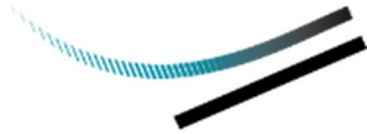


APPENDIX G

WETLAND SURVEYS



DILLON
CONSULTING

NATURAL FORCES DEVELOPMENTS LP

Wetland Surveys

Westchester Wind Project – Appendix G

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1.0 Introduction

The Proponent engaged the expertise of Dillon Consulting Limited (Dillon) to complete the biophysical surveys for the Environmental Assessment (EA) registration for the Westchester Wind Project (the Project), including wetland surveys. Surveys were completed by qualified wetland delineators with Nova Scotia Environment and Climate Change (NSECC formally NSE) approved Wetland Delineation Certification. Dillon has been involved in several resource development projects in Atlantic Canada and has assisted many proponents through the provincial EA processes.

Wetlands are defined as land where the water table is at, near, or above the land's surface, or land which is saturated for a long enough period to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic vegetation, and various kinds of biological activities adapted to the wet environment (Nova Scotia Environment [NSE] 2019). Wetlands were assessed as a biophysical VEC because they may perform many important functions and services in landscapes (e.g., improving water quality, controlling floods, providing critical habitat for rare and endangered species, and many others) (NSE 2019). In addition to performing important landscape functions, wetland ecosystems are typically some of the most productive ecosystems encountered in Nova Scotia. As such, in Nova Scotia (and elsewhere), many other VECs (e.g., SAR and SoCC, migratory birds and culturally significant flora and fauna) are hosted within wetland ecosystems.

Nova Scotia's wetlands have been given specific protection pursuant to the Nova Scotia Environment Act and the Environmental Goals and Sustainable Prosperity Act. NSE requires a permit for any wetland alteration greater than 100 m² in area (NSE 2019). Wetlands often support rare or uncommon vegetation species assemblages, and the Nova Scotia Wetland Conservation Policy and regulatory processes are guided towards the goal of achieving no net loss of wetland function (NSE 2021). Wetland compensation for alterations of a delineated wetland is often required as a condition of a watercourse alteration permit when a net loss of wetland function occurs.

1.1 Scope of Work

For the purposes of this EA registration document, the following definition of a wetland is adopted from the NSE Proponent Guide:

Wetlands – Land commonly referred to as marshes, swamps, fens, bogs, and shallow water areas that are saturated with water long enough to promote wetland or aquatic processes. Salt marshes are also wetlands (NSE 2018).

The scope of work (SOW) included a desktop assessment of wetlands within the Wetland Local Assessment Area (LAA) as well as a preliminary field assessment and delineation of wetlands within the LAA of a preliminary proposed project layout. Additional field assessments are planned for 2022 for

wetlands that have not been field-truthed as part of the 2021 preliminary wetland assessment. The LAA for the Wetland VEC is presented in Figure G-1 and includes the following:

- 50 m buffers along either side of the roads required to access turbine sites during construction and operation;
- 50 m buffers along powerline infrastructure;
- 150 m buffers around substations and ancillary equipment; and
- 150 m buffers around turbine bases.

2.0 Methods

2.1 Desktop Survey

A wet areas model (WAM) was developed using GIS (Geographical Information Systems) to predict potential watercourse and wetland crossings not mapped in provincial or wetland watercourse datasets. This process relies heavily upon the availability of LiDAR Digital Elevation Models (DEM), which are freely available in Nova Scotia. A flow accumulation analysis was completed to determine the area that flows into each cell within the study area. Using these data and applying a suitable threshold is a useful predictor of watercourses, potential watercourses, and drainage channels within a study area. The potential watercourses and drainage channels are then used as an input into potential wet areas modeling.

Wet areas modeling involves comparing the elevations of each cell in a study area against the elevation of the nearest known mapped water features (lakes, rivers, wetlands, etc.). Where there are small differences in the ground elevation against these features (i.e., less than 1 m) these areas can be good predictors of potential wet areas. The predicted watercourse crossings and wet areas were compared against aerial imagery and included as potential constraints in the preliminary layout design.

2.2 Field Survey

The wetland field survey included the field verification and preliminary delineation of wetlands within the LAA as predicted based on wet areas modeling. Field surveys of the wetlands in the LAA were conducted by experienced biologists/scientists that are certified in wetland identification and delineation.

The methods of wetland determination and delineation are based upon established protocols for wetland delineation, which are outlined in the US Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987/2010). Wetland determination and delineation is primarily focused upon establishing the wetland-upland edge, and is based upon the presence of positive indicators for three parameters, including:

- Hydric (wet) soil conditions;
- Hydrophytic (wet adapted) vegetation; and,
- Wetland hydrology.

The focus of the preliminary wetland assessment was to verify the delineation of the wetlands that were predicted during the desktop assessment within the LAA. For this, a two parameter system was established at representative locations within the field identified wetlands based on the presence of hydrophytic vegetation and wetland hydrology. Wetland edges were georeferenced using a handheld Global Positioning System (GPS) (3 to 5 m accuracy).

In order to assure the accuracy of the boundary being delineated, additional soil samples are often made using a soil auger at regular intervals during the delineation. By doing so, the presence of hydrology and hydric soil indicators is able to be confirmed, and continually corroborated with the observation of wetland vegetation and topographic relief, all of which assist in the delineation of the wetland-upland edge condition.

The following defines the wetland parameters:

Hydric Soils - Hydric soil conditions are formed when an area of land is exposed to flooding or saturation for a sufficient length of time during the growing season such that an anaerobic (or oxygen-free) environment is created within the soil matrix. These anaerobic conditions may reveal themselves in a number of ways, but often through the formation of redox (reduction-oxidation) features within the soil matrix, the development of organic soils (i.e., peat), or the creation of hydrogen sulphide (rotten-egg odour), among many other indicators. Interpretation of soil profiles, their associated colours, textures and the presence/absence of any hydric soil indicators provides the basis for judgment of whether or not any given soil is a hydric soil (USDA 2010).

Soil sampling is performed to a depth of at least 50 cm (or to point of refusal, such as bedrock) to identify conditions in wetland soils. Soil horizons are documented in terms of their texture, thickness, colour (Munsell value/chroma/hue) and presence of hydric soil indicators (when applicable). Hydric soil indicators are determined as per Field Indicators of Hydric Soils in the United States (USDA 2010). Wetland Delineation Data Sheets were used to record data collected in the field. The data sheets provide the detailed soil information for each sample point, as well as list the various possible hydric soil indicators.

Hydrophytic Vegetation - Hydrophytic vegetation arises in areas of land where saturation or inundation is of a sufficient duration so as to exert a controlling influence on the plant community derived therefrom. In such areas, plant species which are adapted to high-moisture environments tend to dominate. In order for a given area to classify as a wetland, hydrophytic vegetation should account for the majority (>50%) of the sample sites' total vegetation (USACE 1987).

For every plant species, there is a wetland indicator status which may be interpreted as that species' estimated probability of occurring within a wetland (USACE 1987). If the majority of plant cover in the sample area is comprised of species with facultative (FAC), facultative wetland (FACW), or obligate (OBL) statuses, then the positive indicator for hydrophytic vegetation is met. If the majority of plant cover in the sample area is comprised of species with a facultative upland (FACU) or upland (UPL), then the area sampled is unlikely to be subject to wetland processes and is probably not a wetland. Wetland indicator statuses for plant species were determined as per United States Department of Agriculture (USDA) Region 1 (Nova Scotia and New Brunswick) listings for interpreting USDA Wetland Indicator Statuses.

