

H VISUAL IMPACT ASSESSMENT

MEMO

TO: Jason Parisé, Development Manager, SWEB Development
FROM: Les Ryan, P.Eng.
SUBJECT: Wisokolamson Energy Project Photomontages
DATE: April 13, 2018

WSP has completed the following tasks for the Wisokolamson Energy Project photomontages:

- Site visit to capture images at five locations
- Post-processing of photos
- Stitching of the photos together to create panoramas
- Generation of photo montages for Vestas V126 3.6 MW turbine with a hub height of 117 metres

The photographs were taken using a Canon EOS REBEL T1i DSLR camera (4752 x 3168 resolution) with Canon EFS 18-55 mm lens. The camera was mounted on a tripod at approximately 1.5 m above ground. The skies were cloudy to partly-cloudy on the days the photos were taken.

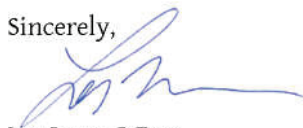
The photomontages were generated using WindPRO version 3.1.617. Control points were used to orient the photos (pan, tilt, and rotation angles) and to confirm the focal length and field of view. The control points used were collected during the field work and from georeferenced aerial photographs (Google maps and Bing maps). The turbines were rendered taking into account the effects of cloud cover and the time of day on the light. A combination of automated and manual masking was performed as needed to create accurate depictions of the turbines.

Hugin (version 2017.0.0.eac5e8cc546e) was used to stitch the photomontage photos into panoramas. Photoshop was used to correct minor stitching flaws, remove spots resulting from dust on the camera sensor, and for resizing and cropping of the photomontage images. The resulting panoramas have a field of view of approximately 120 degrees.

Two locations were selected: “Cabin”, and “Midway Road”. For these locations, maps were produced that show the before and after panorama, the location of that the photos were taken, and the panorama pan arcs. An analysis of the other three locations showed that no turbines would not be visible and no further action was taken.


Please let me know if you have any questions or need any further information.

Sincerely,



Les Ryan, P.Eng.
Attachments.



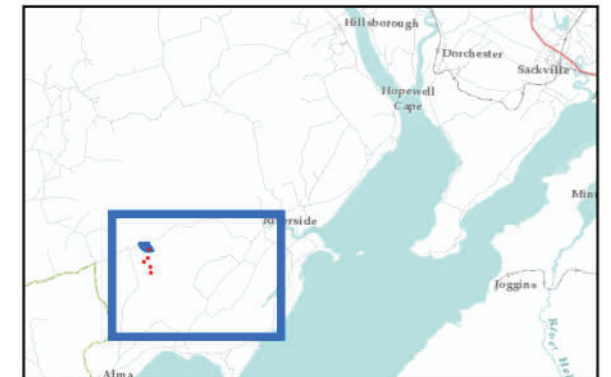
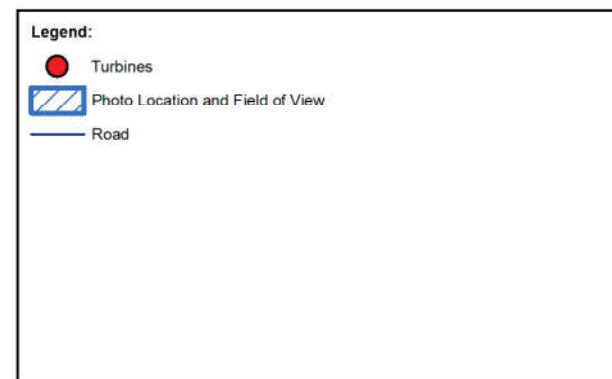
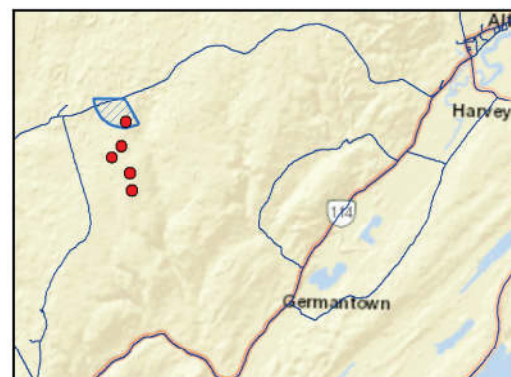
Title: Photomontage: Location 2 (Cabin)	
Project: Wisokolamson Energy LP Wisokolamson Energy Project	
	Datum: NAD 83 Projection: UTM Zone 20N
	Scale: N.T.S.
	Date: 2018-04-02
	Version: 2

Notes:
Photographs taken with Canon EOS REBEL T1i DSLR camera and EFS 18-55 mm lens. Panoramic view compiled from multiple individual photographs. Photomontage simulated using Vestas V126- 3.6 MW turbine with rotor diameter of 126 m and hub height of 117 m using 5 turbine locations (Layout Rev 5 - 2018-03-21).


