



North Atlantic

Appendix D3: Ecological Land Classification

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List of Acronyms and Abbreviations

ATV	all-terrain vehicle
cm	centimetres
CWCS	Canadian Wetland Classification System
CWIM3A	Canadian Wetland Inventory Map version 3A
DBH	diameter at breast height
DEM	Digital Elevation Model
ELC	Ecological Land Classification
GIS	Geographic Information System
GPS	Global Positioning System
HGP	Hydrogen Generation Plant
HP	Hydrogenation Plant
kHz	kilohertz
km	kilometres
kV	kilovolts
LAA	Local Assessment Area
LOHC	Liquid Organic Hydrogen Carrier
m	meters
MW	megawatts
NL	Newfoundland and Labrador
NL ESA	Endangered Species Act (Newfoundland and Labrador)
NL FFA	NL Department of Fisheries, Forestry, and Agriculture
North Atlantic	North Atlantic Refining Corp.
NRCAN	Natural Resources Canada
NWWG	National Wetlands Working Group
regen	regenerating forest
ROW	Right Of Way
SAR	Species at Risk
spp.	species
the Project	North Atlantic Wind to Hydrogen Project

1.0 Introduction

North Atlantic Refining Corp. (North Atlantic) is proposing to undertake the development of a Wind to Hydrogen project (the Project) on the Isthmus of Avalon Region in Newfoundland and Labrador (NL). This Project will entail the development, construction, operation and eventual decommissioning of a 324-megawatt (MW) Wind Farm consisting of 45 wind turbines on an undeveloped peninsula situated between Sunnyside and Deer Harbour. The Wind Farm will provide renewable electricity via a 138 kilovolt (kV) transmission line to a newly developed Hydrogen Generation Plant (HGP), from where generated hydrogen will be transported to a Hydrogenation Plant (HP) for transformation into a Liquid Organic Hydrogen Carrier (LOHC), which will then be shipped from North Atlantic's port facilities to international markets for use in various decarbonization technologies.

In support of the Project, North Atlantic has undertaken environmental baseline studies throughout the Project Area (PA). The Ecological Land Classification (ELC) study was designed to develop a detailed habitat inventory and spatial analysis of the entire PA, beginning with preliminary GIS analyses using open-source habitat data, followed by refinement using high-resolution aerial imagery and input from ground-truthing field surveys. These field surveys were undertaken in the summer and fall of 2024, resulting in the production of a comprehensive ELC and mapping products for the PA. The ELC map is used to inform other terrestrial studies based on the known habitat preferences of various species, especially Species at Risk (SAR), which may be preferential to specific habitat types.

The term “ecotype” is used throughout this report to describe the grouping of biotic and abiotic factors that influence the ecological identity of an area. These factors provide distinctive characteristics to an area and enable differentiation between ecotypes. Specific attention is given to vegetation cover, including the dominant vegetation cover at the canopy level (e.g., in a forest or shrub area) and ground level (e.g., mosses within a forested stand). Abiotic factors are the main component of some ecotype classifications if the habitat type is associated with a lack of or reduced capacity for vegetation (e.g., Rocky Barren).

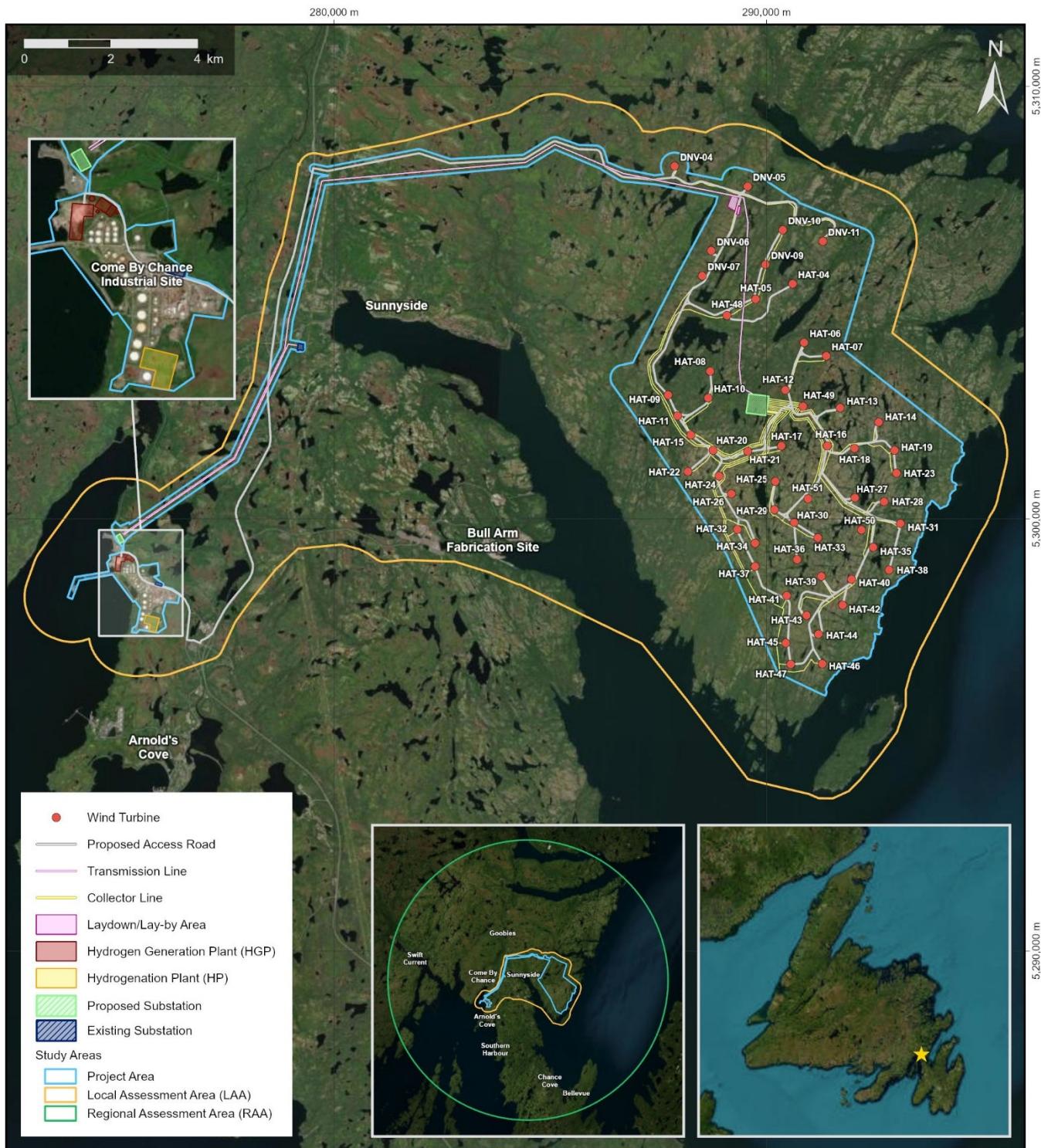


	FIGURE TITLE: Project Location Overview	NOTES: The location of proposed project infrastructure is considered preliminary and is subject to change.	PREPARED BY: C. Burke	DATE: 10/07/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: C. Bursey 10/07/2025	APPROVED BY: C. Collins 10/07/2025
		GRS: WGS 1984 UTM Zone 22N		sem

SEM MAP ID: 016-015-GIS-001-Rev0

Figure D3-1.0-1 Project location and infrastructure overview.