Species encountered at each of the sample locations were analyzed at three strata (tree, shrub, and herbaceous) and were documented in terms of their percent (%) cover within a given plot size (10 m, 5 m and 2 m radius, respectively) and their wetland indicator status (FAC, FACW, and OBL). Wetland indicator status definitions are provided in Table 1 below.

Table 1. Wetland Indicator Status and Their Definitions

Indicator Status	Definition	% Occurrence in Wetlands
Obligate (OBL)	Almost always occur under natural conditions in wetlands.	99%
Facultative Wetland (FACW)	Usually occur in wetlands, but occasionally found in non-wetlands.	67-99%
Facultative (FAC)	Equally likely to occur in wetlands and non-wetlands.	34-66%
Facultative Upland (FACU)	Usually occur in non-wetlands, but occasionally found in wetlands.	1-33%
Upland (UPL)	Can occur in wetlands in other regions, but almost always occur in non-wetlands of the specified region.	1%

Source: Adapted from Lichvar et al. (2012)

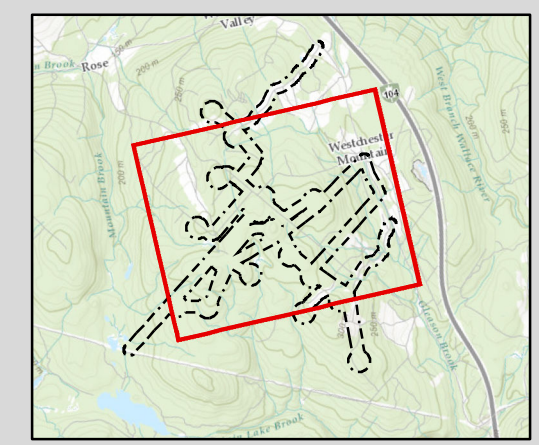
Wetland Hydrology - Both in the soil pits prepared, and over the greater area of the wetland, observations were made concerning the presence of a hydrological regime, which would sustain wetland processes. Taken into consideration were: the site context, site location, and the microtopography of the wetland area.

Primary hydrology indicators (of which at least one must be present) include surface water, a high water table, soil saturation, and sediment deposits, among many other others (USACE 1987). Secondary indicators (of which two are required, in the absence of a primary indicator) include surface soil cracks, drainage patterns, moss trim line, and drift or sediment deposits, among many others.

WETLANDS WITHIN THE TERRESTRIAL LOCAL ASSESSMENT AREA

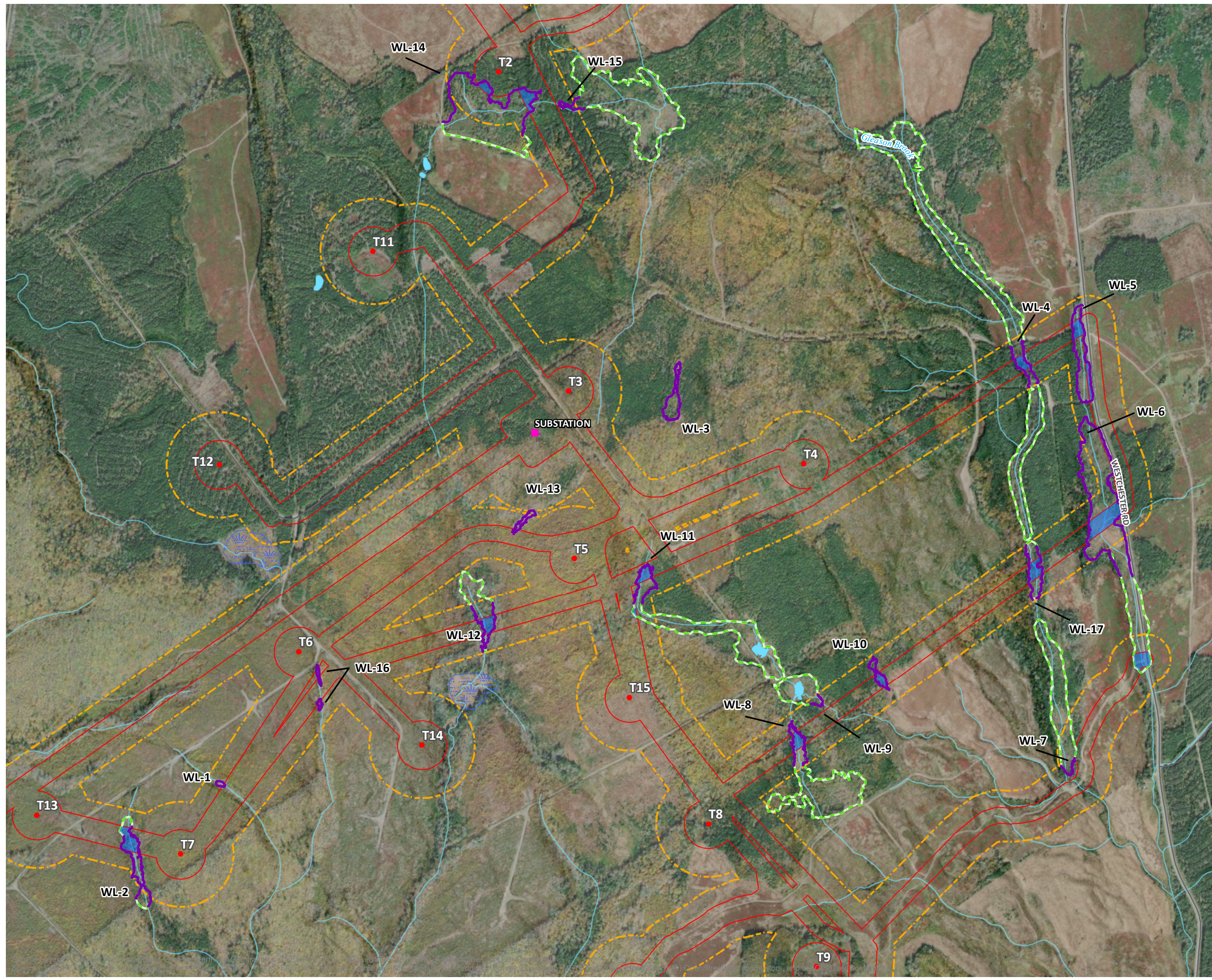
FIGURE G-1

- Proposed Turbine Location
- Substation
- Project Development Area
- Local Assessment Area
- Preliminary Field Delineated Wetland
- Model Interpreted Wetland Boundary
- Wetland and Project Development Area Intersection
- Watercourse
- Waterbody
- Wetland



MAP DRAWING INFORMATION:
DATA PROVIDED BY DILLON CONSULTING, GEONB, NATURAL FORCES

MAP CREATED BY: MEC
MAP CHECKED BY: KB
MAP PROJECTION: NAD 1983 UTM ZONE 20N



3.0 Results

Wetlands identified within the LAA are shown on Figure G-1 and described in Section 3.1. Based on the desktop assessment and the preliminary field assessments based on the original Project layout, 17 wetlands were identified within the LAA. Approximately 7.42 ha of wetlands were delineated within the LAA; however, only 2.51 ha of were delineated within the Project Development Area (PDA). Based on the current proposed PDA (i.e., the assessment of 16 WTG locations with the intention to develop up to 12 WTG locations), which includes an approximately 70 ha of land which has been assessed only by desktop based on predictive mapping of potential wet areas within the LAA. An estimated three additional wetlands, totalling 1.72 ha, are potentially within the LAA.