Data Sources:
GeoNB.

Prepared By: WSP Canada Inc.
Author: L. Ryan
Reviewed: A. Louro
Approved: R. Istchenko

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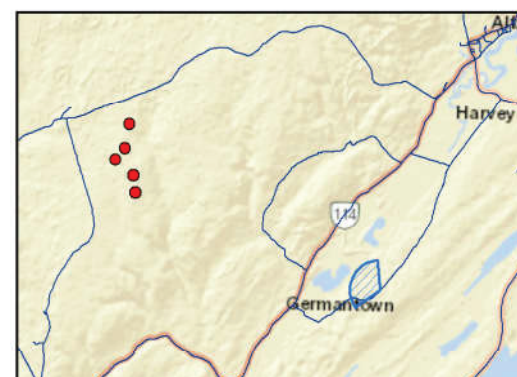
Title: Photomontage: Location 5 (Midway Road)	
Project: Wisokolamson Energy LP Wisokolamson Energy Project	
	Datum: NAD 83 Projection: UTM Zone 20N
	Scale: N.T.S.
	Date: 2018-04-02
	Version: 2

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Photographs taken with Canon EOS REBEL T1i DSLR camera and EFS 18-55 mm lens. Panoramic view compiled from multiple individual photographs. Photomontage simulated using Vestas V126- 3.6 MW turbine with rotor diameter of 126 m and hub height of 117 m using 5 turbine locations (Layout Rev 5 - 2018-03-21).

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Legend:

- Turbines
- Photo Location and Field of View
- Road



MEMO

TO: Jason Parisé, Development Manager, SWEB Development
FROM: Les Ryan, P.Eng.
SUBJECT: Wisokolamson Energy Project Photomontages
DATE: April 13, 2018

INTRODUCTION

WSP has completed a high-level turbine visibility analysis for the Wisokolamson Energy Project. The objective of this analysis was to determine the extent of the visual influence of the wind turbines.

The results of the analysis are presented as two maps:

- A map that shows the extent of the visibility of the wind turbine blades that reach heights of 180 m above ground.
- A map that shows the extent of the visibility of the wind turbine tower and nacelle that is at 117 m above grade.

METHODOLOGY

A visibility analysis was conducted using the Visibility Tool in ArcMap (GIS software). The visibility tool identifies which observable points are visible from each raster surface location. Inputs to the model include a grid of ground elevations of the area around the turbines, the height of the object being observed, and the height of the observer.

For the elevation grid, digital elevation model (DEM) data was obtained from Natural Resources Canada. The base resolution for DEM is 0.75 arc seconds along a profile in the south-north direction and varies from 0.75 to 3 arc seconds in the west-east direction, depending upon the geographic location.

An observer height of 1.5 m was used.

For the height of the objects being observed (i.e., the wind turbine) two scenarios were used: 180 m, which is the maximum height that the blade tip reaches; and 117 m, which is the hub height or average height of the nacelle.

In the first scenario, an object height of 180 m, the maximum distance was limited to 15 km. Beyond that it was assumed that the turbine blades would not be visible to the unaided eye. For the second scenario, an object height of 117 m, the maximum distance was limited to 25 km. The increase in maximum distance used for the second scenario is because the nacelle is larger than the blades and can be seen from a greater distance.

The analysis does not take into consideration objects that may obstruct the view such as trees or buildings.

RESULTS

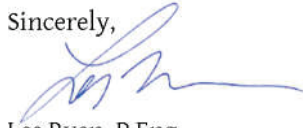
The results of the visibility analysis are shown on the two attached maps. The first map shows the areas from which it would be possible to see at least some portion of the turbine blades (maximum height above ground of 180 m). The second map shows the areas from which it would be possible to see the turbine nacelle (height above ground of 117 m) and possibly some of the tower.

