A desktop review of the New Scotia Groundwater Atlas (GNS 2020) was completed by Dillon Consulting (2022). It should be noted that the information provided within the Nova Scotia Groundwater Atlas is not guaranteed for accuracy. There are a number of domestic water wells located within the Falls Lake area to the Southwest of the PDA. The wells range from 15.2 to 152.3 meters deep and have between 6.1 and 12.2 meters of casing. Bedrock in the Falls Lake area was encountered between ground surface and 9.7 meters below ground surface (mbgs) (GNS 2020). Domestic Water wells are also located in the area of North Canoe Lake which is in the vicinity of the access point to the PDA. The wells range from 23.8 to 97.4 meters deep and have between 4.8 and 12.2 meters of casing. Bedrock in the area of North Canoe Lake was encountered between ground surface and 4.8 mbgs (GNS 2020).

A groundwater chemistry sample was collected from a groundwater well on October 18, 1965 within the vicinity of the PDA, however no information was provided on the well, sample methodology or depth the sample was collected.

6.1.3 Visual Environment

The existing landscape surrounding the PDA consists of a combination of rolling hills, forested areas in various stages of regeneration due to harvesting activities, lakes, and open fields. There are also some small residential neighbourhoods located at least 1.6 km from the nearest proposed WTG. The immediate Project site is located on an elevated area that is fairly remote. The land has largely been forested and therefore has a network of existing forestry access roads throughout and impacted vegetation. A small portion of the Project site is a forested area not impacted by forestry activity. The details of a visual assessment are presented in **Appendix D**.