Of these wetlands, the majority were treed and shrub swamps; however, there were also wet meadows, fens, and bogs located on the landscape. There are blueberry fields and forest harvesting, along with their associated roads in the area, so some of the wetlands in the area are likely already impacts by forestry/agriculture activities.

Desktop-based analysis constraints mapping informed an avoidance-based design approach for the proposed Project layout. Predicted wetlands and watercourses were then ground-truthed during the 2021 field season to confirm that avoidance was achieved to the extent possible. Wetlands were not observed within 30 m of the proposed WTG locations; however, a few wetlands are located with the PDA for access road development if the current road layout is selected. By using the existing road network, the possible impacts to wetlands from the Project activities can be greatly minimized. The southern portion of wetland 7 is located adjacent to existing site roads and likely already experiences impacts from previous and current site activity.

3.1 Wetlands Located in the Local Assessment Area

The following wetlands assessed during the 2021 field season for the proposed Project are described below. These wetlands were delineated prior to a WTG layout change.

Wetland 1 – Wet Meadow

Approximate/predicted total area: 0.030 ha.

Delineated area within PDA: 0.0041 ha.

Approximate % of wetland overlap with PDA: 13.7%

Wetland 1 (WL-1) is classified as a wet meadow and is located between the proposed locations of T6 and T7. This small wetland has an inlet and outlet with an intermittent channel meandering through the wetland area. WL-1 drains to the southeast via an unnamed tributary to Fountain Lake Brook. The soil

conditions in WL-1 were saturated and the water table was approximately 8" below the surface. Other indicators of wetland hydrology included water-stained leaves, drift deposits and drainage patterns.

As currently proposed, approximately 13.7% of WL-1 overlaps with the PDA.

Photos 1 and 2 below show the typical vegetation present in Wetland 1, Table 2 describes the vegetation profile of Wetland 1, and Table 3 describes the soil profile.

Table 2. Vegetation Profile of Wetland 1

Stratum	Plant Species
Tree	Yellow Birch (<i>Betula allegheniensis</i>), Sugar Maple (<i>Acer saccharum</i>)
Sapling/Shrub	Mountain Maple (<i>Acer spicatum</i>), Sugar Maple, Yellow Birch, Hobblebush (<i>Viburnum lantinooides</i>), Common Blackberry (<i>Rubus allegheniensis</i>)
Herb	Northeastern Manna Grass (<i>Glyderia melicaria</i>), Nodding Sedge (<i>Carex gynandra</i>), Star Sedge (<i>Carex echinata</i>), Pointed Broom Sedge (<i>Carex scoparia</i>), Wood Fern (<i>Dryopteris spp.</i>), Dwarf Raspberry (<i>Rubus pubescens</i>)

Table 3. Soil Profile of Wetland 1

Depth	Matrix	Redox Features	Texture
2-0"	n/a	n/a	duff layer
0-10"	2.5Y 2.5/1 (100%)	none	Silty loam mixed w/ dark organics
10"+	Restrictive Layer	n/a	Cobbles/gravels



Photo 1. Representative photo of Wetland 1 (14 July 2021)



Photo 2. Representative photo of Wetland 1 (14 July 2021)

Wetland 2 – Treed Swamp

Approximate/predicted total area: 0.719 ha.

Delineated area within PDA: 0.261 ha.

Approximate % of wetland overlap with PDA: 36.3%

Wetland 2 (WL-2) is a treed swamp and is located between the proposed locations of T7 and T13. This wetland has an inlet and outlet with an intermittent channel meandering through the wetland area connecting them. WL-2 drains to the south as an unnamed tributary to Fountain Lake Brook. The soil conditions in WL-2 were saturated and there was shallow standing water (~2 inches) in depressions throughout the wetland. Other indicators of wetland hydrology included water-stained leaves, aquatic fauna, and a high water table.

As currently proposed, approximately 36.3% of WL-2 overlaps with the PDA.

Photos 3 and **4** below show the typical vegetation present in Wetland 2, **Table 4** describes the vegetation profile of Wetland 2, and **Table 5** describes the soil profile.

Table 4. Vegetation Profile of Wetland 2

Stratum	Plant Species
Tree	Yellow Birch, Sugar Maple, Red Spruce (<i>Picea rubens</i>)
Sapling/Shrub	Balsam Fir (<i>Abies balsamea</i>), Sugar Maple, Yellow Birch, Speckled Alder (<i>Alnus incana</i>)
Herb	Sensitive Fern (<i>Onoclea sensibilis</i>), Dwarf Enchanter's Nightshade (<i>Circaea alipina</i>), Dark-green Bullrush (<i>Scirpus atrovirens</i>), Common Marsh Bedstraw (<i>Galium palustre</i>), Dwarf Raspberry, Wood Fern, Nodding Sedge, Northeastern Manna Grass, <i>Epilobium spp.</i> , <i>Lycopus spp.</i>

Table 5. Soil Profile of Wetland 2

Depth	Matrix	Redox Features	Texture
0-10"	n/a	none	Sphagnum and other organics
10"+	Restrictive Layer	n/a	Cobbles



Photo 3. Vegetation and Open water in Wetland 2 (14 July 2021)



Photo 4. Representative Photo of Wetland 2 (14 July 2021)

Wetland 3 – Fen

Approximate/predicted total area: 0.343 ha.

Delineated area within PDA: 0.00 ha.

Approximate % of wetland overlap with PDA: 0.0%

Wetland 3 (WL-3) is currently classified as a fen and is located to the east of the proposed location of T3. This wetland appears to be influenced by groundwater and has one outlet, draining to the north as an unnamed tributary to Gleason Brook. The soil conditions in WL-3 were saturated and the water table was at the soil surface.

WL-3 was delineated during the 2021 field season; however, the Project footprint has since changed and, as such, there is currently no overlap between WL-3 and the PDA.

Photos 5 and 6 below show the typical vegetation present in Wetland 3, Table 6 describes the vegetation profile of Wetland 3, and Table 7 describes the soil profile.

Table 6. Vegetation Profile of Wetland 3

Stratum	Plant Species
Tree	Yellow Birch, Balsam Fir
Sapling/Shrub	Yellow Birch, Balsam Fir, Spruce
Herb	Sensitive Fern, Nodding Sedge, Dark-green Bullrush, Canada Bluejoint (<i>Calamagrostis canadensis</i>), Dwarf Raspberry, Purple-stemmed Aster (<i>Symphotrichum puniceum</i>), Marsh St. John's Wort (<i>Hypericum virginicum</i>)

Table 7. Soil Profile of Wetland 3

Depth	Matrix	Redox Features	Texture
0-10"	n/a	none	Sphagnum and other organics
10"+	Restrictive Layer	n/a	Cobbles and gravels



Photo 5. Representative Photo of Wetland 3 (14 July 2021)



Photo 6. Representative Photo of Wetland 3 (14 July 2021).

