone A - 1% Annual Chance (No BFE)
- Modeled 100 Year Floodplain
- Hydric Soils
- CREC Property Boundary

Clear River Energy Center
Surrounding Area Floodplains

Figure 5

Path: J:\1108 - Invenergy Burrillville\04 Graphics\GIS\00 MXD\RIDEM 3rd Set\1108_Figure_6_Forest Impacts.mxd

Drawing Date: 8/30/2016

Clear River Energy, LLC
Clear River Energy Center

Burrillville, Rhode Island

1 inch = 400 feet

Source: 1) USGS 2011 Imagery
2) RIGIS, Roads E-911 2016
3) RIGIS National Wetlands Inventory 2015
4) RIGIS NRCS Hydric Soils 2014

Legend

- Wetland 2 100' Buffer within LOD
- Wildlife Corridor
- Wetlands
- Proposed Line of Disturbance
- Direct Impact to Jurisdictional Wetlands (2.4 Acres)
- Indirect Impact 100' Buffer of LOD (29 Acres)
- Indirect Impact 300' Buffer of LOD (68 Acres)
- Unfragmented Forest 500 Acres or More

Clear River Energy Center
Direct and Indirect Impacts to Forest Habitat

Figure 6

Appendix A

Wetland Forms and Photographs

Wetland Function-Value Evaluation Form

Total area of wetland 35 Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use Residential, Mixed Deciduous Forest, Industrial Distance to nearest roadway or other development 5 ft.

Dominant wetland systems present PFO1E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Upper

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland 1

Latitude 41.966798 Longitude -71.752007

Prepared by: JB Date 6/28/2016

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office [X] Field [X]

Corps manual wetland delineation completed? Y [X] N [ ]

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X		1,6,7,11,12,13,15	X	wetland is upstream from designated groundwater recharge areas, aquifer, and WHPA
Floodflow Alteration	X		1,2,5,6,7,8,9,10,13,14,15,16,18	X	wetland is upstream of downtown Pascoag, which has some floodplain development
Fish and Shellfish Habitat	X		1,2,4,7,8,10,11,12,14,16,17	X	~1 mile upstream of Wilson Reservoir, perennial stream bisects wetland
Sediment/Toxicant Retention	X		3,5,6,7,8,10,12,13,14,16	X	long retention time, dense vegetation and perennial stream have sediment trapping potential
Nutrient Removal	X		1-3,8,9,11,12,13,14	X	wetland has high potential for nutrient attenuation
Production Export	X		1,2,4,5,6,7,10,12	X	wetland has high potential for primary and secondary production
Sediment/Shoreline Stabilization	X		6-7, 12,14		wetland provides bank and sediment stabilization to Iron Mine Brook
Wildlife Habitat	X		1-8,11,13,15,16,17-19,21	X	designated by RIDEM as a wildlife corridor and contiguous forest patch >500 acres
Recreation		X	5, 6		wetland is located on private property and access is restricted
Educational/Scientific Value		X	2, 4-5,14		wetland is located on private property and access is restricted
Uniqueness/Heritage		X	5,7,18,22,27		wetland is located on private property and access is restricted
Visual Quality/Aesthetics		X	4,5,7,8,11		wetland is located on private property and access is restricted
ES Endangered Species Habitat		X			no endangered species present during surveys
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 103 ac Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use Residential, Mixed Deciduous Forest, Industrial Distance to nearest roadway or other development crosses transmission line

Dominant wetland systems present PFO4, PF01E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Upper

How many tributaries contribute to the wetland? 2 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland 2

Latitude 41.96729 Longitude -71.75972

Prepared by: JB Date 6/29/2016

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office [X] Field [X]

Corps manual wetland delineation completed? Y [X] N [ ]

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X		1,6,7,11,12,13,15	X	wetland is upstream from designated groundwater recharge areas, aquifer, and WHPA
Floodflow Alteration	X		1,2,5,6,7,8,9,10,13,14,15,16,18	X	wetland is upstream of downtown Pascoag, which has some floodplain development
Fish and Shellfish Habitat	X		1,2,4,7,8,10,11,14-17		~1 mile upstream of Wilson Reservoir, perennial stream bisects wetland
Sediment/Toxicant Retention	X		3,5,6,7,8,9,10,12,13,14,16	X	dense vegetation and perennial stream have sediment trapping potential
Nutrient Removal	X		1,3,8,9,11,12,13,14	X	wetland has potential for nutrient attenuation
Production Export	X		1,2,4,5,6,7,10,12	X	wetland has high potential for primary and secondary production
Sediment/Shoreline Stabilization	X		6-7, 12,14		wetland provides bank and sediment stabilization to Dry Arm Brook
Wildlife Habitat	X		1-8,11,13,15,16-19,21	X	Designated by RIDEM as a wildlife corridor and contiguous forest patch >500 acres
Recreation		X	5-6		wetland is located on private property and access is restricted
Educational/Scientific Value		X	2, 4-5,14		wetland is located on private property and access is restricted
Uniqueness/Heritage		X	5,7,18,22,27		wetland is located on private property and access is restricted
Visual Quality/Aesthetics		X	4,5,7,8,11		wetland is located on private property and access is restricted
ES Endangered Species Habitat		X			no endangered species present during surveys
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 3 Human made? No Is wetland part of a wildlife corridor? No or a "habitat island"? No

Adjacent land use Residential, Mixed Deciduous Forest, Transmission Line Distance to nearest roadway or other development 500 ft.

Dominant wetland systems present PFO1E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? Yes If not, where does the wetland lie in the drainage basin?