6.2 Biophysical VECs

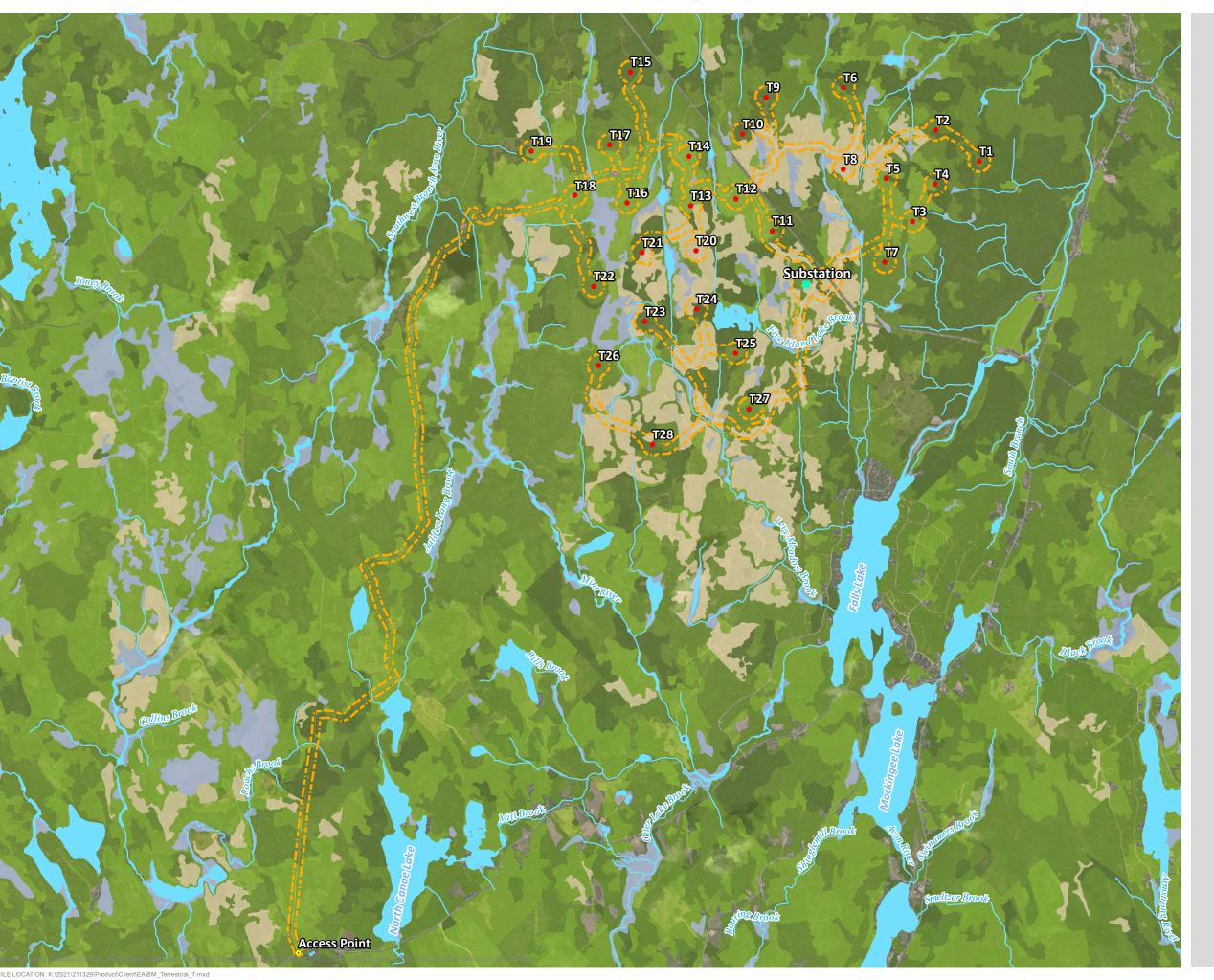
6.2.1 Terrestrial Environment

The terrestrial environment considers the vegetation, wildlife and wetlands within the assessed area. For all VECs of the terrestrial environment, as part of this EA, the assessed area included 50 m on either side of roads required to access turbine sites during construction and operation and along powerline easements; as well as 150 m around turbine bases, substations and ancillary equipment. Vegetation, wildlife and wetlands were selected as terrestrial environment VECs because they are valued in their relationship with species at risk, migratory birds and bats and other biological and physical components addressed as VECs in this environmental assessment (EA) Registration.

The assessed area primarily consists of forested lands which were previously disturbed through forestry activities. A description of the existing terrestrial environment is based on data and observations obtained through desktop and biological field surveys. Details of the baseline assessments for vegetation (including lichens), wildlife and wetlands are discussed in the sections below.

Most of the terrestrial habitat identified in the assessed area consisted of the following habitat types: hardwood-dominant forests, conifer-dominant forests, mixed-wood forests, previously cut disturbed areas, bogs and fens, and swamps and marshes. The major habitat types were identified based on the results of the desktop and field surveys. These habitats are described in relation to the VECs in the sections and the shown on **Figure 7**.







BENJAMINS MILL WIND PROJECT

HABITATS WITHIN THE TERRESTRIAL **LOCAL ASSESSMENT AREA**

FIGURE 7

- Proposed Access Point
- Proposed Turbine Location
- Substation
- Watercourse
- Waterbody
- Local Assessment Area

Habitat

- Conifer Dominant Forest
- Mixed Wood Forest
- Hardwood Dominant Forest
- Recently Cut Area
- Wetland

0 0.25 0.5



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



PROJECT: 21-1329

STATUS: DRAFT

DATE: 2022-01-10

6.2.1.1 Vegetation

This VEC covers the vegetation component of terrestrial habitats and includes plant species and lichens within habitats associated with the assessed area, shown on **Figure 8.** A high level desktop assessment was completed to identify environmental constraints prior to the field surveys for plants and lichens during the 2021 growing season. Surveys of areas were completed during the 2021 growing season by experienced botanists with experience in lichen identification. Details of the assessment methodology and findings are presented in **Appendix E**.

Concurrently, a list of culturally important vegetation for the Mi'kmaq Nation in Nova Scotia was prepared by a Terrestrial Biologist from Maqamigew Anqotumeg. The list was established following a desktop analysis of the site and includes vegetation that are culturally significant to the Mi'kmaq Nation in Nova Scotia for herbal medicine and foraging and are believed to likely be present within the Site Plans of the Project. The plants identified during the 2021 vegetation surveys were cross referenced with the list of culturally important vegetation. The list of culturally significant plants with the potential to occur in the area is included in **Appendix E**. A list of the flora deemed to be of cultural significance to the Mi'kmaq Nation that was identified across the Project site is presented in **Table 10**.