Wetland 4 – Shrub Swamp

Approximate/predicted total area: 5.575 ha.

Delineated area within PDA: 0.127 ha.

Approximate % of wetland overlap with PDA: 2.3%

Wetland 4 (WL-4) is currently classified as a shrub swamp and is located to the west of Westchester Road, where it functions as a floodplain area for Gleason Brook (Photo 7). There is a gravel forestry/agriculture road immediately north of WL-4. Its inlet and outlet are Gleason Brook, in addition to a secondary ephemeral inlet on the western side of the wetland (Photo 8). The soil conditions in WL-4 were saturated and the water table was approximately 6" below the surface. Standing water in backchannels of Gleason Brook and other stagnant areas was typically 4 inches deep. Other indicators of wetland hydrology included drift deposits and aquatic fauna.

As currently proposed, approximately 2.3% of WL-4 overlaps with the PDA.

Photos 9 and 10 below show the typical vegetation present in Wetland 4, Table 8 describes the vegetation profile of Wetland 4, and Table 9 describes the soil profile.

Table 8. Vegetation Profile of Wetland 4

Stratum	Plant Species
Tree	Balsam Fir
Sapling/Shrub	Speckled Alder, Mountain Maple
Herb	Sensitive Fern, Tall Meadow-rue (<i>Thalictrum pubescens</i>), Dwarf Enchanter's Nightshade, Dwarf Raspberry, Northeastern Manna Grass, Greater Bladder Sedge (<i>Carex intumescens</i>), Pointed Broom Sedge, Rough Bedstraw (<i>Galium asprellum</i>), Common Marsh Bedstraw, Purple-stemmed Aster

Table 9. Soil Profile of Wetland 4

Depth	Matrix	Redox Features	Texture
0-10"	5YR 2.5/1 (100%)	none	Silt with sand and organics
10+"	Restrictive Layer	n/a	Cobbles and gravels



Photo 7. Gleason Brook within Wetland 4 (5 October 2021)



Photo 8. Second ephemeral inlet of Wetland 4 (5 October 2021)



Photo 9. Representative photo of Wetland 4 (15 July 2021)



Photo 10. Representative photo of Wetland 4 (15 July 2021)

Wetland 5 – Shrub Swamp

Approximate/predicted total area: 0.836 ha.

Delineated area within PDA: 0.303 ha.

Approximate % of wetland overlap with PDA: 36.2%

Wetland 5 (WL-5) is classified as a shrub swamp and is located immediately west and adjacent to the Westchester Road. To its east, is mostly surrounded by blueberry fields and managed conifer plantations. This wetland area is contiguous with road ditching, but a naturalized channel still exists meandering widely throughout the wetland. This channel drains into a culvert under a dirt road (Photo 11) and into WL-6, eventually joining with Gleason Brook approximately 1,500 m downstream. There was some puddled, shallow standing water (~2 inches) throughout the wetland and soil conditions were found to be saturated. Other indicators of wetland hydrology included a high water table, aquatic fauna and water-stained leaves.

As currently proposed, approximately 36.2% of WL-5 overlaps with the PDA.

Photos 12 and 13 below show the typical vegetation present in Wetland 5, Table 10 describes the vegetation profile of Wetland 5, and Table 11 describes the soil profile.

Table 10. Vegetation Profile of Wetland 5

Stratum	Plant Species
Tree	N/A
Sapling/Shrub	Speckled Alder, Balsam Fir, Elderberry (<i>Sambucus spp.</i>)
Herb	Spotted Touch-me-not (<i>Impatiens capensis</i>), Sensitive Fern, Rough Bedstraw, Northeastern Manna Grass, Purple-stemmed Aster, Common Marsh Bedstraw, White Turtlehead (<i>Chelone glabra</i>), Tall Meadow-rue (<i>Thalictrum pubescens</i>), Jack-in-the-pulpit (<i>Arisaema triphyllum</i>) (Photo 14), Dwarf Enchanter's Nightshade, Wild Mint (<i>Mentha arvensis</i>)

Table 11. Soil Profile of Wetland 5

Depth	Matrix	Redox Features	Texture
5-0"	n/a	n/a	mucky organics
0-5"	5Y 3/1 (100%)	none	Silty clay loam
5"+	Restrictive Layer	n/a	Small gravel with minor sand component



Photo 11. Culvert at outlet of Wetland 5 (5 October 2021)



Photo 12. Representative photo of Wetland 5 (15 July 2021)



Photo 13. Representative Photo of Wetland 5 (15 July 2021)



Photo 14. Jack in-the-Pulpit (7 June 2021).

Wetland 6 – Fen/Shrub Swamp

Approximate/predicted total area: 4.501 ha.

Delineated area within PDA: 0.761 ha.

Approximate % of wetland overlap with PDA: 16.9%

Wetland 6 (WL-6) is currently classified as a fen/shrub swamp complex and, as with WL-5, is located immediately west and adjacent to the Westchester Road. WL-5 and WL-6 were once likely one contiguous wetland, however, they are now separated by an access road which serves as a logging access road and popular ATV trail. WL-6 has two inlets, one from WL-5, which travels through a culvert under the aforementioned access road/ATV trail (Photo 11), and another from across the Westchester Road, draining into the wetland from the east. The stream stemming from WL-5 has a defined, often incised channel through WL-6 that averages 35 cm deep, with pools up to 60 cm deep (Photo 15). Schools of small brook trout were observed within this stream. This second inlet is intermittent or ephemeral and appears to be the result of an old, overgrown ATV path (Photo 16). Lastly, a number of incidences of Large Purple Fringed Orchid (*Platanthera grandiflora*) were found in this wetland, which is listed as S3 (vulnerable) according to the Atlantic Canada Conservation Data Centre (AC CDC). The soil conditions in WL-6 were found to be saturated, there were areas of shallow, standing water throughout, and the water table was at or very near the soil surface. Other indicators of wetland hydrology included observed aquatic fauna, including the eggs and larvae of *Amystoma* spp. salamanders.

As currently proposed, approximately 16.9% of WL-6 overlaps with the PDA.

Photo 17, 18 and 19 below illustrate the typical vegetation present in WL-6 and Photo 20 shows the suspected salamander larvae (*Amystoma* spp.). Table 12 describes the vegetation profile of WL-6, and Table 13 describes the soil profile. Photos 19 and 20 below show aquatic fauna found in WL-6.

