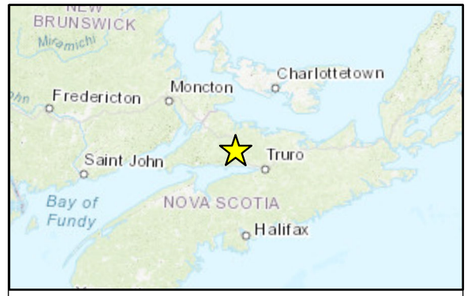
Westchester Wind Project

Figure 28 Realistic Case Sound Assessment



Legend

- Preliminary Turbine Layout
- Receptors
- Existing Roads

Sound Assessment Contours

- 35 dB(A)
- 40 dB(A) [regulated max.]
- 45 dB(A)
- 50 dB(A)

Notes

1. The regulated maximum perceived sound at a receptor is 40 dB(A) according to the *Guide to Preparing an EIA Registration Document for Wind Power Projects in Nova Scotia*

2. All receptors are outside the 40 dB(A) regulated maximum contour land

Sources

- Basedata provided by the Province of Nova Scotia
- Basemap: ESRI World Topo Map

N

Meters

0 245 490 980

Scale: 1:25,000

Spatial Reference: NAD 1983 UTM Zone 20N

Page Size: 11" x 17"

Production Date: Dec 14, 2022

Natural Forces

4.2 Potential Interactions and Mitigations

The potential interactions of the Project with the ambient sound levels and the proposed mitigation measures are summarized in **Table 51**.

TABLE 51: POTENTIAL INTERACTIONS AND PROPOSED MITIGATION MEASURES FOR AMBIENT SOUND LEVELS

Potential Interactions with Ambient Sound Levels	Proposed Mitigation Measures
Disturbance to receptors within the surrounding area due to use of equipment and machinery during construction and decommissioning. Disturbance to receptors within the surrounding area due to sound levels generated during operations. Disturbance to receptors within the surrounding area due to infrasound from wind turbines during operations.	1) Per industry standards, turbines have been sited minimum 1 km away from residences. 2) A sound level impact assessment has been conducted showing that sound levels anticipated at nearby dwellings are below provincial guidelines of 40 dB(A). 3) The wind turbine model selected for the Project will incorporate noise reduction technologies to mitigate sound levels generated by the moving blades, if feasible. 4) Site preparation, construction, and decommissioning activities will be limited to daytime hours when feasible. 5) Clearing of flora on the Project site will be minimized to aid in attenuation of sound levels. 6) Events with particularly high sound levels, such as blasting, will be communicated to local residents adequately and with ample time. 7) Blasting will be conducted by a certified contractor and will be limited to that which is necessary to enable the Project to be carried out. 8) A complaint resolution plan has been developed to address sound level concerns (**Appendix P**). 9) Proper sound level management measures following the Environmental Management and Protection Plan (**Appendix O**) will be instated. 10) Infrasound from wind turbines is not anticipated to be a concern based on the project modeling and given the distance the wind turbines are located relative to dwellings.

Significance of Residual Effects

Elevated sound levels caused by the construction and decommissioning phases will be temporary, during the day when possible, and short term. Sound level production from the turbines during operation have been mitigated by setback distances and confirmed by a sound level impact assessment. By using the mitigation identified above, the Project is not anticipated to have any significant residual environmental effect on sound levels for humans or wildlife outside the Project site. While any effect on ambient noise will be negative, the significance of residual effects on ambient noise is considered negligible and no follow up monitoring post-construction is recommended.

While heightened sound levels during construction activities are unavoidable, the sound level assessment for the construction period shows that sounds levels at nearby residences are not expected to be significant. Various mitigation measures will be put in place during construction to limit the heightened sound levels.

The operational sound level modelling for the Project demonstrates that the sound levels expected to be experiences at receptors under realistic conditions including ambient sound adhere to the Nova Scotia guidance. Should excessive sound emissions from the Project be reported during operation at nearby receptors, appropriate mitigations will be explored for feasibility in the area. Mitigation measures could include increasing vegetation between the receptor and emitting source, and any other appropriate technology available at the time of the required mitigation.

As mentioned before, a complaint resolution plan (**Appendix P**) has also been developed for handling sound level concerns from surrounding communities. The Proponent will start the review process for complaints within 5 business days of the concern or complaint being received. The Proponent will then conduct an investigation into the complaint in collaboration with relevant parties.