TABLE 10: CULTURALLY SIGNIFICANT FLORA TO THE MI'KMAQ NATION OBSERVED AT THE BENJAMIN MILLS WIND PROJECT SITE.

Plant Name	Mi'kmaq Name	Habitat at BMWP Site
Alleghaney blackberry (Rubus allegheniensis)	Ajioqjimanaqsi (blackberry)	Clear cut or previously cut-over areas
American beech (Fagus grandifolia)	Suomusi	Hardwood-dominant forestMixed-wood forestSwamps and marshes
American mountain ash (Sorbus americana)	Epsimusi	Clear cut or previously cut-over areasConifer-dominant forestMixed-wood forest
Beaked hazlenut (Corylus cornuta)	Mlipkanjmusi	Mixed-wood forest
Common plantain (Plantago major)	Wijikanipkl	Clear cut or previously cut-over areas
Common yarrow (Achillea millefolium)	N/A	Clear cut or previously cut-over areas
Creeping snowberry (Gaultheria hispidula)	Kna'ji'j	 Clear cut or previously cut-over areas Conifer-dominant forest Mixed-wood forest Bogs and fens Swamps and marshes
Dwarf red raspberry (Rubus pubescens)	Katomin	Hardwood-dominant forest
Eastern white pine (Pinus strobus)	Kuow	 Clear cut or previously cut-over areas Hardwood-dominant forest Mixed-wood forest



Plant Name	Mi'kmaq Name	Habitat at BMWP Site
		Swamps and marshes
Goldthread (Coptis trifolia)	Wisawkweskl	Mixed-wood forestSwamps and marshes
Harlequin blue flag (Iris versicolor)	N/A	Clear cut or previously cut-over areas
Late lowbush blueberry (Vaccinium angustifolium)	Pkwiman (blueberry)	Clear cut or previously cut-over areasConifer-dominant forest
Northern wild raisin (Viburnum nudum)	Skinaqanmusi	 Clear cut or previously cut-over areas Mixed-wood forest Swamps and marshes
Partridge berry (Mitchella repens)	Ka'qaujumnaqsi	Hardwood-dominant forestMixed-wood forestSwamps and marshes
Pearly everlasting (Anaphalis margaritacea)	Wapwasuek	Clear cut or previously cut-over areas
Pin cherry (Prunus pensylvanica)	Maskwe'simanaqsi	 Clear cut or previously cut-over areas Hardwood-dominant forest Conifer-dominant forest
Red elderberry (Sambucus racemosa)	Pukulu'skwimanaqsi (elderberry)	Hardwood-dominant forest
Red raspberry (Rubus idaeus)	Klitaw	 Clear cut or previously cut-over areas Hardwood-dominant forest Swamps and marshes
Red spruce (Picea rubens)	Mekwe'k kawatkw	 Clear cut or previously cut-over areas Hardwood-dominant forest Mixed-wood forest
Sheep laurel (Kalmia angustifolia)	N/A	 Clear cut or previously cut-over areas Conifer-dominant forest Mixed-wood forest Bogs and fens Swamps and marshes
Striped maple (Acer pensylvanicum)	Wapoq	Hardwood-dominant forestMixed-wood forest
Sugar maple (Acer saccharum)	Snaweyey	Hardwood-dominant forestMixed-wood forest
Sweet-fern (Comptonia peregrina)	N/A	Clear cut or previously cut-over areas
Velvet-leaved blueberry (Vaccinium myrtilloides)	Pkwiman (blueberry)	 Clear cut or previously cut-over areas Conifer-dominant forest Mixed-wood forest Swamps and marshes
Wild sarsaparilla	Wopapa'kjukal	Hardwood-dominant forest