2.0 Methods

Desktop research was used in combination with ground-truthing surveys to create a highly refined and detailed categorization of the habitat composition throughout the PA. Ground-truthing exercises enabled biologists to assess the accuracy of open-source data and add detailed vegetation inventories (e.g., non-forest vegetation such as herbs, shrubs, and bryophytes). Habitat data collected in the field was compiled and analyzed in ArcGIS to create an ELC map with highly detailed polygons illustrating the ecotypes that exist in the PA.

2.1 Desktop Research

To obtain a preliminary understanding of the habitat composition within the PA, all known and available open-source data, including habitat inventories and/or forestry inventories, were analyzed. The NL Department of Fisheries, Forestry, and Agriculture (NL FFA) maintains a Forest Inventory and associated maps, which are used as the foundation of forest management planning (NL FFA, 2025). This inventory classifies and delineates various landscape features, with a focus on forest types. Landscapes without commercial forest cover are also mapped and are classified as general habitat features. The current system incorporates softcopy technology with high-quality imagery, and contains the most up-to-date information available (NL FFA, 2025). This open-source dataset was used to inform the creation of the ELC.

Desktop research included a literature review of the general habitat information and geology of the PA. Under a regionalized habitat classification regime, NL is divided into areas known as ecoregions, which is further broken down into subregions and specific habitat types (Government of NL, 2020). These classifications are largely influenced by climate and geology. Habitat types specific to the ecoregions found in NL are described in detail by Meades & Moores (*Forest site classification manual: A field guide to the Damman forest types of Newfoundland*, 1994). This manual was referenced in classifying the habitat types throughout the PA. Soil maps from Agriculture Canada were also reviewed to support habitat classification at a desktop level and during ground-truthing efforts (Agriculture Canada, 1991). Soil types throughout Newfoundland influence the forest types and vegetation that exist on the surface (Meades & Moores, 1994).

2.2 Field Surveys

Field verification surveys were conducted throughout the PA. For the purposes of this study, ecotypes were described more generally based on vegetation and obvious abiotic factors (e.g., rocky terrain). General characteristics of the environment were inferred from both visual observations during surveys and through examination of forestry inventories. Survey points were plotted with the assistance of

preliminary GIS analyses and were selected to represent adequate coverage of the PA on an ecological and geospatial basis. Habitat data were also collected opportunistically during other surveys undertaken within the PA. Each new survey in the PA was accompanied by a general habitat description, resulting in a dataset with adequate information to classify the ecotypes. The following information was collected at each ELC survey point:

- Date and time;
- Vegetation richness;
- Vegetation percentage of cover for each species;
- Abiotic factors such as elevation, rockiness, moisture regime;
- GPS coordinates;
- Recommended (detailed) classification;
- Refined classification (often during post-field work data analysis);
- Photographs of each site and any notable features (e.g., vegetation, rare species, SAR suitability, geology); and
- Ancillary notes.

2.2.1 Ecotype Identification

Both abiotic and biotic factors were used to classify ecotypes in the PA. Biotic factors refers to vegetation including vascular and non-vascular bryophytes, and abiotic factors refers to general topography as it relates to and affects the ecotype (e.g., basins, valleys, upland rocky outcrops). The ecotype classification methodology used in this study was largely based on the field guide by Meades & Moores (1994). This manual lists the dominant vegetation types in the canopy and shrub/herb layer in various habitat types, which assists in their classification.

To analyze the habitat type in a given area, the observer noted all vegetation and abiotic features within a 10 m radius of a selected observation site. Topographic characteristics, moisture regimes, and other features were noted outside of the 20 m zone where such information would aid in the classification of an area (e.g., a 20 m forested site surrounded by barren is a different ecotype than a 20 m forested site within a large continuous patch of forest in a valley). Further detail on vegetation and wetland analyses is provided below.

2.2.1.1 Vegetation Analysis

Each plant species within the herb layer (<1 m height), shrub layer (>1 m to 5 m height), and tree layer/canopy (>5 m) was identified, and their relative abundance was estimated within the plot. The

indicator of abundance for each species was relative to the surrounding species and expressed on a scale of 1 to 100% dominance of the survey area. Species relative abundance varies between sites and can signify changes in moisture regime, which in turn may indicate a difference in ecotype based on vegetation prevalence alone in some cases. Dominant vegetation cover may also be linked to the habitat potential for rare species. For instance, a species that forages primarily on coniferous seeds will have a high potential of inhabiting Mature Coniferous Forest as opposed to Coniferous Scrub or coniferous regen area surrounded by rocky barren, although these ecotypes may appear similar in composition.

2.2.1.2 Wetland Classification

Wetlands were assessed as per the Canadian Wetland Classification System (CWCS) (NWWG, 1997). Wetlands in NL are grouped by CWCS into the following: (i) bog; (ii) fen; (iii) swamp; (iv) marsh; and (v) shallow water wetlands (NWWG, 1997). This information was collected in the field, however for the purposes of this study, wetlands were not differentiated in the final ELC.

2.3 GIS Analysis

A thorough GIS analysis was undertaken to generate the final ELC classes and mapping products for the PA, with use of the following data sources:

- NL FFA Land Cover databases and tables (NL FFA, 2025);
- Canadian Wetland Inventory Map version 3A (CWIM3A) (NRCCAN, 2024);
- NL aerial imagery (30 cm resolution) (purchased from the Government of NL);
- NL 5 m Digital Elevation Model (DEM) (NL FFA, 2021); and
- 56 ground-truthing points and associated habitat data collected during field surveys.