Table 12. Vegetation Profile of Wetland 6

Stratum	Plant Species
Tree	N/A
Sapling/Shrub	Speckled Alder
Herb	Canada Bluejoint, Swamp Yellow Loosestrife (<i>Lysimachia terrestris</i>), Marsh St. John's Wort, Star Sedge, Small-fruited Bullrush (<i>Scirpus microcarpus</i>), Common Marsh Bedstraw, Large Purple Fringed Orchid

Table 13. Soil Profile of Wetland 6

Depth	Matrix	Redox Features	Texture
4-0"	n/a	n/a	duff layer/organics
0-12"	10YR 2/1 (100%)	none	Silt w/ organics
12"+	Restrictive Layer	n/a	Cobbles/gravels



Photo 15. Permanent channel within Wetland 6 (15 July 2021)

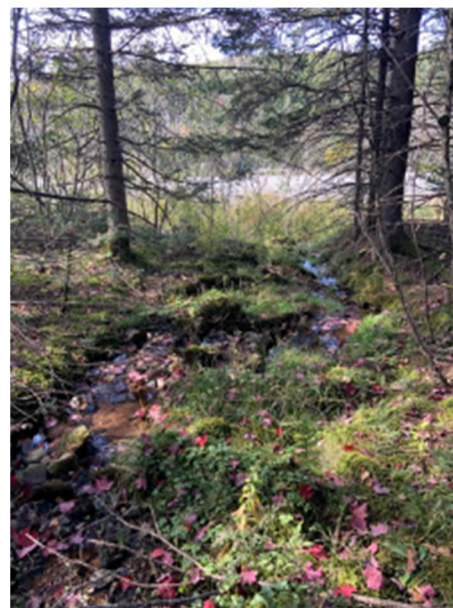


Photo 16. Ephemeral inlet to Wetland 6 (8 October 2021)



Photo 17. Representative photo of Wetland 6 (15 July 2021)

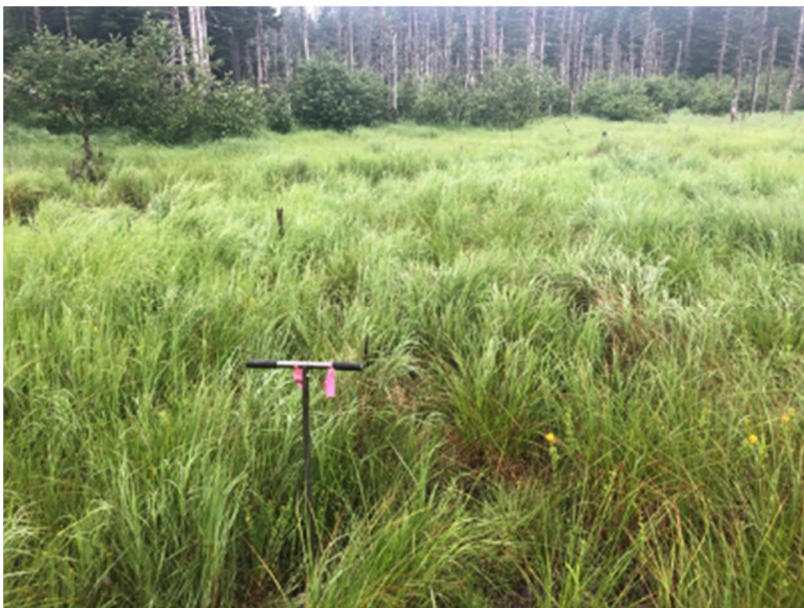


Photo 18. Representative photo of Wetland 6 (15 July 2021).



Photo 19. Representative Photo of Wetland 6 (15 July 2021)



Photo 20. Aquatic Salamander larvae (*Amystoma* spp.) observed in Wetland-6 (15 July 2021)

Wetland 7 – Shrub Swamp

Approximate/predicted total area: 1.781 ha.

Delineated area within PDA: 0.002 ha.

Approximate % of wetland overlap with PDA: 0.1%

Wetland 7 (WL-7) is currently classified as a shrub swamp and is located to the west of Westchester Road, where it functions as a floodplain area for Gleason Brook. An existing timber-decked bridge structure spans Gleason Brook at this wetland's outlet and a large culvert conveys the brook southward (Photo 21). The wetland is largely surrounded by managed blueberry fields on all sides, and as such, has had much of its forested buffer cleared.

As currently proposed, approximately 16.9% of WL-7 overlaps with the PDA.

Photo 22 below shows the typical vegetation present in WL-7, and Table 14 describes the vegetation profile of Wetland 7. A soil profile was not collected at WL-7.

Table 14. Vegetation Profile of Wetland 7

Stratum	Plant Species
Tree	N/A
Sapling/Shrub	Speckled Alder, Meadowsweet (<i>Spirea alba</i>)
Herb	Canada Bluejoint, American Bur-reed (<i>Sparganium americanum</i>), Sensitive Fern, Common Marsh Bedstraw, Tall-Meadow-rue, Wild Mint

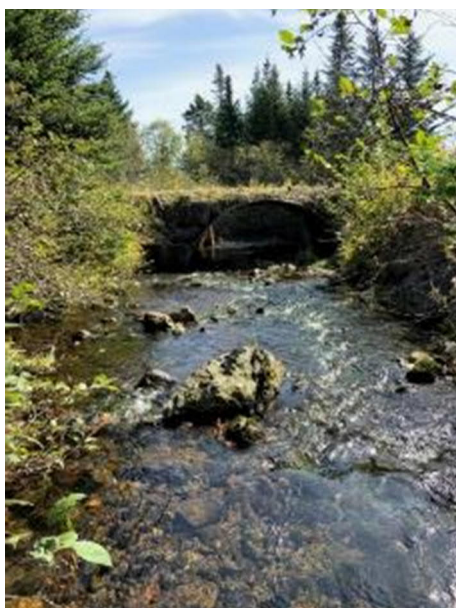


Photo 21. Large Culvert at the Outlet of Wetland 7 (19 July 2021)



Photo 22. Representative Photo of Wetland 7 (19 July 2021)

Wetland 8 - Fen

Approximate/predicted total area: 2.430 ha.

Delineated area within PDA: 0.135 ha.

Approximate % of wetland overlap with PDA: 5.6%

Wetland 8 (WL-8) is currently classified as a fen and is located northeast of the proposed location of T8. It has at least two inlets, one stemming from WL-9 (north) which appears to overtop an old ATV trail during periods of high flow, and another more ephemeral input from the hillside to its west. The watercourse channel within the wetland was often incised and occasionally appeared to become subterranean (Photo 23). This wetland drains to the southeast into an unnamed tributary to Gleason Brook, which it joins approximately 900 m downstream. The closest existing road to WL-8 is approximately 30 m northeast. The soil conditions in WL-8 were saturated and the water table was at or very near the soil surface.

As currently proposed, approximately 5.6% of WL-8 overlaps with the PDA.

Photo 24 below shows the vegetation present in WL-8, Table 15 describes the vegetation profile of Wetland 8, and Table 16 describes the soil profile.

Table 15. Vegetation Profile of Wetland 8

Stratum	Plant Species
Tree	N/A
Sapling/Shrub	Birch, Willow (<i>Salix spp.</i>), Spruce, Meadowsweet, Red Maple (<i>Acer rubrum</i>)
Herb	Woolgrass (<i>Scirpus cyperinus</i>), Rough-stemmed Goldenrod (<i>Solidago rugosa</i>), Sensitive Fern, Common Marsh Bedstraw, Necklace Sedge (<i>Carex projecta</i>), Atlantic Sedge (<i>Carex atlantica</i>), Marsh St. John's Wort, Woodland Strawberry (<i>Fragaria vesca</i>), Cattails (<i>Typha spp.</i>)

Table 16. Soil Profile of Wetland 8

Depth	Matrix	Redox Features	Texture
32-0"	n/a	n/a	Organics, peat
0"+	Restrictive Layer	n/a	Possibly bedrock and gravels



Photo 23. Intermittent Channel in Wetland 8 (8 October 2021)



Photo 24. Representative Photo of Wetland 8 (19 July 2021)

Wetland 9 – Fen/Shrub Swamp

Approximate/predicted total area: 0.838 ha.