Plant Name	Mi'kmaq Name	Habitat at BMWP Site
(Aralia nudicaulis)		Conifer-dominant forestMixed-wood forestSwamps and marshes
Wild strawberry (Fragaria virginiana)	Atuomkominaqsi	Clear cut or previously cut-over areas
Yellow birch (Betula alleghaniensis)	Nimnoqn	 Clear cut or previously cut-over areas Hardwood-dominant forest Mixed-wood forest

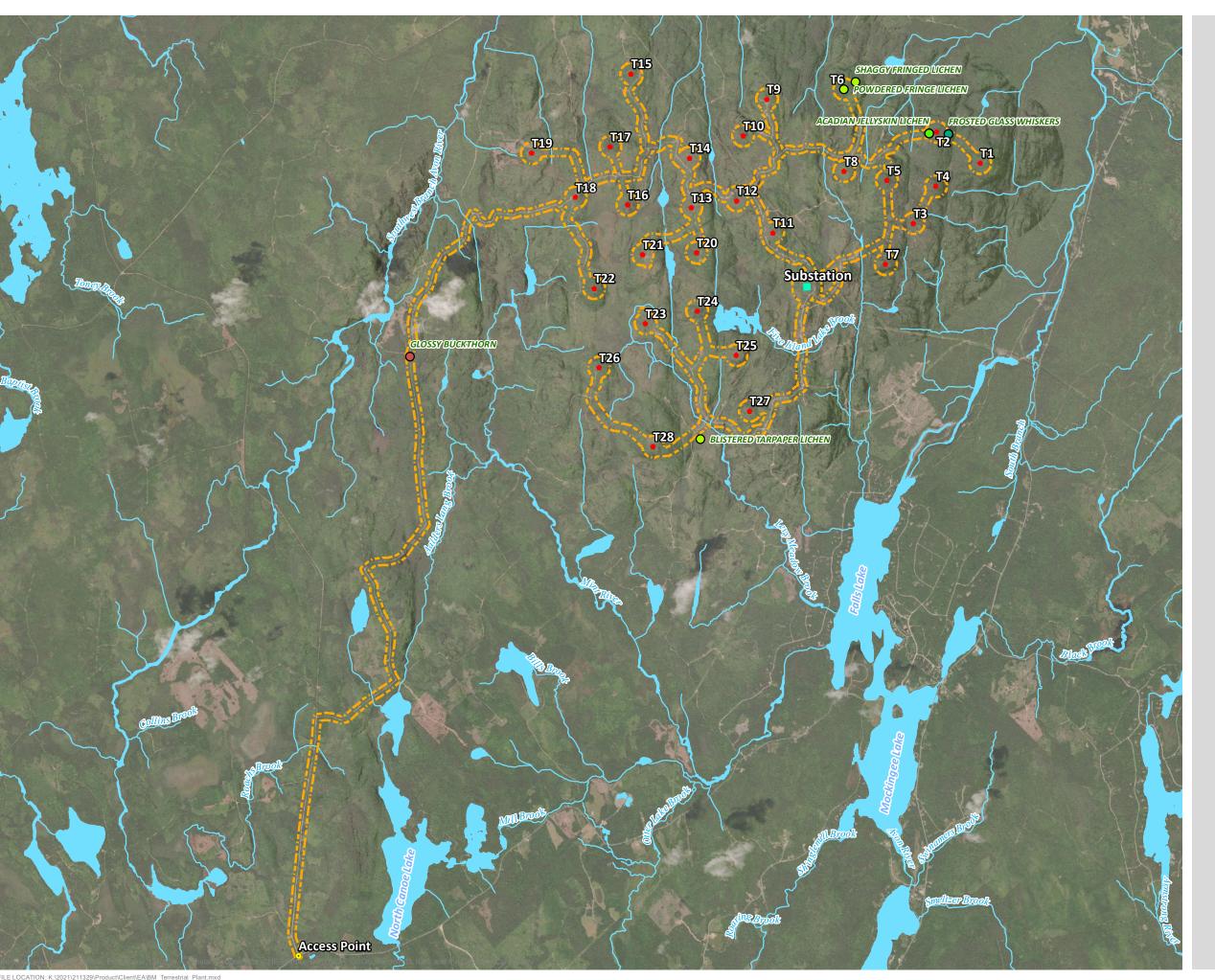
The regional vegetation of the South Mountain Ecodistrict is generally dominated by Acadian forest tree species. Locally, the site consists of two ecoelements; the Spruce Hemlock Pine Hummocks and Hills ecoelement, and the Red and Black Spruce Hummocks ecoelement (NSDLF 2019). The majority of the site is covered by Spruce Hemlock Pine Hummocks and Hills ecoelement, which consists of well drained coarse grained soils. This ecoelement is dominated by red spruce, eastern hemlock and white pine in areas with slightly moist soils; and by white pine, red oak and red pine on the drier hilltops. The remaining portions of the site, which tends to be wetter and consist of imperfectly drained course-grained soils (NSDLF 2019), are characterized by the Red and Black Spruce Hummocks ecoelement. This ecoelement includes late successional shade-tolerant softwoods, such as red spruce and eastern hemlock, along with white pine (NSDFL 2019).