Firstly, the NL FFA Land Cover dataset was manipulated to generate a preliminary ELC map of the PA. The *Commercial Stocked Forest* layer was used to separate areas into coniferous, deciduous, or mixedwood forest. Age data was then used to define these forests into the following ecotypes:

- Regenerating Forest: stands with any species type aged 0 to 20 years.
- Mature Coniferous Forest: stands with <30% deciduous species that were >20 years old.
- Mature Deciduous Forest: stands with <30% coniferous species that were >20 years old.
- Mixedwood Forest: stands with a mixture of coniferous and deciduous species (at least 30% of either) that were >20 years old.

The *Non-Commercial Stocked Forest* layer was used to plot Coniferous Scrub and Deciduous Scrub. The *Not Stocked Commercial Forest* layer was manually reviewed and assigned an ELC class based on aerial imagery interpretation. Areas within this layer were classified as open herbaceous (to be refined later) or Regenerating Forest. The *Non-Forest* layer was grouped as follows:

- Rock barren and soil barren were classified as Rocky Barren.
- Bog, wet bog, and treed bog were classified as Wetland.
- Cleared land, residential, Right of Ways (ROWs), and agriculture were classified as Developed/Disturbed Land.
- Small Island was individually reviewed to assign an ELC class based on aerial imagery.

Next, NL aerial imagery, CWIM3A, and ground-truthing points were used to manually reclassify the preliminary map. A 1 km x 1 km grid was generated over the entire PA, and each square was visually inspected and refined with consideration for the following:

- CWIM3A was used to identify potential wetland locations. Wetland boundaries were altered manually or added as a new feature anywhere that the NL FFA dataset had not identified wetland.
- Aerial imagery was used to manually alter the boundaries of ELC classes (this increased the number of identified Wetlands and Coniferous Scrub in the PA, thereby reducing the amount of Rocky Barren).
- Each ground-truthing point was reviewed and the ELC map was adjusted where the aerial imagery confirmed the class given.

Note that several ground-truthing points identify smaller stands of Mature Coniferous Forest that were located within a larger Coniferous Scrub area. Due to these types of generalizations, it is likely that Coniferous Scrub is overrepresented and Mature Coniferous Forest is underrepresented in the ELC.

After the manual reclassification took place, NL 5 m DEM was used to create slope and aspect maps to refine the preliminary open herbaceous class. This class was split into either Open Coniferous Forest or Open Mixedwood Forest. For example, open herbaceous areas on steep slopes that were in proximity to Mixedwood Forest or sparse deciduous growth were reclassified as Open Mixedwood Forest. Hardwood species such as white birch are able to rapidly colonize disturbed sites and are highly tolerant of direct sunlight (Meades & Moores, 1994). This allows them to colonize disturbed hillsides much more rapidly than coniferous species, where the soil composition allows (Meades & Moores, 1994).

Finally, the draft ELC was reviewed by a biologist familiar with the ground-truthing surveys and was further refined based on the feedback provided. After this step was complete, the ELC classes and associated mapping products were considered final.

3.0 Results

3.1 Desktop Research

The PA is located fully within the Maritime Barrens Ecoregion and the Southeastern Barrens subregion. Where it is at the northern extent of this subregion, it may also feature characteristics similar to the Northeastern Barrens subregion. These subregions experience strong winds, cold summers, and dense fog for extended periods (Meades & Moores, 1994). The Southeastern Barrens subregion is dominated by heath with patchy forests throughout. These vegetation patterns may have been affected greatly by fires induced by early European settlers and other anthropogenic activity (Meades & Moores, 1994).

The PA is largely composed of mineral soils developed in moderately fine and coarse glacial till, largely dominated by shallow bedrock or exposed rocky outcrops in elevated areas (Agriculture Canada, 1991). Organic soils exist in small pockets and are less than 2 m in depth (Agriculture Canada, 1991). The valleys of the PA are deep with steep edges. This creates high variation in the soils between the upland rocky areas and plateaus and the relatively deep valleys, especially those with surface water features. The north-northeast portion of the PA is predominately covered by bare rock with a mixture of Gleyed Humo-ferric Podzols and Placic Humo-ferric Podzols formed from gray slate in the remaining soiled areas (Agriculture Canada, 1991). This area is considered hilly and stony.

3.2 Field Surveys

Field verification surveys were undertaken across representative portions of the PA. Broad ecological coverage was achieved through dedicated ELC surveys and opportunistic ecotype classifications recorded during other terrestrial surveys. Fifty-six (56) total field verification plots were surveyed across the PA.

The PA exists on a predominately elevated rocky peninsula northeast of Bull Arm, east of the Town of Sunnyside, and south-southwest of Deer Harbour. Large flat wetlands and forested terrain in the far east lead to deep valleys toward the west. The west to central portion of the PA contains heavily forested valleys, sparse high elevation (200 m+) rocky outcrop and ridge lines, and elongated ponds and streams. Rocky elevated terrain then dominates the central zone with some sloped valleys between large rocky ridges. The far eastern portion of the PAs becomes deeply valleyed and forested again but ends with cliff coastline where forest gives way to steep bare rock.

The upland areas host a dominant ground cover of barrens and heathlands, with sparse patches of coniferous forest stands surrounding wetlands, and small valleys often associated with streams. Several long, skinny valleys hosting small rocky streams bisect the PA, flowing out to the coastline. The deeper

valleys in the east and west host some deciduous forests. Larger, pure larch forest stands exist in the far east as well near Sibley's Cove Pond.

Centre Hill, a large mound part of an old mountain chain, sits in the western portion of the PA and reaches 384 m in elevation. Larger plateaus and rocky ridgelines are present east-southeast of this hill and are approximately 200 m in height. Deep valleys bisect the rocky plateaus and decrease rapidly in elevation, creating forested valleys in both the southwest and north-northeast. Figure D3-3.2-1 is an image of the centre to eastern portion of the PA, illustrating upland barren and rocky plateau intersected by valleys with coniferous forest and wetland.



Figure D3-3.2.1 Aerial image taken while flying over the eastern portion of the Project Area.

3.3 Ecological Land Classification

Thirteen (13) ecotypes were identified throughout the PA as listed in Table D3-3.3-1. Descriptions of each ecotype are presented in subsections 3.3.1 through 3.3.12 (note that Open Coniferous Forest and Open Mixedwood Forest are discussed together). The final ELC map is available as Figure D3-3.3-1.

Table D3-3.3-1 Ecotype composition, Project Area.