The visibility analysis results in what can be considered a “worst case” viewshed area. Practically speaking, there are several factors that were not accounted for that would limit the visibility of turbines, such as:

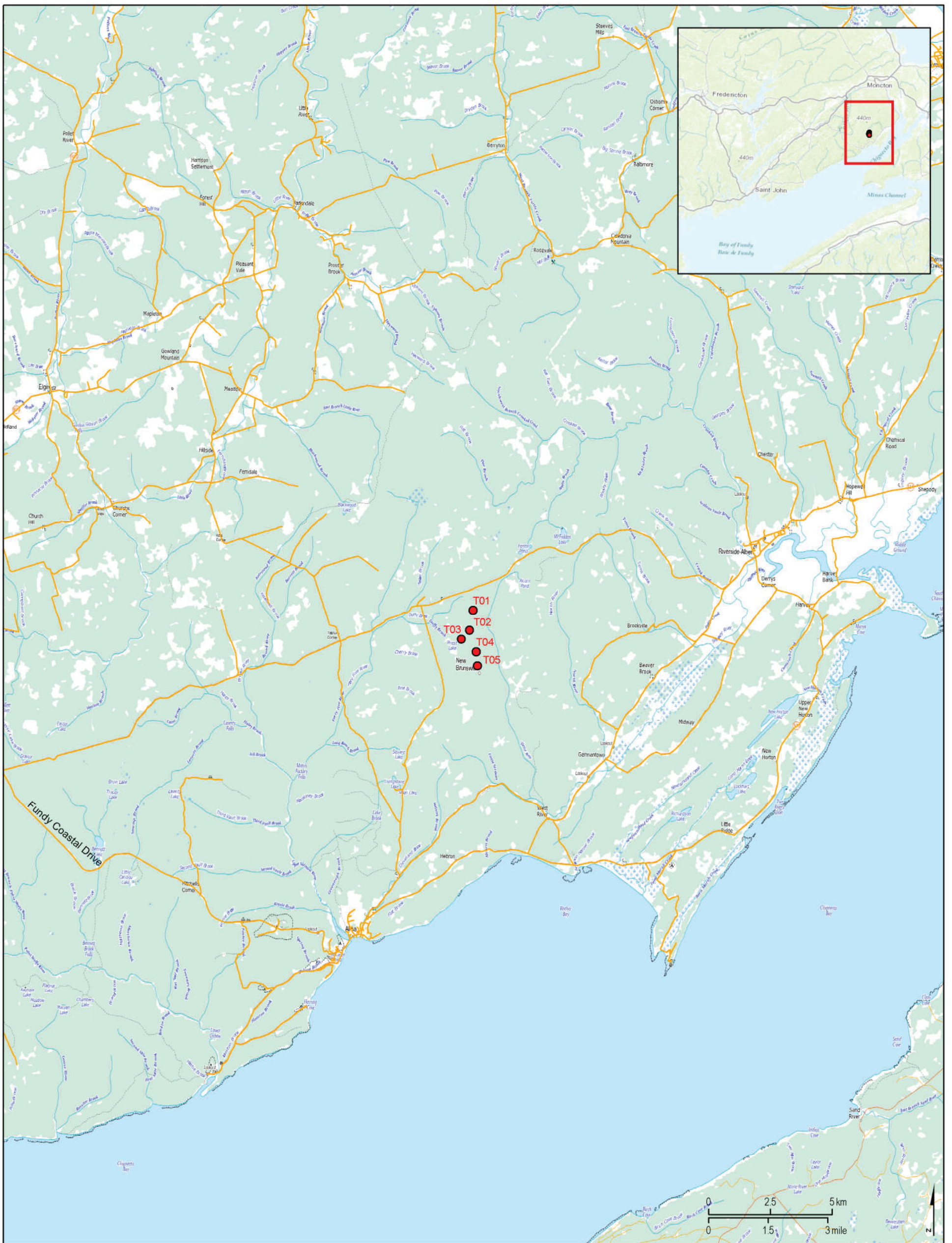
- Obstructions (e.g., trees, buildings),
- Atmospheric, weather and lighting conditions (e.g., clouds, low contrast lighting, haze, etc.),
- The amount of the turbine that is visible (e.g., only a portion of the blade tip might be visible),
- Relative size of the turbine at the viewing distance (e.g., turbines farther away are smaller and harder to see or recognize).

Please let me know if you have any questions or need any further information.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Les Ryan', with a long horizontal flourish extending to the right.

Les Ryan, P.Eng.
Attachments.



- Turbines
- Road
- Zone of Visual Influence

In the preparation of this map, WSP has relied upon certain information provided by the Client. While WSP has taken reasonable measures to present accurate information in the map, WSP does not warrant the reliability, accuracy, quality, currency, validity, or completeness of information found in the map.