The general vegetation within each habitat type is described as follows:

Hardwood-dominant Forests

Hardwood forests are characterized by temperate trees and understory flora and require rich and well drained soils (NSDFL 2021). This habitat type was the least-common encountered and was generally limited to the Crown Land Property which has not been forested as much as the privately-owned resource land parcels. The hardwood forest habitat encountered during the 2021 vegetation surveys was dominated by red maple and included a diverse understory of mostly herbaceous plants. No vegetation SAR or SoCC were identified within the hardwood-dominant forests. Several culturally significant plants were identified within the hardwood forest habitat including: American beech (Suomusi), dwarf red raspberry (Katomin), eastern white pine (Kuow), partridge berry (Ka'qaujumnaqsi), pin cherry (Maskwe'simanaqsi), elderberry (Pukulu'skwimanaqsi), red raspberry (Klitaw), red spruce (Mekwe'k kawatkw), striped maple (Wapoq), sugar maple (Snaweyey), wild sarsaparilla (Wopapa'kjukal), and yellow birch (Nimnoqn).







BENJAMINS MILL WIND PROJECT

VEGETATION WITHIN THE TERRESTRIAL LOCAL ASSESSMENT AREA

FIGURE 8

- Proposed Access Point
- Proposed Turbine Location
 - Substation
 - Watercourse
- Waterbody
- Local Assessment Area

Plant Observation

- Invasive Species
- Species at Risk
- O Species of Conservation Concern

0 0.25 0.5



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



PROJECT: 21-1329

STATUS: DRAFT

DATE: 2022-01-10

Dominant vegetation within the hardwood forest habitats of the terrestrial LAA included:

- A diverse herbaceous understory with ferns, flowering plants (e.g., asters, lilies, trillium) sedges and berries; and,
- Hardwood trees such as maples (i.e., red, striped, sugar and mountain), American beech, white ash, and paper and yellow birch.

Conifer-dominant Forests

Conifer-dominant forests are common in areas previously disturbed by fire or windthrow (NSDFL, 2021), or, in the case of this site, forestry activities. A typical spruce and pine forest in Nova Scotia consists of an overstory of black spruce and pines (white, red, jack), a shrub layer dominated by ericaceous species (i.e., lambkill, blueberry and huckleberry), along with black spruce regeneration, and a herb cover may be present but is dependent on the amount of light reaching the ground (NSDFL, 2021). No vegetation

SAR or SoCC were identified with the conifer-dominate forests during the 2021 vegetation surveys at the BMWP site. Several culturally significant plants identified within the hardwood forest habitat included: American mountain ash (Epsimusi), creeping snowberry (Kna'ji'j), blueberry (Pkwiman), pin cherry (Maskwe'simanaqsi), wild sarsaparilla (Wopapa'kjukal), and sheep laurel (no associated Mi'kmaq name provided).

Dominant vegetation observed within conifer-dominate forests included the following:

- Conifer trees (e.g., black spruce and Balsam fir.
- Woody shrubs (e.g., blueberry, smooth service berry, rhodora and juniper); and,
- Depending on the presence of open spaces, some locations had an understory of fern, grasses and asters, and other hardy flowering plants (i.e., northern starflower, painted trillium, wild sarsaparilla).