Ecotype	Area (m ²)	Area (ha)	Percentage Cover (%)
Rocky Barren	22,101,167	2,210	36.82%
Coniferous Scrub	15,942,549	1,594	26.56%
Wetland	7,033,447	703	11.72%
Mature Coniferous Forest	5,228,898	523	8.71%
Open Water	4,407,146	441	7.34%
Developed/Disturbed Land	1,768,558	177	2.95%
Open Coniferous Forest	1,378,295	138	2.30%
Mixedwood Forest	922,094	92	1.54%
Open Mixedwood Forest	594,623	60	0.99%
Mature Deciduous Forest	194,331	19	0.32%
Coastline	165,206	17	0.27%
Deciduous Scrub	119,291	12	0.20%
Regenerating Forest	23,899	2	0.04%
ELC Total:	59,879,504	5,988	99.75%*
Total Surface Area:	60,031,706	6,003	100%
<u>Notes</u>			
*The discrepancy between total ELC area (5,988 ha) and Project Area (6,003 ha) resulting in 99.75% total area coverage is attributed to variable marine coastal boundaries (tidal influence), which was not classified in the ELC.			

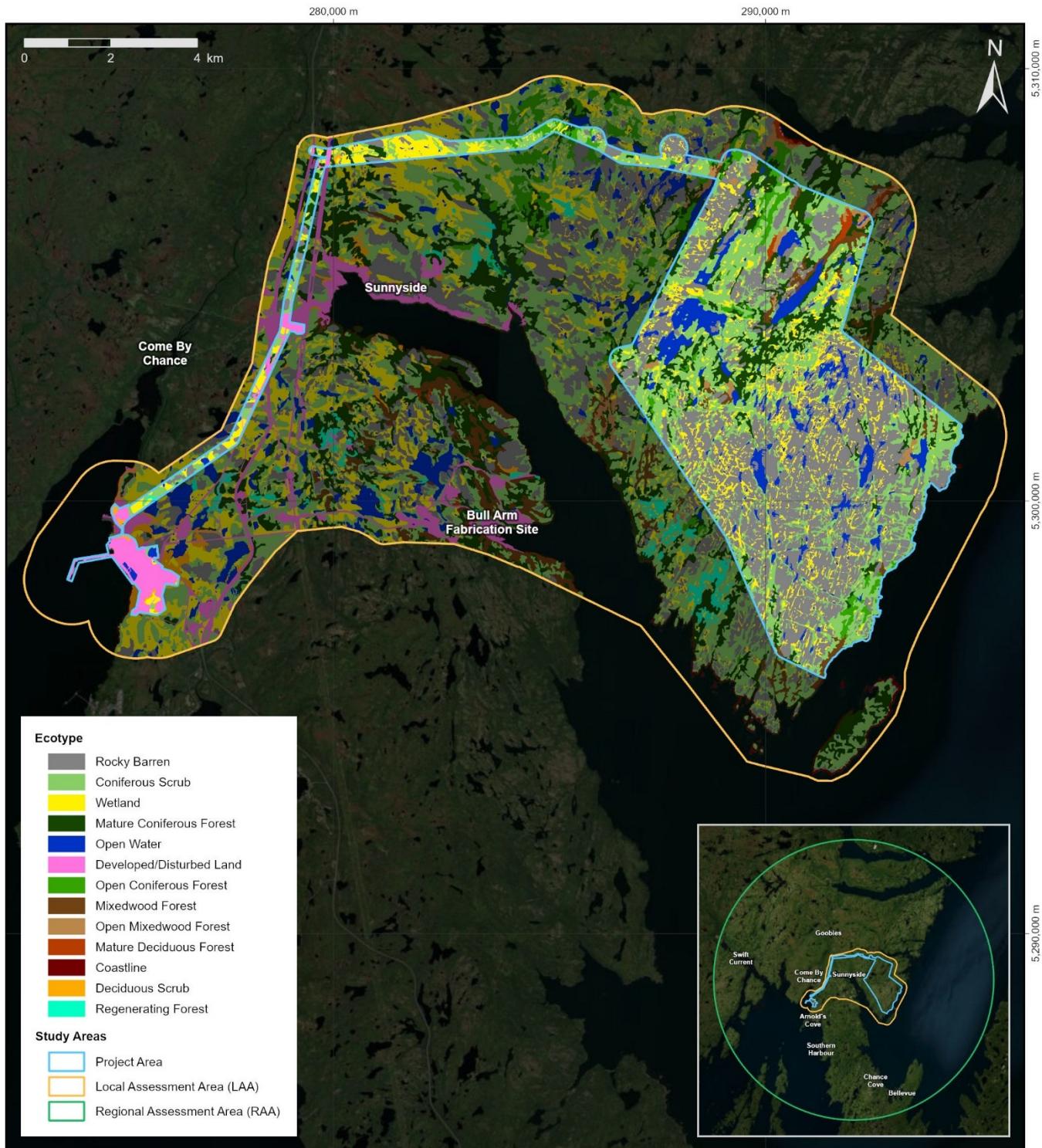


	FIGURE TITLE:	Ecological Land Classification of the Project Area	NOTES: Data sources used in Ecological Land Classification (ELC) generation include Department of Fisheries, Forestry and Agriculture Land Cover, Canadian Wetland Inventory Map 3A, NL 30cm aerial imagery, NL 5m Digital Elevation Model, and field ground-truthing observations.	PREPARED BY:	DATE:
	PROJECT TITLE:			C. Burke	11/06/2025

SEM MAP ID: 016-015-GIS-523-Rev0

Figure D3-3.3-1 ELC for the Project Area.

3.3.1 Rocky Barren

Rocky Barrens (Figure D3-3.3-2) are comprised of upland, dry sites where the vegetation layer is restricted to low shrubs and herbs. The dominant ground cover consists of non-vascular plants and lichens such as *Cladonia* spp. (reindeer lichens). This ecotype also includes rocky outcrops where vegetated barrens transition, often rapidly, into high elevation “tolts” or rocky knobs with minimal to no vegetation. These outcrops contain pockets of soil and nutrients supporting sparse groupings of non-vascular plants such as *Racomitrium* mosses, lichens, and heath such as crowberry. Trees are extremely scarce in the Rocky Barren ecotype but may grow in transitional zones between forested habitat and rocky uplands, albeit stunted. These are represented mostly by Coniferous Scrub, which is its own ecotype where it dominates the landscape at a higher composition; however, it often occurs throughout the Rocky Barren ecotype in portions too small to be separated and is therefore represented within Rocky Barren as well. The three (3) Rocky Barren subtypes within the PA are:

- Cladonia Barren – Dominated by non-vascular lichens and mosses with sparse heath patches. *Cladonia* lichens are often represented by four species: *Cladonia alpestris*, *Cladonia arbuscula*, *Cladonia angifera*, and *Cladonia mitit*.
- Rocky Upland – Largely bare rock with pockets of non-vascular plants (as in *Cladonia* barrens) often existing at the highest elevations and on rapidly transitioning “tolts”.
- Heath – The transitional zone between coniferous scrub and upland barrens. Non-vascular plants such as *Cladonia* lichens and mosses occur on ground level; crowberry heath, lingonberry, juniper, and kalmia dominate the herb layer; and sparse black spruce and alder may occur in the shrub layer.