Delineated area within PDA: 0.00 ha.

Approximate % of wetland overlap with PDA: 0.0%

Wetland 9 (WL-9) is currently classified as a fen/shrub swamp complex and is located northeast of the proposed location of T8. This wetland has one inlet stream, which stems from WL-11 to its north, as well as two outlets. WL-9 and WL-11 were likely once contiguous, but have since been separated by an abandoned access road. However, the culvert that once conveyed this stream between WL-11 and into WL-9 is currently blown out which is allowing for a less restricted flow between the two wetlands than when it was operational. This stream flows through the wetland and outlets to the southeast as an unnamed tributary to Gleason Brook, which it join approximately 900 m downstream. As previously mentioned, this wetland's second outlet appears water overtops an ATV trail to the west of WL-9 during periods of high flow and contributes to the hydrology of WL-8. The soil conditions in WL-9 were saturated, the water table was at or near the soil surface and there were areas of 6 to 8" of standing water throughout. Other indicators of wetland hydrology included aquatic fauna and drift deposits. Lastly, several instances of Large Purple Fringed Orchid were observed in this wetland, which is defined as S3 (vulnerable) according to the Atlantic Canada Conservation Data Centre (AC CDC) (Photo 25).

Although, there is a delineated portion of WL-9 within the LAA, as currently proposed, WL-9 does not overlap with the PDA.

Photos 26 and 27 below show the typical vegetation present in WL-9, Table 17 describes the vegetation profile of WL-9, and Table 18 describes the soil profile.

Table 17. Vegetation Profile of Wetland 9

Stratum	Plant Species
Tree	Black Spruce (<i>Picea mariana</i>)
Sapling/Shrub	Speckled Alder, Meadowsweet
Herb	Spotted touch-me-not, Sensitive Fern, Nodding Sedge, Marsh St. John's Wort, Fox Sedge (<i>Carex vulpinoidea</i>), Necklace Sedge, Rushes (<i>Juncus spp.</i>), Common Marsh Bedstraw, Rough-stemmed Goldenrod, Arrow-leaved Tearthumb (<i>Polygonum sagittatum</i>), Fowl Manna Grass (<i>Glyceria striata</i>), Northeastern Manna Grass, Grass-leaved Goldenrod (<i>Euthamia graminifolia</i>), <i>Lycopus spp.</i> , Purple-fringed Orchid

Table 18. Soil Profile of Wetland 9

Depth	Matrix	Redox Features	Texture
8-0"	n/a	n/a	Peat/organics
0"+	Restrictive Layer	n/a	Cobbles/gravels



Photo 25. Purple-fringed Orchid (19 July 2021)



Photo 26. Representative Photo of Wetland 9 (19 July 2021)



Photo 27. Representative Photo of Wetland 9 (19 July 2021)

Wetland 10 – Wet Meadow

Approximate/predicted total area: 0.147 ha.

Delineated area within PDA: 0.087 ha.

Approximate % of wetland overlap with PDA: 59.1%

Wetland 10 (WL-10) is currently classified as a wet meadow and is located south of the proposed T4 location. This wetland occurs on a gentle slope with no apparent inlets, suggesting it derives its hydrology primarily from spring-fed groundwater. This wetland has outlet draining southeast as an unnamed tributary to Gleason Brook, which it joins approximately 700 m further downstream. The soil conditions in WL-10 were saturated and there was 1" of standing water in shallow puddles throughout. As currently proposed, approximately 59.1% of WL-10 overlaps with the PDA.

Photos 28 and 29 below show the typical vegetation present in WL-10, Table 19 describes the vegetation profile of WL-10, and Table 20 describes the soil profile.

Table 19. Vegetation Profile of Wetland 10

Stratum	Plant Species
Tree	Yellow Birch, Balsam Fir, Red Maple
Sapling/Shrub	Meadowsweet, Bristly Black Currant (<i>Ribes lacustre</i>)
Herb	Interrupted Fern (<i>Osmunda claytoniana</i>), Cinnamon Fern (<i>Osmunda cinnamomea</i>), Sensitive Fern, Bristly Dewberry (<i>Rubus hispida</i>), Two-seeded Sedge (<i>Carex disperma</i>), Woolgrass

Table 20. Soil Profile of Wetland 10

Depth	Matrix	Redox Features	Texture
8-0"	n/a	n/a	Organics/peat/muck
0"+	Restrictive Layer	n/a	Possibly bedrock



Photo 28. Representative Photo of Wetland 10 (19 July 2021)

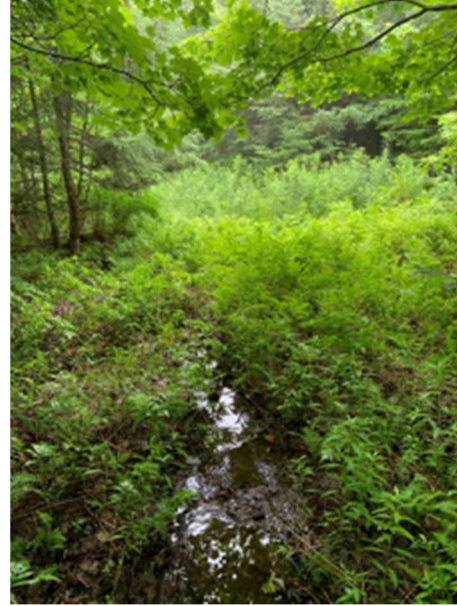


Photo 29. Representative Photo of Wetland 10 (19 July 2021)

Wetland 11 – Fen/Shrub Swamp

Approximate/predicted total area: 2.504 ha.

Delineated area within PDA: 0.159 ha.

Approximate % of wetland overlap with PDA: 6.4%

Wetland 11 (WL-11) is currently classified as a fen/shrub swamp complex and is located southeast of the proposed location of T5. Forest harvesting has taken place in the surrounding upland area of WL-11 and a wide, purposeful trench (Photo 30) that appears to collect road drainage, directs flow towards the wetland area (Photo 31). There is no channelized stream within the northern lobe of this wetland (area within the PDA), but subterranean flow was sometimes visible in pockets of open water. This northern lobe of WL-11 drains to the east, becoming narrower, and eventually channelizes into a stream that is conveyed by a small culvert under an old ATV trail into a second, larger lobe that is located immediately north of Wetland 9. This second, more southern, lobe (Photo 32) features a permanent ponded area, which likely holds small minnow species. The ponded area appears to be the result of an active beaver dam, which restricts the outflow of WL-11 into WL-9. The soil conditions in WL-11 were saturated and the water table was at or near the soil surface. Other indicators of hydrology included observed aquatic fauna, drift deposits and water-stained leaves.

As currently proposed, approximately 6.4% of WL-11 overlaps with the PDA.

Photos 33 and 34 below show the typical vegetation present in Wetland 11, Table 21 describes the vegetation profile of Wetland 11, and Table 22 describes the soil profile.