Mixed-wood Forests

Mixed wood forests are tree dominated landscapes that contain both coniferous and deciduous trees (NSDLF 2021). Several lichen SAR/SoCC were identified on hardwood trees within the mixed-wood forests during the 2021 vegetation and lichen surveys at the BMWP site. A complete list of vegetation and lichens, along with their conservation status (as of December 2021) is included in **Appendix E**. A list of the SAR and SoCC lichen species are detailed below in **Section 6.2.3.** Several culturally significant plants identified within the mixed-wood forest habitat included: American beech (Suomusi), American mountain ash (Epsimusi), beaked hazlenut, (Mlipkanjmusi), creeping snowberry (Kna'ji'j), eastern white pine (Kuow), goldthread (Wisawkweskl), northern wild raisin (Skinaqanmusi), partridge berry (Ka'qaujumnaqsi), red spruce (Mekwe'k kawatkw), sheep laurel (for which no associated Mi'kmaq name was provided), striped maple (Wapoq), sugar maple (Snaweyey), blueberry (Pkwiman), wild sarsaparilla (Wopapaʻkjukal), and yellow birch (Nimnoqn).

Dominant vegetation within mixed-wood forests included the following:

• A diverse tree overstory that varied between landscapes. Dominant deciduous trees included maples (i.e., red, striped, sugar and mountain), American beech, white ash, and paper and



- yellow birch. Dominant conifer tree species included eastern white pine, spruce (white, red and black) and Balsam fir;
- Woody shrubs (e.g., blueberry, smooth service berry, American witch-hazel, northern wild raisin, rhodora and juniper); and,
- Herbaceous understories were variable and depended on the available light and open spaces in the tree canopy.

Clear Cut or Previously Cut-Over Areas

This category includes all regenerating habitat that has been recently or historically harvested for forestry products. The majority of the PDA is anticipated to fall within this habitat type. No vegetation SAR or SoCC were identified within previously cut lands during the 2021 vegetation surveys at the BMWP site. Several culturally significant plants identified within the previously cut lands included: blackberry (Ajioqjimanaqsi), American mountain ash (Epsimusi), common plantain (Wijikanipkl), creeping snowberry (Kna'ji'j), eastern white pine (Kuow), blueberry (Pkwiman), northern wild raisin (Skinaqanmusi), pearly everlasting (Wapwasuek),pin cherry (Maskwe'simanaqsi), red raspberry (Klitaw), red spruce (Mekwe'k kawatkw), wild strawberry (Atuomkominaqsi) and yellow birch (Nimnoqn), as well as common yarrow, Harlequin blue flag, sheep laurel and sweet fern (for which no associated Mi'kmag names were provided).

Several plants that are considered to be exotic were identified within disturbed habitats. The majority of the exotic species are weeds and common in Nova Scotia in disturbed areas and along road sides. Two species: multiflora rose (Rosa multiflora) and glossy buckthorn (Frangula alnus); however, are considered to be invasive species and were observed in the disturbed cutover landscapes within the assessed area. Multiflora rose is prolific in invading native habitats such as woodlands, forest edges where it can form impenetrable thickets that exclude native plant species (Bergmann and Swearingen 2005). Multiflora rose was wide spread through through previously cut areas within the LAA, shown on Figure 7. Glossy buckthorn can also spread very quickly and tends to shade out native shrubs and plants; as well, it can harm nearby plant species by producing allelopathic chemicals from its roots (Pridham 2009). Locations where glossy buckthorn was identified within the LAA are shown on Figure 8.