Figure D3-3.3-2 Rocky Barren in the Project Area.

3.3.2 Coniferous Scrub

This ecotype describes mature stands of stunted, shrub-like coniferous trees. In the PA, Coniferous Scrub (Figure D3-3.3-3) predominately exists within transitional zones from Wetland to Mature Coniferous Forest, and additionally in the transitional zone between Mature Coniferous Forest and upland Rocky Barren habitats. Trees are mainly between 0 and 3.5 m in height, with black spruce (*Picea mariana*) as the dominant tree species, although sparse balsam fir (*Abies balsamea*) and eastern larch (*Larix laricina*) may also persist. Coniferous Scrub grows densely and in numerous layers, with wet soils and *Sphagnum* spp. mosses common throughout. The stunted size of the Coniferous Scrub is a result of the lack of resources, nutrient deficiency, poor soil and soil development, wind erosion, and competition between densely packed trees (Whitaker et al., 2015).



Figure D3-3.3-3 Coniferous Scrub in the Project Area.

3.3.3 Wetland

Wetlands (Figure D3-3.3-5) are abundant throughout the PA, existing mainly in the form of basin fens and bog complexes, although numerous other subtypes were derived. The PA contains mostly natural wetland systems unaltered by human activity. Some alterations have been made in the west where all-terrain vehicle (ATV) trails have altered wetlands near Deer Harbour and Sunnyside.

Sphagnum moss (*Sphagnum* spp.), sedges (*Carex* spp.), bog cranberry (*Vaccinium oxycoccus*), and other obligate wetland herbs and graminoid species dominate the herbaceous vegetation in Wetlands within the PA. Increased diversity and shrub growth can be observed at the transition point between fens and bogs and riparian ecosystems. Wetlands were typically larger in the western portion of the PA, including the watershed consisting of Southwest Arm River, Deer Harbour Steady, Lady Cove Pond, and Gull Pond. Wetlands here are connected as large complexes adjacent to or associated with this watershed. To the east, where Rocky Barrens dominate the landscape, wetlands mostly existed as smaller pockets of basin fens and bogs between upland barrens, rocky outcrops, and rocky streams connecting waterbodies. In valleys throughout the PA, dense forests and hilly terrain creates fens, marshes, and shallow pools of water. Marshes often exist within smaller portions of waterbodies, larger wetland complexes such as fens, or riparian zones of streams where water slows and pools (see Figure D3-3.3-4). Six (6) Wetland subtypes were identified throughout the PA: bog, fen, marsh, treed bog, treed fen, and swamp.



Figure D3-3.3-4 Marshy Wetland, Project Area.



Figure D3-3.3-5 Wetland-fen in the Project Area with visible muskrat trails.

3.3.4 Mature Coniferous Forest

The Mature Coniferous Forest ecotype (Figure D3-3.3-6) was abundant particularly along the proposed linear corridor (transmission line and access road) from the Come By Chance Industrial Site to the Wind Farm site. The PA is dominated by Mature Coniferous Forest with pockets of less abundant Deciduous or Mixedwood Forests scattered throughout. Mature patches of Mature Coniferous Forest are mostly dominated by black spruce and/or balsam fir, with occasional eastern larch observed surrounding wetlands. The Mature Coniferous Forests of the PA host trees that reach between 9.6 and 12.5 m in height. For the purposes of this report, where Coniferous Forest exists as stands of mature stunted trees (e.g., between 0 and 6.5 m in height), they are classified as Coniferous Scrub (see Section 3.3.2). The shrub layer is typically limited in the understory due to dense canopy cover. In breaks between the canopy, immature balsam fir and shrubs like sheep laurel (*Kalmia angustifolia*), Labrador tea (*Rhododendron groenlandicum*) and lowbush blueberry (*Vaccinium angustifolium*) can typically be observed. Herbaceous vegetation often consists of bunchberry (*Cornus canadensis*), twinflower (*Linnea borealis*), yellow clintonia (*Clintonia borealis*), and creeping snowberry (*Gaultheria hispida*). Ground cover mainly consists of feathermoss species such as Schreber's moss (*Pleurozium schreberi*), stairstep moss (*Hylocomium splendens*) and plume moss (*Ptilium crista-castrensis*).

The Mature Coniferous Forest ecotype was classified into four subtypes based on the dominant canopy and substrate cover/herb layer species present:

- Balsam Fir Feathermoss.
- Balsam Fir Sphagnum.
- Balsam Fir Feathermoss/Sphagnum.
- Black Spruce Feathermoss.

Feathermoss in Mature Coniferous Forest is defined as a mixture of upland moss species such as Schreber's Moss (*Pleurozium schreberi*), plume moss (*Ptilium crista-castrensis*), haircap moss (*Polytrichum commune*), shaggy moss (*Rhytidadelphus triquetrus*), broom moss (*Dicranum scoparium*), and several other common species of bryophyte such as three-lobed liverwort (*Bazzania trilobata*). Balsam fir feathermoss forests will often transition to balsam fir feathermoss/sphagnum subtypes, which are important for their potential to host rare lichens (see Figure D3-3.3-7 with mature *Coccocarpia* growth, an indicator species for some rare lichens).