How many tributaries contribute to the wetland? None Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland 3

Latitude 41.968307 Longitude -71.765734

Prepared by: JB Date 6/29/2016

Wetland Impact:
Type Area

Evaluation based on:
Office [X] Field [X]

Corps manual wetland delineation completed? Y [X] N [ ]

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X		1,2,5,6,16		wetland is small but has some groundwater recharge potential
Floodflow Alteration	X		2, 5-6, 8-9, 18		wetland has some flood storage capacity
Fish and Shellfish Habitat		X	1		no open water habitat
Sediment/Toxicant Retention		X	8,9		wetland is small and does not appear to have major sources of sediment
Nutrient Removal		X			wetland is small and does not appear to have major sources of nutrients
Production Export		X			does not appear to have high potential for export
Sediment/Shoreline Stabilization		X			no open water shorelines associated with wetland
Wildlife Habitat	X		1, 3-5, 7,8,11,13	X	wetland is small but located within a large unfragmented forest (>500 acres)
Recreation		X	2		Wetland is located on private property and access is restricted
Educational/Scientific Value		X	14		wetland is located on private property and access is restricted
Uniqueness/Heritage		X	5		wetland is located on private property and access is restricted
Visual Quality/Aesthetics		X	4		wetland is located on private property and access is restricted
ES Endangered Species Habitat		X			no endangered species present during surveys
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 0.29 Human made? No Is wetland part of a wildlife corridor? No or a "habitat island"? No

Adjacent land use Residential, Mixed Deciduous Forest, Transmission Line Distance to nearest roadway or other development 1250 ft.

Dominant wetland systems present PFO1E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? Yes If not, where does the wetland lie in the drainage basin?

How many tributaries contribute to the wetland? None Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland 4

Latitude Longitude

Prepared by: JB Date 6/29/2016

Wetland Impact:
Type Area

Evaluation based on:
Office [X] Field [X]

Corps manual wetland delineation completed? Y [ ] N [ ]

Function/Value	Suitability Y (✓)	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X		1-2,5,6,15		wetland us small but has some groundwater recharge capacity
Floodflow Alteration	X		2,5,6,8,9, 18		wetland is small and does not appear to hold standing water during most of the season
Fish and Shellfish Habitat		X	1		no open water habitat
Sediment/Toxicant Retention		X	8,9		wetland is small and does not appear to have major sources of sediment
Nutrient Removal		X			wetland is small and does not appear to have major sources of nutrients
Production Export		X			does not appear to have high potential for export
Sediment/Shoreline Stabilization		X			no open water shorelines associated with wetland
Wildlife Habitat	X		1,4,5,7,8,11,13,	X	wetland is small but located within a large unfragmented forest (>500 acres)
Recreation		X			Wetland is located on private property and access is restricted
Educational/Scientific Value		X	14		wetland is located on private property and access is restricted
Uniqueness/Heritage		X	5,23		wetland is located on private property and access is restricted
Visual Quality/Aesthetics		X	4		wetland is located on private property and access is restricted
ES Endangered Species Habitat		X			no endangered species present during surveys
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 7 Human made? No Is wetland part of a wildlife corridor? ? or a "habitat island"? No

Adjacent land use Residential, Mixed Deciduous Forest Distance to nearest roadway or other development 5 ft.

Dominant wetland systems present PFO1E Contiguous undeveloped buffer zone present ?

Is the wetland a separate hydraulic system? Yes If not, where does the wetland lie in the drainage basin?

How many tributaries contribute to the wetland? None Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. PUD Wetland A

Latitude 41.963904 Longitude -71.699703

Prepared by: JB Date 6/29/2016

Wetland Impact:
Type Area

Evaluation based on:
Office [X] Field [X]

Corps manual wetland delineation completed? Y [X] N [ ]

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge			1-3,5,8,12	X	wetland hydrology likely dependent on local water table
Floodflow Alteration	X		2,5-9,18	X	wetland is a vernal pool that holds surface water during spring
Fish and Shellfish Habitat		X	1		wetland does not have hydrologic characteristics sufficient to support fish/shellfish population
Sediment/Toxicant Retention	X		1,2,4,5,6,8,9		wetland is located in lower portions of watershed and collects/retains sediment during storm events
Nutrient Removal	X		3,4,5,6,7,8,9,10,11	X	deep organic layer has potential to trap nutrients
Production Export		X			does not appear to have high potential for export
Sediment/Shoreline Stabilization		X			no open water shorelines associated with wetland
Wildlife Habitat	X		1,7,8,11,13,15,16-21	X	wetland functions as an amphibian breeding area
Recreation		X	5		lack of open water habitat or other recreational opportunity
Educational/Scientific Value	X		4,5,8,9,10,14	X	wetland is located on municipal property and as a vernal pool has high educational and scientific value
Uniqueness/Heritage	X	X	5,8,9,17		potential educational opportunities along with available access and parking
Visual Quality/Aesthetics	X	X	4,5,7,8,9,11		important wildlife habitat and relatively easy access
ES Endangered Species Habitat		X			no listed species known to exist in this area
Other					

Notes:

* Refer to backup list of numbered considerations.

Photograph No.: 1
Northwestern Wetland 1

Photograph No.: 2
Woods road in eastern project area. Wetland 1 located to the left.

Photograph No.: 3
Iron Mine Brook at Wallum Lake Road, Wetland 1

Photograph No.: 4
Unnamed intermittent stream in northeastern Wetland 1

Photograph No.: 5
Wetland 2, eastern arm, south of woods road

Photograph No.: 6
Eastern hemlock stand in northeastern portion of Wetland 2

Photograph No.: 7
Perennial stream in western arm of Wetland 2

Photograph No.: 8
Upland adjacent to western arm of Wetland 2

Photograph No.: 9
Wetland 2 shrub/emergent wetland in Algonquin Gas Transmission Line

Photograph No.: 10
Wetland 3

SB-2015-06 Invenergy CREC Service List as of 08/26/2016

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