5 Biodiversity values and ecological connectivity

This section serves to fulfill the following request from the Minister's AIR:

5. In consultation with ECC Protected Areas and Ecosystems Division provide an analysis of potential impacts to biodiversity values and land-scape scale ecological connectivity from habitat fragmentation. Identify any associated mitigation measures.

Connectivity refers to the movement of organisms and processes and the features that affect this movement (Stewart and Neily 2008). Ecological connectivity refers to a landscape's ability to facilitate the unimpeded movement of ecological resources, such as water, flora and fauna, through resource patches and corridors (Brooks 2003). Ecological connectivity considers both the structural components (i.e., the spatial structure) and functional components (i.e., how a particular organism reacts to the spatial structure) of the landscape (Brooks 2003). Ecological resources and wildlife movement without excessive risk is of critical importance to maintaining biodiversity at all levels. The presence of human disturbances can significantly impact a landscape's ability to allow movement; therefore, ecological connectivity has been identified as a VEC for the Westchester Wind Project and is addressed in this Addendum.

Landscapes are large areas that function as ecological systems and respond to a variety of natural and anthropogenic influences. Elements are smaller ecosystems that make up landscapes and are typically described by their potential vegetation (e.g., forest type) and physical features (e.g., soil, landform). The type of elements within a landscape help determine historical vegetation patterns and promote an understanding of present distributions and potential habitat development (NSDNRR 2015a). When assessing the

biodiversity values and factors contributing to ecological connectivity, it is important to consider how the distribution of naturally occurring factors has been classified and mapped.

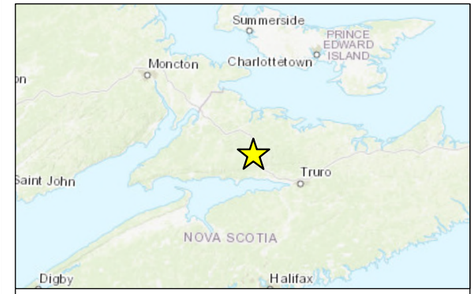
The Ecological Land Classification for Nova Scotia divides the province into different spatial units based on a variety of ecological attributes for Integrated Resource Management planning (Stewart and Neily 2008). There are 5 levels of Ecological Land Classification, each providing ecologically relevant information at different scales (Neily et al. 2017):

- Ecozone: It is the broadest level, describing ecological features at a continental scale. Canada is divided into 18 terrestrial ecozones, with all of Nova Scotia being located within the Atlantic Maritime Ecozone;
- Ecoregion: Subdivision of the ecozone characterized by ecological responses to regional climate. There are nine ecoregions in the province, with the Project being located in the Nova Scotia Uplands Ecoregion (300).
- Ecodistrict: Subdivision of an ecoregion characterized by distinctive assemblages of landform, relief, surficial geological material, soil, water bodies, vegetation, and land uses. There are 39 ecodistricts in the province of Nova Scotia. The Project is located in the Cobequid Hills ecodistrict (340), running from east to west in an elongated shape between the counties of Cumberland, Colchester, and Pictou (**Figure 29**).
- Ecosection: Subdivision of an ecodistrict which presents specific physical features like topographic patterns, soil texture and soil drainage. Dominant ecosections can be found several times in an ecodistrict. Ecosections and ecosites are not coded uniquely to higher orders, as they can be found throughout Nova Scotia in different ecodistricts.
- Ecosite: Smallest management classification, showing ecosystems that have similar moisture and nutrient regimes and vegetation as expressed by slope or slope position.

Corridors are natural linear communities that link parts of the ecodistrict (NSDNRR 2015a). When assessing connectivity, watercourses are defined as linear corridors and often times serve as a natural delineation of the landscape. The Project is located within the Economy (1DJ) and Phillip/Wallace (1DN) primary watersheds. Scaling for this, the Project spans three secondary watersheds, described in Section 3.2.4.1: the River Philip (1DN-1), the Wallace River (1DN-3), and the Portapique River (1DJ-7) secondary watersheds. As previously mentioned, landscapes are large and heterogeneous areas with a variety of land covers and different shapes, sizes, and compositions. As such, the process to define an assessment area for the Project is different than those used for the LAAs described in **Section 2.2.1**. When conducting a landscape analysis, the scale will depend on specific conditions of the area, spatial heterogeneity, and objectives of the study. Having a fixed size for the spatial dimension can be arbitrary and may not provide a comprehensive view of the impacts of the Project. The purpose of landscape analysis is to understand the region as an ecological system and explore the structures and functions within it (Stewart and Neily 2008).