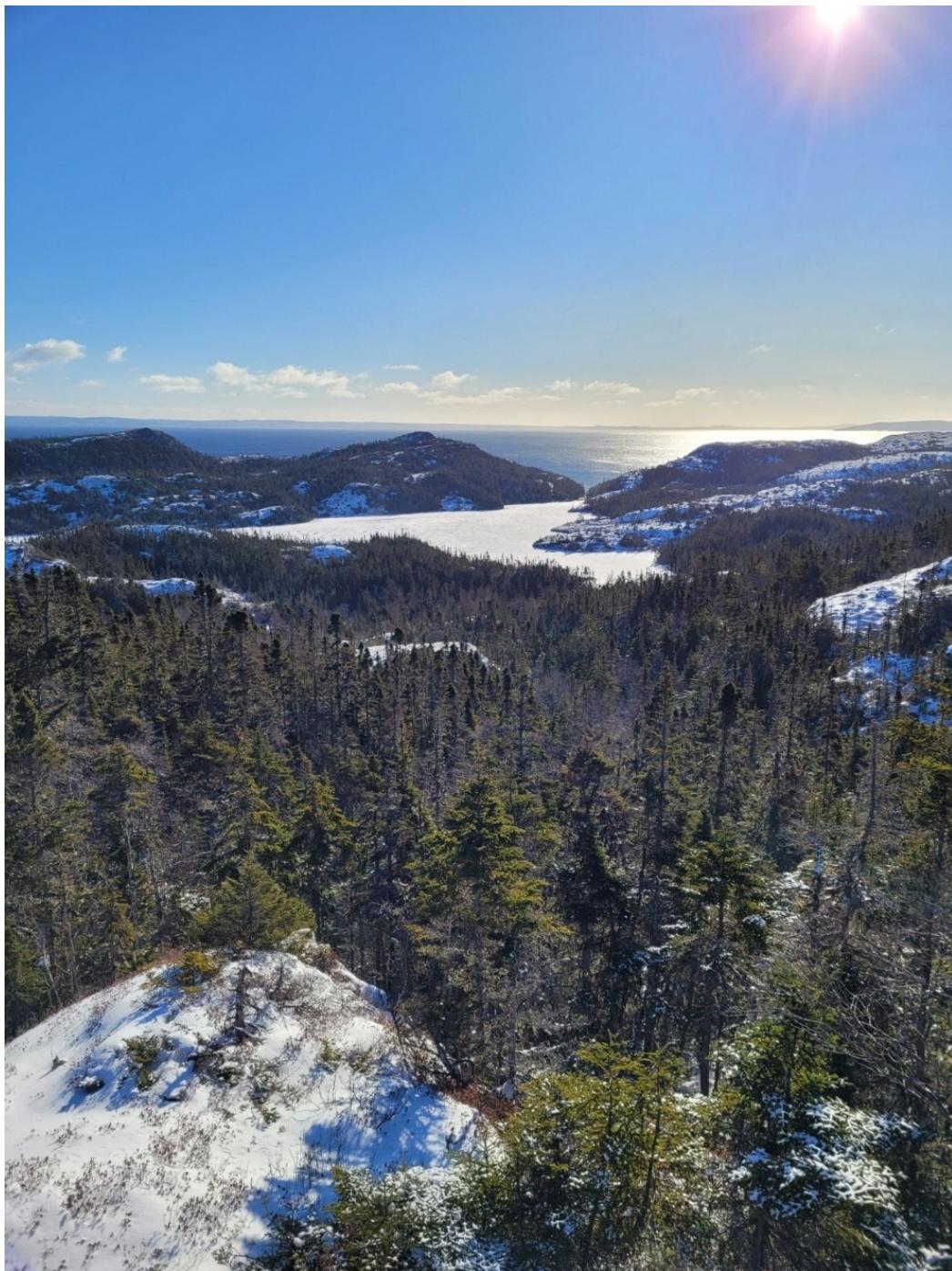


Figure D3-3.3-6 Mature Coniferous Forest by Sibley's Cove Pond in the Project Area.



Figure D3-3.3-7 Balsam fir feathermoss forest in the Project Area.

3.3.5 Open Water

The Open Water ecotype (Figure D3-3.3-8) describes the ponds, pools, and streams throughout the PA. Lacustrine and riverine environment and standing water on bogs exists throughout the PA. For the purposes of this report, only terrestrial ecotypes are described in detail. Further information on the aquatic resources found within the PA is available in Appendix B1: Aquatic Environment Component Study.



Figure D3-3.3-8 Open Water in the Project Area.

3.3.6 Developed/Disturbed Land

The Developed/Disturbed Land ecotype encompasses all habitats that have been altered by human activity. The prevalence of Developed/Disturbed Land in the PA varies greatly between the highly industrialized Come By Chance Industrial Site area and the relatively untouched wild lands within the proposed Wind Farm site. The Come By Chance Industrial Site hosts a variety of infrastructure including storage tanks, administrative buildings, parking lots, and roads, all of which are included in this ecotype. In addition, roads such as the Trans-Canada Highway and right of ways (ROWs) such as the NL Hydro transmission line intersect the PA at various points, mostly along the Project's proposed linear corridor.

Within the footprint of the Wind Farm area, there is little disturbance aside from historical small-scale wood harvesting, a few abandoned cabins, and campsites. The landscape remains almost entirely uninfluenced by anthropogenic activity. However, several areas of younger Regenerating Forest stands, and Open Coniferous Forest may have been formed through previous forestry practices. There are a few instances of flattened meadows where forestry camps once existed, with remnants such as old chairs, pans, and glass jars persisting on the ground. These are typically located on flood plains where streams meet lacustrine environment, as is visible in Figure D3-3.3-9 (photo taken at approximately UTM Zone 22T 289172 E, 5302912 N).



Figure D3-3.3-9 Previously disturbed meadow habitat and historical camp equipment, Project Area.

3.3.7 Open Coniferous and Open Mixedwood Forests

Open Coniferous and Open Mixedwood (Coniferous and Deciduous) Forests (Figure D3-3.3-10) within the PA are open forested areas that have been previously deforested or disturbed by anthropogenic or natural forces such as domestic tree-cutting, windfall events, landslides on sloped terrain (e.g., Southwest Arm River Valley), mature forest stand die-offs, and/or pest mortality. Any forest stands in a state of regrowth that remain open for various reasons are included under this ecotype. In the PA, the Open Forest canopy is mostly or fully open, and dominant vegetation is represented in the shrub and herb layer. Sparse trees, including fir or spruce in Open Coniferous Forest and white birch (*Betula papyrifera*) in Open Mixedwood Forest, are often stunted by exposure or moose browsing. Moose activity, if intensive, influences vegetation growth and may lead to the creation of Open Forest rather than Regenerating Forest. Stunted trees within Open Forests receive abundant sun and experience generally low competition for space, with dead standing and felled trees common throughout. Meadows exist throughout the Open Forests in the PA, typically consisting of native meadow species such as goldenrod spp., meadowsweet (*Filipendula ulmaria*), bluejoint reedgrass (*Calamagrostis canadensis*), hawkweed, and other native herbs and graminoid species. This is especially true in flood plain and riparian zones (see Figure D3-3.3-11).