Dominant vegetation within clear cut or previously cut-over areas included the following:

- A diverse tree overstory that varied between landscapes. Dominant deciduous trees included red maple, trembling aspen, American mountain ash, paper and grey birch, white poplar, northern red oak, and Bebs willow. Dominant conifer tree species included eastern white pine, spruce (white and red) and Balsam fir; and
- Diverse assemblages of herbaceous plants including several weeds (e.g., black knapweed, mouse-ear hawkweed and common dandelion), grasses, asters, ferns and others;

Bogs and Fens

Bogs and fens typically consist of peatlands saturated with water. Bog vegetation may or may not include trees and are usually covered with Sphagnum spp. and ericaceous shrubs. The vegetation of fens is more diverse than in bogs and generally consists of sedges and mosses and shrubby trees (NSE



2021). No vegetation SAR or SoCC were identified within bogs or fens during the 2021 vegetation surveys at the BMWP site. Culturally significant plants identified with bogs and fens habitat included sheep laurel (no associated Mi'kmaq name provided) and creeping snowberry (*Kna'ji'j*).

Dominant vegetation within bogs and fens included the following:

- Woody shrubs (i.e., leatherleaf, sheep laurel, rhodora and sweet grass);
- Herbaceous plants (i.e., northern pitcher plant, three-leaved false soloman's seal, Virginia St. John's-wort, asters and other ferns, grasses and sedges); and
- Trees (when present) included black spruce and hardwood trees (i.e., red maple and paper birch).

Swamps and Marshes

Swamps and marshes are wetland types with mineral soils and are not typically dominated by peatlands (NSE 2021). Swamp vegetation is often dominated by trees and shrubs, but also often contain grasses, sedges ferns and rushes in open areas. Marshes, which are typically wetter than swamps, typical host emergent aquatic plants (macrophytes) such as rushes, reeds, grasses and sedges, as well as floating and submerged aquatic macrophytes, and non-vascular plants. No vegetation SAR or SoCC were identified within swamps and marshes during the 2021 vegetation surveys at the BMWP site. Several culturally significant plants identified within swamps and marsh habitat including: American beech (*Suomusi*), creeping snowberry (*Kna'ji'j*), eastern white pine (*Kuow*), goldthread (*Wisawkweskl*), northern wild raisin (*Skinaqanmusi*), partridge berry (*Ka'qaujumnaqsi*), red raspberry (*Klitaw*), blueberry (*Pkwiman*), wild sarsaparilla (*Wopapa'kjukal*); and sheep laurel (for which no associated Mi'kmaq name was provided).

Dominant vegetation within swamps and marshes included the following:

- Woody shrubs (including speckled alder, smooth service berry, mountain holly, Canada yew, red raspberry, and sheep laurel);
- Herbaceous plants (including water horsetail, white meadow sweet, asters and other grasses and sedges); and,
- Trees (when present) included conifers (i.e., black spruce, Balsam fir, and eastern white pine) and hardwood trees (i.e., red maple and American beech).

During the 2021 vegetation and lichen surveys, one species at risk (SAR) lichen and four species of conservation concern (SoCC) lichen species were observed within mix-wood forests. The list of SAR and SoCC lichen species with their legal protection status and/or provincial rarity rankings (S-Ranks) from the Atlantic Canada Conservation Data Centre (ACCDC) are presented below in **Table 11** and their locations are presented on **Figure 8**. Further information on vegetation SAR and SoCC, along with the ACCDC report and information on the legal protection status are presented in **Section 6.2.5** and **Appendix L**.



TABLE 11: SPECIES AT RISK AND SPECIES OF CONSERVATION CONCERN FLORA OBSERVED AT THE BENJAMIN MILLS WIND PROJECT SITE

Plant Name	Status and S-Rank	
Frosted glass-whiskers (Sclerophora peronella Atlantic pop.)	S1? SARA: Special Concern COSEWIC: Special Concern	
Blistered tarpaper lichen (Collema nigrescens)	\$3	
Powdered fringe lichen (Heterodermia speciose)	\$3	
Acadian jellyskin lichen (Leptogium acadiense)	S3S4	
Shaggy fringed lichen (Anaptychia palmulata)	\$3\$4	
Notes:	<u> </u>	

Atlantic Canada Conservation Data Centre (ACCDC) S-Ranks as follows: S1: Critically imperiled in province; S2: Imperiled in province; S3: Vulnerable in province; S4: Apparently secure, uncommon but not rare in province; S5: Secure: Common, widespread and abundant in province S#S# = a numeric range rank used to indicate any range of uncertainty about the status of the species or community, ? = Inexact or Unknown. (ACCDC 2021).