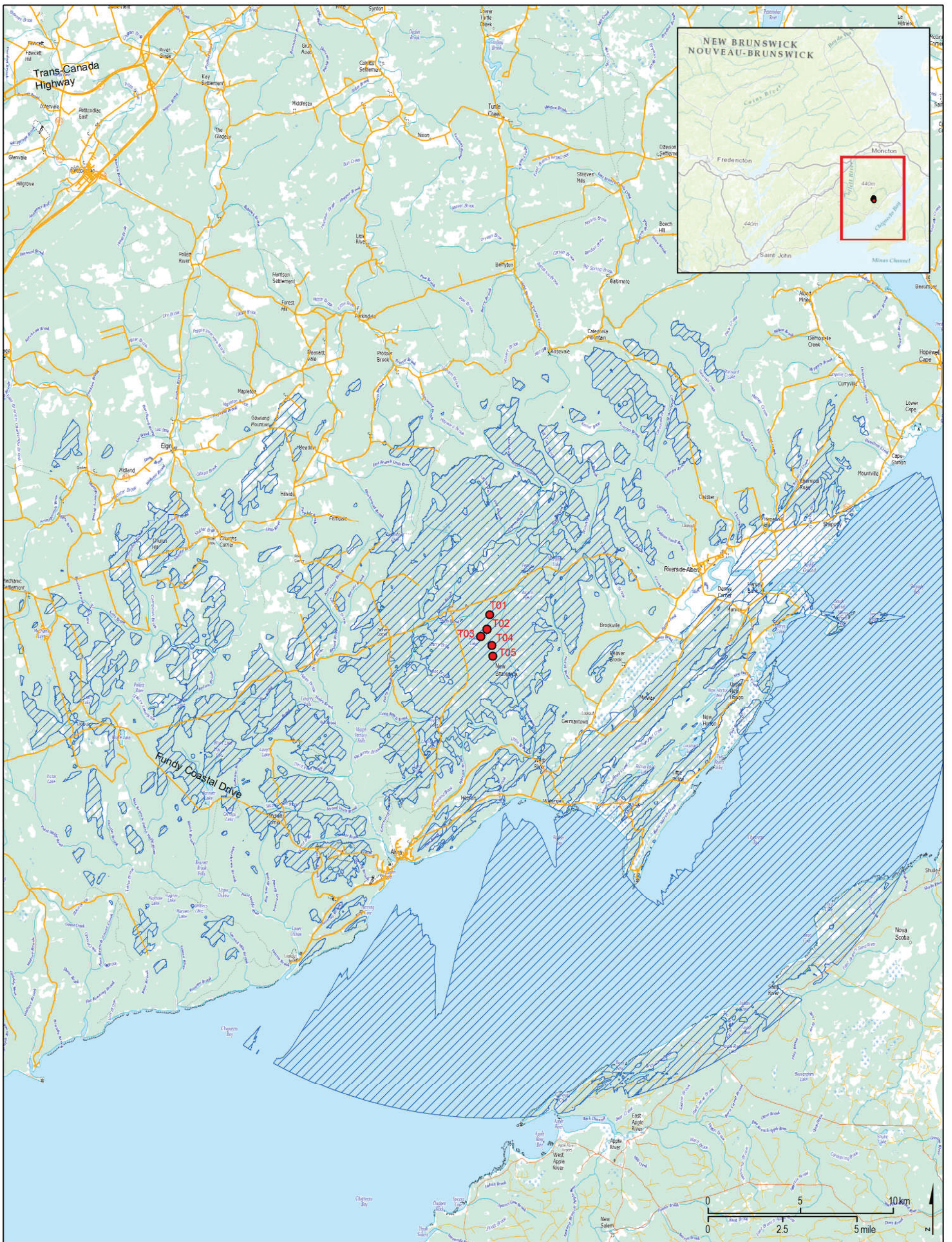
Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Wisokolamson Wind Project

Zone of Visual Influence Map
Turbine Tip (180 m above grade)
15 km Limit

Date: 2018-04-13
Version: 2
Layout: Rev 5, 2018-03-21
Datum: NAD 83 CSRS
Projection: UTM Zone 20N
Scale: 1:150,000

Prepared by: WSP
Author: L. Ryan, Eng
Reviewed: E. Halberg, P. Eng
Approved: R. Istchenko, P. Eng



- Turbines
- Road
- Zone of Visual Influence

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Wisokolamson Wind Project

Zone of Visual Influence Map
 Turbine Nacelle (117 m above grade)
 25 km Limit

Date: 2018-04-05
 Version: 1
 Layout: Rev 5, 2018-03-21
 Datum: NAD 83 CSRS
 Projection: UTM Zone 20N
 Scale: 1:200,000

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 Author: L. Ryan, Eng
 Reviewed: E. Halberg, P. Eng
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