Table 21. Vegetation Profile of Wetland 11

Stratum	Plant Species
Tree	Black Spruce, Balsam Fir, Yellow Birch
Sapling/Shrub	Black Spruce, Balsam Fir, Yellow Birch, Willows
Herb	Nodding Sedge, Canada Bluejoint, Atlantic Sedge, Cinnamon Fern

Table 22. Soil Profile of Wetland 11

Depth	Matrix	Redox Features	Texture
12-0"	n/a	n/a	Organic (100% Sphagnum)
0"+	Restrictive Layer	n/a	Possibly bedrock

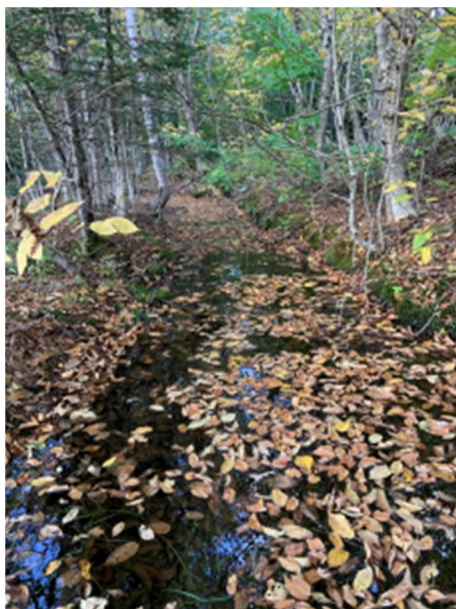


Photo 30. Trench Draining into Northern Lobe of Wetland 11 (8 October 2021)



Photo 31. Inlet of Wetland 11 (8 October 2021)



Photo 32. Larger Southern Lobe of Wetland 11 (19 July 2021)



Photo 33. Northern Lobe of Wetland-11 and Representative Vegetation (19 July 2021)



Photo 34. Northern Lobe of Wetland-11 and Representative Vegetation (19 July 2021)

Wetland 12 – Treed Swamp

Approximate/predicted total area: 0.891 ha.

Delineated area within PDA: 0.165 ha.

Approximate % of wetland overlap with PDA: 18.5%

Wetland 12 (WL-12) is currently classified as a treed swamp and is located to the west of the proposed location of T6. This wetland is surrounded by early succession deciduous regrowth as the surrounding upland appears to have been previously clearcut. The wetland has two ephemeral inlets along its northern edge and one outlet into an unnamed tributary to Fountain Lake Brook, which it joins a short 200 m further downstream, within an NSDNR mapped wetland located immediately northeast of T14. The soil conditions in WL-12 were saturated and there was 1-2" of standing water. Other indicators of wetland hydrology included a high water table and observed aquatic fauna.

As currently proposed, approximately 18.5% of WL-12 overlaps with the PDA.

Photos 35 and 36 below show the vegetation present in WL-12, Table 23 describes the vegetation profile of WL-12, and Table 24 describes the soil profile.

Table 23. Vegetation Profile of Wetland 12

Stratum	Plant Species
Tree	Yellow Birch, Red Maple
Sapling/Shrub	Speckled Alder, Balsam Fir, Yellow Birch
Herb	Canada Bluejoint, Sensitive Fern, White Turtlehead, Tall Meadow-rue, Northeastern Manna Grass, Yellow Avens (<i>Geum aleppicum</i>), Jack-in-the-pulpit

Table 24. Soil Profile of Wetland 12

Depth	Matrix	Redox Features	Texture
10-0"	n/a	n/a	Mucky, dark organics
0"+	Restrictive Layer	n/a	Possibly bedrock, cobbles



Photo 35. Representative photo of Wetland 12 (19 July 2021)



Photo 36. Representative photo of Wetland 12 (19 July 2021)

Wetland 13 – Treed Swamp

Approximate/predicted total area: 0.096 ha.

Delineated area within PDA: 0.011 ha.

Approximate % of wetland overlap with PDA: 11.0%

Wetland 13 (WL-13) is currently classified as a treed swamp and is located to the south of the proposed T3 location. Like WL-12, this wetland is surrounded by early succession deciduous regrowth as the surrounding upland appears to have been previously clearcut. WL-13 drains toward and into WL-12, eventually joining Fountain Lake Brook approximately 500 m its outlet. The soil conditions in WL-13 were saturated. Other indicators of wetland hydrology included drainage pattern and water-stained leaves.

As currently proposed, approximately 11.0% of WL-13 overlaps with the PDA.

Photos 37 and 38 below show the typical vegetation present in WL-13, Table 25 describes the vegetation profile of WL-13, and Table 26 describes the soil profile.

Table 25. Vegetation Profile of Wetland 13

Stratum	Plant Species
Tree	Yellow Birch, Red Maple, American Beech (<i>Fagus grandifolia</i>)
Sapling/Shrub	Mountain Maple, Balsam Fir, Speckled Alder
Herb	Interrupted Fern, Nodding Sedge, Canada Bluejoint, Necklace Sedge, Canada Manna Grass (<i>Glyceria canadensis</i>),

Table 26. Soil Profile of Wetland 13

Depth	Matrix	Redox Features	Texture
6-0"	n/a	n/a	Mucky organics
0"+	Restrictive Layer	n/a	Rock



Photo 37. Representative Photo of Wetland 13 (19 July 2021)



Photo 38. Representative Photo of Wetland 13 (19 July 2021)

Wetland 14 – Shrub Swamp

Approximate/predicted total area: 3.672 ha.

Delineated area within PDA: 0.282 ha.

Approximate % of wetland overlap with PDA: 7.7%

Wetland 14 (WL-14) is currently classified as a shrub swamp and is located south of the proposed location of T2. This wetland is subject to a number of ongoing anthropogenic influences as it is largely surrounded by managed blueberry fields and conifer plantations. The southern boundary of WL-14 is constrained by a dirt access road and portions of its northern boundary appear to have been historically cleared and planted with rows of conifers. The wetland has two inputs entering from the northwest and southwest, respectively, which merge within the wetland area and may represent the headwaters of Gleason Brook. The wetland outlets to the east as a permanent channel before flowing into WL-15. The

soil conditions in WL-14 were saturated, the water table was found to be at or very near the soil surface and there were occasional shallow ponded areas (1 to 2 inches).

As currently proposed, approximately 7.7% of WL-14 overlaps with the PDA.

Photos 39 and 40 below show the typical vegetation present in WL-14, Table 27 describes the vegetation profile of WL-14, and Table 28 describes the soil profile.

Table 27. Vegetation Profile of Wetland 14

Stratum	Plant Species
Tree	Black Spruce
Sapling/Shrub	Speckled Alder
Herb	Sensitive Fern, Canada Bluejoint, Rough-stemmed Goldenrod, Crested Shield Fern (<i>Dryopteris cristata</i>), Golden Groundsel (<i>Packera aurea</i>), Fowl Manna Grass, Tall Meadow-rue

Table 28. Soil Profile of Wetland 14

Depth	Matrix	Redox Features	Texture
10-0"	n/a	n/a	Mucky organics
0"+	Restrictive Layer	n/a	Gravels



Photo 39. Representative Photo of Wetland 14 (19 July 2021)



Photo 40. Representative Photo of Wetland 14 (19 July 2021)

Wetland 15 – Fen/Shrub Swamp

Approximate/predicted total area: 4.056 ha.

Delineated area within PDA: 0.00 ha.