Status refers to listings of E: Endangered, T: Threatened, V: Vulnerable or SC: Special Concern on Schedule 1 of the federal *Species at Risk Act* (SARA), the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the *Nova Scotia Endangered Species Act* (NSESA).

6.2.1.2 Wildlife

The majority of the proposed Project is located within an area that has been extensively used for forestry practices. The majority of the site (i.e., Hingley Road, network of logging roads and the proposed turbine locations) is dominated by previously harvested areas (clear-cuts or strip-cuts) that are now in different stages of natural regeneration, or have become conifer plantations. Nevertheless, some areas within the proposed project footprint still extend through several less disturbed habitat types, including areas of relatively mature hardwood and softwood forest stands, as well as wetlands and watercourses.

A total of eleven mammal species, six amphibian species and two reptile species were identified within the assessment area during the terrestrial field studies conducted in 2021. Incidental observances made during the other field programs including; direct observations (i.e., sightings) and/or indirect evidence (e.g., scat, tracks, bones, and browse) of any wildlife species encountered were also documented. Targeted searches of wetland and pond habitats, when encountered, were conducted for reptiles and amphibians in conjunction with the wetland surveys.

A list of recorded observations of wildlife from the 2021 surveys (excluding bats and birds) is presented in **Appendix F**.

The mammal species observed or detected include:

- American Beaver (Castor canadensis);
- American Black Bear (Ursus americanus);
- Fisher (*Pekania pennanti*);
- Eastern Chipmunk (Tamias striatus);
- Eastern Coyote (Canis latrans);
- North American Porcupine (*Erethizon dorsatum*);



- Northern Flying Squirrel (Glaucomys sabrinus);
- Red Squirrel (Tamiasciurus hudsonicus);
- Snowshoe Hare (Lepus americanus);
- Striped Skunk (Mephitis mephitis); and
- White-tailed Deer (Odocoileus virginianus).

Reptiles and amphibian species observed, or detected, include:

- Eastern Red-backed Salamander (*Plethodon cinereus*);
- Green Frog (Lithobates clamitans);
- Maritime Garter Snake (Thamnophis sirtalis pallidulus);
- Northern Ringneck Snake (Diadophis punctatus edwardsii);
- Northern Leopard Frog (Lithobates pipiens);
- Pickerel Frog (Lithobates palustris);
- Spring Peeper (Pseudacris crucifer); and
- Wood Frog (Lithobates sylvaticus).

A deer wintering area (DWA) is located adjacent to the Project site, on the north side of the West Branch of the Avon River. During the winter, White-tailed Deer congregate in high density groups in areas with which provide shelter from the prevailing wind, offer maximum exposure to the sun and offer cover as well as access to vegetation for browse (NSDNR 2012). DWAs are identified by NSDNRR for identifying areas for special management practices in Nova Scotia. Although no designated DWAs on the Project site, there is potential for deer to winter in uncut forested areas, generally located on the east side of the project site.

The encountered wildlife species listed above have populations in Nova Scotia that are considered secure according to the ACCDC (2021) with the exception of a fisher. One fisher was observed during the spring while crossing one of the site access roads. The fisher is ranked S3 (i.e., Vulnerable) by the ACCDC and is therefore included with the SoCC discussion in **Section 6.2.5**.

Although not encountered, the eastern painted turtle and mainland moose were reported by the ACCDC as being observed within 10 km of the BMWP site and potential habitat is available at the site. Dillon personnel checked accessible water bodies, when encountered as part of the wetland and watercourse surveys, for the presence turtles. Dillon biologists were aware of the potential for moose to be present in the LAA and to record signs of moose if encountered. Such signs include scat, tracks, high browse and shed antlers; however, there were no observations or signs of moose reported during the 2021 field surveys.

6.2.1.3 Wetlands

Wetlands were assessed as part of the Terrestrial Environment 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). 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 VECs (e.g., SAR