Westchester Wind Project Addendum

Figure 29
Ecodistricts and Secondary Watersheds



RIVER PHILIP

WALLACE

PORTAPIQUE

GREAT VILLAGE

BASS

ECONOMY

Legend

- Potential Development Area
- Secondary Watershed Boundary

Ecodistrict

- Cobequid Hills
- Cobequid Slopes
- Northumberland Lowlands
- Cumberland Hills

Notes

1. 28 turbine locations are being considered for the project. Only up to 12 turbine locations and their associated infrastructure would be developed for this Project.

Sources

- Basedata provided by the Province of Nova Scotia
- Basemap: ESRI World Topo Map

N

0 1,500 3,000 4,500

Meters

Scale: 1:85,000

Spatial Reference: NAD 1983 UTM Zone 20N

Page Size: 11" x 17"

Production Date: Dec 14, 2022	Prepared By: Alex Torrealba

Natural Forces

To provide a better understanding of the landscape-scale impacts of the Project, different scales were used when characterizing the current landscape status and connectivity. There is not a single LAA for ecological connectivity like with other VECs, but rather different study areas depending on the component that is being analysed. It is important to note that this analysis used a landscape feature approach focused on "general species" rather than a specific multi-species approach, which could present different results. This analysis also focused solely on structural connectivity, not functional connectivity.

While this Addendum includes the assessment of a 28-turbine Footprint, the Project will only develop up to 12 turbines and their associated infrastructure. The Proponent has taken a conservative approach when assessing the landscape, as the presented results (assessed 28 turbines) are a deliberate overestimation of the final Project layout.

5.1 Landscape Status/Connectivity

5.1.1 Approach and Methodology

A desktop review using publicly-available resources was conducted to characterize the current state of the landscape surrounding the Project. The following sources were included:

- NSDNRR GIS map layers (Ecological Land Classification, Forest and Non-Forest Inventory, Old Growth Forest Policy, Land Cover, Road Index, Seral Stage, Ecological Emphasis Class, Protected Natural Areas, Wildlife Management Zones) (GeoNOVA 2022);
- Nova Scotia (NS) provincial landscape viewer (NSDNRR 2022);
- Spatial data retrieved from Forest connectivity in Nova Scotia by Cunningham et al. (2020);
- NSDNSDNRR 2021 Recovery Plan for Mainland Moose;
- NSDNSDNRR 2012 Special Management Practices for White-tailed Deer Wintering Areas; and,
- High-resolution Google Earth satellite imagery.

Nova Scotia's Procedural Guide for Ecological Landscape Analysis (Stewart and Neily 2008) details the process to carry out a historical and existing landscape analysis in the province. Using this information as a basis, this section focuses on identifying the current landscape conditions around the Project and assessing how different Project stages could modify them. Several concepts from this guide were used to provide a better understanding of the landscape (i.e., Ecological Land Classification, Land Cover, Seral Stage, Road Index, and Ecological Emphasis Classification). While each component shows different interpretations of the landscape, the holistic view of all components allows us to understand the Project and region's landscape composition.

As described in **Section 3.1.1.1**, available mapping and observations gathered during the biophysical assessments were used to generate GIS maps showing the existing habitat and land use features surrounding the Project and to calculate the area of potential disturbance within each type (**Figure 5**). Approximately 57% of the PDA is located within areas that have been largely previously disturbed by forestry, agriculture, recreational trails, and access

roads. The remaining non-disturbed areas are primarily softwood and hardwood forests (18% and 16%, respectively; **Table 8**).

5.1.2 Ecologically Significant Areas

The closest wilderness area, approximately 1 km south from the closest Project turbine, is the 2,050-hectare (ha) Portapique River Wilderness Area, containing old growth hemlock (Tsuga Canadensis) and red spruce (Picea rubens) stands near hardwood and mixed-wood forests (NSE 2022). The Project is located within an area designated as Core Habitat for Mainland moose (Alces alces Americana) (NSDNRR 2021). While the Mainland moose would not use agricultural areas as part of their habitat, some forested areas on-site could be suitable habitat, and they may move through the PDA to access more suitable habitats. There is a deer wintering area approximately 1.5 km northeast of the Project, where white-tailed deer (Odocoileus virginianus) congregate in high density groups for shelter, cover, and foraging (NSDNRR 2012). Deer wintering within the PDA is considered to be unlikely because much of the lands are cut and developed, providing little protection from wind.