Open Coniferous Forests also exist in upland areas adjacent to Coniferous Scrub where forested ground is occupied by coniferous trees at mature age classes, typically growing individually rather than in groups. Heath species such as sheep laurel, Labrador tea, lowbush blueberry, and rhodora (*Rhododendron canadense*) dominate the herb layer and sometimes reach into the shrub layer, although they are usually under 2 m in height (Meades & Moores, 1994). Ground-level vegetation is dominated by lichens such as *Cladonia* spp. Upland dry areas that are nutrient poor often display interwoven rhizomes, and large plant communities (e.g., Kalmia heath) are most dominant here. This habitat type was described by Meades & Moores as Cladonia-Kalmia Black Spruce (1994), which falls within the broader Open Coniferous Forest ecotype in this report.



Figure D3-3.3-10

Open Coniferous Forest upland habitat, Project Area.



Figure D3-3.3-11

Floodplain meadow with mature conifers, Project Area.

3.3.8 Mixedwood Forest

Mixedwood Forests (Figure D3-3.3-12) contain both deciduous and coniferous trees, with neither comprising more than 75% of the canopy (Meades & Moores, 1994). Most mature forests within the PA are dominated by coniferous trees; however, in some areas (especially along deep valleys), deciduous trees occupy a prominent role in the canopy. These areas are either classified as Mature Deciduous Forest (see next section) or Mixedwood Forest, depending on the coverage. Mixedwood Forest stands typically exhibit a mixture of white birch and other deciduous trees and shrubs combined with black spruce and balsam fir.

Mixedwood Forests are found along valleys in the PA, typically between large Mature Coniferous Forest stands. Mixedwood Forest stands often exist in small pockets but provide drastically different habitat in comparison to the surrounding Mature Coniferous Forest. Where the forest canopy is a deciduous-coniferous mix, the shrub layer hosts less coniferous regen due to the shade provided by broad-leaved mature birch in the canopy. Ferns are common in the understory beneath more dominant birch areas. Most Mixedwood Forest understory vegetation at the herb layer consists of *Dryopteris* ferns and *Lycopodium* mosses, with sparse black spruce regen in the herb layer and balsam fir regen sometimes reaching into the shrub layer.



Figure D3-3.3-12

Mixedwood Forest in Deer Harbour Steady, Project Area.

3.3.9 Mature Deciduous Forest

In several valleys of the PA, pure stands of white birch exist with only sparse conifers present, if any at all. The dominant vegetation in the understory are ferns and non-vascular feathermosses with sparse herbs and shrubs. Birch thickets such as these often exist as secondary growth after a deforesting event, such as fire or clear-cutting (Meades & Moores, 1994). At one Mature Deciduous Forest site in the PA (D3-3.3-13), mature birch grows along a steep slope with evidence of previous landslides. The deciduous thickets here are composed of fully mature, large white birch hosting healthy lichen growth. The steepness of this slope and richness of the soil may have provided the birch thicket with the means to grow more rapidly and successfully here compared to Open Coniferous and Open Mixedwood Forested areas.

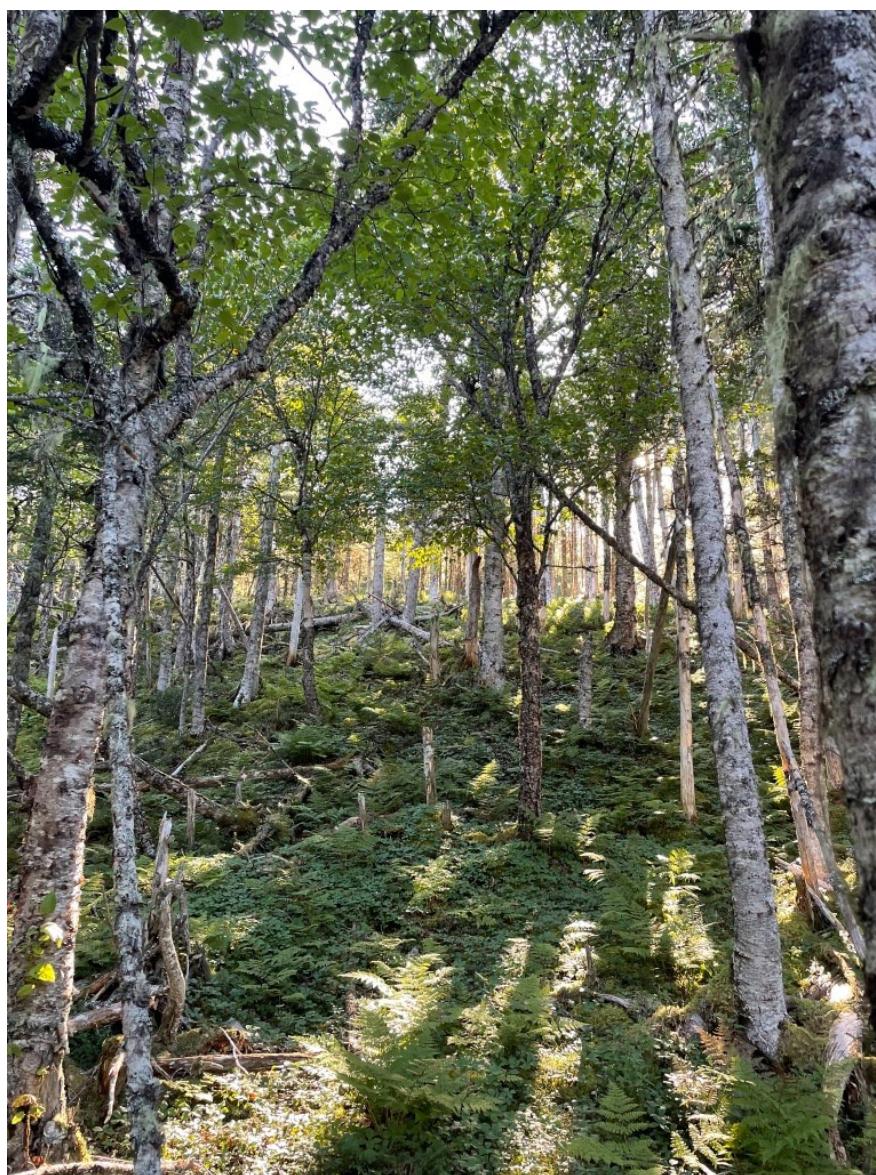


Figure D3-3.3-13 Mature Deciduous Forest, Deer Harbour Steady, Project Area.