Approximate % of wetland overlap with PDA: 0.0%

Wetland 15 (WL-15) is currently classified as a fen/shrub swamp complex and is located southeast of the proposed location of T2. This wetland has at least four inlets, including the permanent channelized inlet deriving from Wetland 14. As with WL-14, this wetland also appears to have had portions of its area historically cleared and planted with rows of conifers. A ponded area within WL-15 appears to be the result of an active beaver dam, which also restricts the outflow of the wetland. The soil conditions in WL-15 were saturated, the water table was found to be at or very near the soil surface and there were occasional shallow ponded areas (1 to 2 inches) in addition to the previously described larger ponded area (which was deeper, but could not be measured). Other indicators of wetland hydrology included a high water table and observed aquatic fauna.

Although, there is a delineated portion of WL-15 within the LAA, as currently proposed, WL-15 does not overlap with the PDA.

Photos 41 and 42 below show the typical vegetation present in WL-15, Table 29 describes the vegetation profile of Wetland WL-15, and Table 30 describes the soil profile.

Table 29. Vegetation Profile of Wetland 15

Stratum	Plant Species
Tree	Black Spruce
Sapling/Shrub	Speckled Alder
Herb	Sensitive Fern, Canada Bluejoint, Rough-stemmed Goldenrod, Crested Shield Fern (<i>Dryopteris cristata</i>), Golden Groundsel (<i>Packera aurea</i>), Fowl Manna Grass, Tall Meadow-rue

Table 30. Soil Profile of Wetland 15

Depth	Matrix	Redox Features	Texture
10-0"	n/a	n/a	Mucky organics
0"+	Restrictive Layer	n/a	Gravels



Photo 41. Representative Photo of Wetland 15 (19 July 2021)

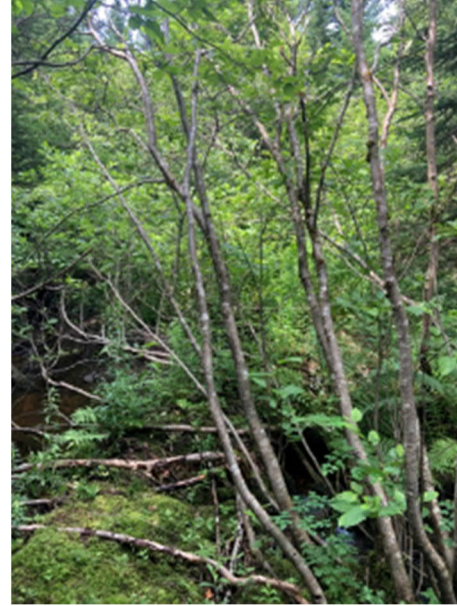


Photo 42. Representative photo of Wetland 15 (19 July 2021)

Wetland 16 – Wet Meadow/Treed Swamp

Approximate/predicted total area: 0.059 ha.

Delineated area within PDA: 0.022 ha.

Approximate % of wetland overlap with PDA: 36.7%

Wetland 16 (WL-16) is currently classified as a wet meadow/treed swamp complex located just south of the proposed location of T6. This small wetland is surrounded by early succession deciduous regrowth as the surrounding upland appears to have been previously clearcut. WL-16 does not appear to have any inlets and drains to the south into an unnamed tributary to Fountain Lake Brook. The soil conditions in WL-16 were saturated and there was standing water approximately 2 to 4" in depth in scattered depressions. Other indicators of wetland hydrology included drainage patterns, sparsely vegetated concave depressions, water-stained leaved and some limited surface soil cracking.

As currently proposed, approximately 36.7% of WL-16 overlaps with the PDA.

Photos 43 and 44 show the typical vegetation in WL-16, and Table 31 describes the vegetation profile. A soil profile was not collected at WL-16.

Table 31. Vegetation profile of Wetland 16

Stratum	Plant Species
Tree	Yellow Birch, Sugar maple
Sapling/Shrub	Yellow Birch, Balsam Fir, Speckled Alder
Herb	Cinnamon Fern, Canada Bluejoint, Fowl Manna Grass, Marsh St. John's Wort, Common Marsh Bedstraw, Woodfern



**Photo 43. Representative Photo of Wetland 16
(30 September 2021)**



**Photo 44. Representative Photo of Wetland 16
(30 September 2021)**

Wetland 17 – Shrub Swamp

Approximate/predicted total area: 0.511 ha.

Delineated area within PDA: 0.187 ha.

Approximate % of wetland overlap with PDA: 36.5%

Wetland 17 (WL-17) is currently classified as a shrub swamp and is located to the west of Westchester Road, where it functions as a floodplain area for Gleason Brook. This wetland has one inlet and one outlet, Gleason Brook, which remains channelized and straight, flowing southward through the wetland. WL-17, as with many of the other wetlands, is wedged between actively managed blueberry fields and conifer plantations, which have mostly eliminated any natural forested buffer. Lastly, the presence of the Eastern Waterfern (*Peltigera hydrotheria*) (Photo 45), which is listed by SARA/NS Endangered Species Act as 'Threatened') was detected within Gleason Brook in WL-17. Consequently, this wetland may be considered a Wetland of Special Significance pursuant to the provincial Wetland Conservation Policy (NSE 2019).

As currently proposed, approximately 36.5% of WL-17 overlaps with the PDA.

Photos 46 and 47 below show the vegetation in WL-17, and Table 32 describes the vegetation profile. A soil profile was not collected at WL-17.

Table 32. Vegetation Profile of Wetland 17

Stratum	Plant Species
Tree	n/a
Sapling/Shrub	Meadowsweet, Speckled Alder
Herb	Sensitive Fern, Canada Bluejoint, Rough-stemmed Goldenrod, Crested Shield Fern (<i>Dryopteris cristata</i>), Fowl Manna Grass, Tall Meadow-rue



Photo 45. Eastern Waterfan in Wetland 17 (25 August 2021)



Photo 46. Representative Photo of Wetland 17 (25 August 2021)



Photo 47. Representative photo of Wetland 17
(25 August 2021)

4.0

References

- Adamus, P.R. 2018. Wetland Ecosystem Services Protocol for Atlantic Canada (WESPAC). Calculator spreadsheet and manual. New Brunswick Department of Environment and Local Government, Government of New Brunswick, Fredericton, NB.
- National Wetlands Working Group. 1997. The Canadian Wetland Classification System, 2nd Edition. Warner, B.G. and C.D.A. Rubec (eds.), Wetlands Research Centre, University of Waterloo, Waterloo, ON, Canada. 68 pp.
- (NSNRR) Nova Scotia Natural Resources and Renewables. 2022. Species at Risk – Recovery Update. Biodiversity Program, Wildlife Division. Retrieved from Government of Nova Scotia: <https://novascotia.ca/natr/wildlife/species-at-risk/>. Accessed February 2022.
- (NSE) Nova Scotia Environment. 2018. A Proponent’s Guide to Environmental Assessment. Policy Division, Environmental Assessment Branch. iii + 38 pp.
- (NSE) Nova Scotia Environment. 2019. Nova Scotia Wetland Conservation Policy. Retrieved from Government of Nova Scotia: <https://novascotia.ca/nse/wetland/docs/Nova.Scotia.Wetland.Conservation.Policy.pdf>. Accessed January 2022.
- U.S Army Corps of Engineers. 1987. Corps of Engineers Wetlands Delineation Manual. Prepared for U.S. Army Corps of Engineers Washington, DC 20314-1000. Retrieved from: US Army Corps of Engineers: <https://usace.contentdm.oclc.org/digital/collection/p266001coll1/id/4530>. Accessed January 2022.