Additionally, the Project is set back from the following ecologically significant areas:

- 16 km to nearest Important Bird Area (IBA), Cobequid Bay;
- 15.8 km to the nearest provincial park, Wentworth Provincial Park;
- 1 km to the Portapique River Wilderness Area, 12 km to the Economy River Wilderness Area, and 15 km to the Polly Brook Wilderness Area, the closest wilderness areas;
- > 12 km to Provincially Protected Nature Reserves, Montrose Nature Reserve and Steepbank Brook Nature Reserve; and
- > 5 km to known bat hibernacula.

5.1.3 Ecodistricts

As previously mentioned, the Project is located in the Cobequid Hills ecodistrict (340) (**Figure 29**). Approximately 91% of the ecodistrict's land cover is forest/woodland, followed by 5% of agricultural land and 2% of wetlands (Neily et al. 2017). Large, intact hardwood forests such as sugar maple (*Acer saccharum*), beech (*Fagus sp.*), and yellow birch (*Betula alleghaniensis*) extend from crest to lower slopes. An ecological landscape analysis conducted in the Cobequid Hills ecodistrict in 2015 identified six distinctive elements (NSDNRR 2015a):

- One matrix (a dominant element): Tolerant Hardwood Hills; and
- Four patches (smaller elements): Tolerant Mixedwood Hummocks, Red and Black Source Hummocks, Tolerant Mixed Slopes and Wetlands.

Tolerant Hardwood Hills represent more than 65% of the ecodistrict. Tolerant Mixed Hummocks and Red and Black Spruce Hummocks are the two largest patches, each representing almost 12% of the ecodistrict. The former is a very fragmented patch with areas occurring in the Economy Lake and Lynn Mountain. Tolerant Mixed Sloped make over 7% of the area, with Wetlands making up the smallest area patch in the ecodistrict (NSDNRR 2015a). The Project is located within the largest land cover element of the ecodistrict (i.e., Tolerant Hardwood Hills).

The Project is located less than 1 km south of the Cumberland Hills ecodistrict (540), with one of the access roads located adjacent to the ecodistrict boundary. The Cumberland Hills ecodistrict presents more anthropogenic disturbance than Cobequid Hills, mainly from agricultural activities like blueberry production. Tolerant Mixedwood Hills, representing the matrix element and half of the area, have been altered from shade-tolerant hardwoods to a forest with a relatively equal area in all cover types. The largest patch element (Tolerant Mixedwood Hummocks) has been converted to agricultural land or other uses. However, the Cumberland Hills ecodistrict still connects to adjacent ecodistricts through numerous valley bottoms and slope systems that follow the main river valleys (NSDNRR 2015b). Other ecodistricts adjacent to Cobequid Hills include Cobequid Slopes (350), Minas Lowlands (620), and Northumberland Lowlands (530). While direct impacts from the Project are not anticipated to affect these ecodistricts, they have been identified in this section as they form part of the landscape of the region.

5.1.4 Land Cover

The NSDNRR land cover classification identifies forest and non-forest cover types, and it includes 12 vegetation communities based on three cover groups (i.e., softwood, mixedwood, and hardwood), as well as wetlands, harvests, and agriculture, among other classifications. The PDA is located is mostly classified as blueberries or barren, harvests, and softwood (17, 12, and 35% respectively), with patches of mixedwood (11%), and hardwood cover (25%).

Wildlife corridors, also called dispersal corridors or landscape linkages are passages that connect terrestrial areas to one another. These corridors are crucial to preserve landscape-scale connectivity. These pathways allow terrestrial flora to disperse and terrestrial fauna to move into habitats where they can reproduce, forage and find shelter (NCC 2022). There is a considerable potential species wildlife corridor with a mix of hardwood, mixedwood, softwood, and wetlands approximately 5 km southwest of the Project, between the Portapique River and Economy River Wilderness Areas. This is an important area to preserve given the connectivity it provides between protected areas and with the rest of the region. The Project will not impact the ability to traverse this potential wildlife corridor, as any tree clearing or construction by the Project will not interact with this area.

A large portion of the area northwest of the Project is classified by NSDNRR as blueberries or barren, suggesting that terrestrial animals, such as Mainland moose, will be less likely to use these cleared areas and instead opt to travel through more forested paths (NSDNRR 2021). There are several hardwood patches outside the Project area leading north-south (most notably from old growth forest areas within the Economy River Wilderness Area and Polly Brook Wilderness Area, 12 and 15 km west of the Project, respectively) that could serve this purpose (**Figure 30**). Other large mammals (i.e., reindeer, Rangifer tarandus) have shown to shift away from sites with wind turbines (Skarin et al. 2018), preferring less disturbed areas.