3.3.10 Coastline

A strip of Coastline is present in the eastern portion of the PA, but otherwise the Project boundary does not extend to the coast. The Coastline here exists mainly as rocky cliffs that drop steeply to the ocean below. In several areas where stream valleys meet the sea or flatter topography allows for the accumulation of eroded beach stone, small rocky beaches occur. Forested edges along the coastline are influenced by wind at the coast and the salt spray. The most dominant neighbouring ecotypes along the Coastline are Open Coniferous Forest, Coniferous Scrub, and Rocky Barren. The elevation, exposure, and erosion create similar vegetation communities here as in upland sites. Large Rocky Barren outcrops exist in the northeast portion of the area, contrasting the forested edges in the southeast. Figure D3-3.3-14 illustrates a representative strip of coastline along Bull Island in the LAA.



Figure D3-3.3-14

Coastline, Bull Island, Local Assessment Area.

3.3.11 Deciduous Scrub

Deciduous Scrub (Figure D3-3.3-15) describes low-growing areas of deciduous herb-layer and shrub-layer trees and shrubs between 0 and 5 m in height (shrublands). Secondary succession of areas previously cleared of vegetation will often form a shrubland dominated by rapidly invading pioneer species such as alders, willows, and other shrubs. In the PA it is often alders which take over anthropogenically disturbed sites. Deciduous Scrub within the PA is more likely associated with moist conditions where alder-swamps may exist in riparian zones along fens, streams, and near marshy lacustrine environments (Meades & Moores, 1994). Natural shrublands exist where Wetlands meet upland areas, leading to alder and sweetgale-dominated habitats.

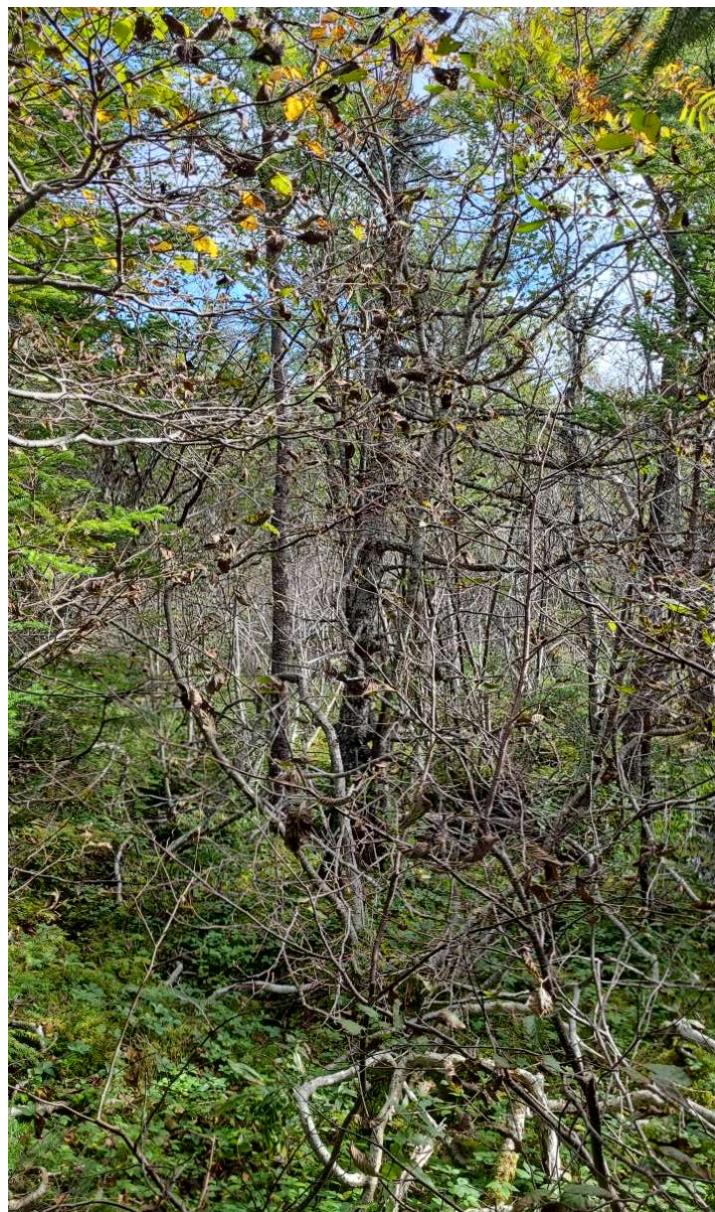


Figure D3-3.3-15

Deciduous Scrub in the Project Area.

3.3.12 Regenerating Forest

This ecotype is a generalized classification for Coniferous Forest stands between 10 and 20 years old. While Regenerating Forest (Figure D3-3.3-16) could classify many previously disturbed sites, this ecotype is specific to areas with densely growing conifers up to 6.5 m tall that exhibit minimal signs of previous deforestation or stunting due to environmental factors (i.e., wind exposure, erosion). Regenerating Forest in the PA contains predominately black spruce intermixed with balsam fir, with early successional white birch growing throughout.



Figure D3-3.3-16 Regenerating Forest in the Project Area.

4.0 Discussion

The PA is mostly comprised of Rocky Barren, Coniferous Scrub, and Wetland, especially within the proposed Wind Farm site. Valleys typically consist of Mature Coniferous Forest with some areas of Mixedwood Forest. Open areas of disturbed forested sites consist of Open Coniferous and Open Mixedwood Forests with low-growing vegetation and sparse mature trees. The ecotypes listed for the PA are common throughout the Maritime Barrens Ecoregion.

The eastern portion of the PA, comprising much of the Wind Farm area, is comprised primarily of Rocky Barren, while the western sections of the PA are more of a mosaic of Coniferous Scrub, Wetland, and Mature Coniferous Forest. The inaccessibility (due to steep, craggy topography) of much of the PA, especially eastern sections, has left it largely unaffected by anthropogenic influences.

The Rocky Barren plateau where the Wind Farm will be located has an elevation from 200 to 300 m. The plateau maintains its height almost to the eastern Project boundary where the terrain ends abruptly and drops off to coastal cliffs. Across all upland areas, vegetation was dominated by sheep laurel and crowberry heath. Mature Coniferous Forest (represented primarily by the balsam fir-feathermoss subtype) was the most prevalent forest ecotype, as it is in much of this ecoregion.

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