

APPENDIX M
EMI

From: [Ryan Hearn](#)
To: [Sarah Palmer](#); [Jonathan Bitoun](#)
Subject: FW: Ellershouse 3 Wind Project DND Network Assessment - 2MAY2022
Date: May 2, 2022 4:06:24 PM
Attachments: [2MAY2022 - Ellershouse 3 RCMP DND Coords.xlsx](#)

From: Ryan Hearn <rhearn@potentiarenewables.com>
Sent: May 2, 2022 4:06:21 PM (UTC-05:00) Eastern Time (US & Canada)
To: windturbines@forces.gc.ca <windturbines@forces.gc.ca>
Cc: Ellershouse III Wind <ellershouseiiiwind@potentiarenewables.com>; Regulatory Notices <regnotices@potentiarenewables.com>
Subject: Ellershouse 3 Wind Project DND Network Assessment - 2MAY2022

Dear DND/CAF,

Ellershouse 3 Wind Limited Partnership is proposing to build a wind farm near the town of Ellershouse, Nova Scotia. I am writing on behalf of the project entity to request an evaluation of potential interference with DND Radiocommunication network. The current layout includes 12 turbine locations consisting of turbines with a total height of 194 metres.

Attached to this email is an excel spreadsheet with turbine coordinates. I trust this is sufficient for your review, but please reach out with any questions or for additional information.

Thank you,

Ryan Hearn
Project Manager, Environment and Community Consultation

Potentia Renewables Inc.

200 Wellington Street West
Suite 1102, PO Box 169
Toronto, Ontario M5V 3C7

M • 647.618.2117 | www.potentiarenewables.com



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Turbine Number	LAT dd mm ss.ss	LONG -ddd mm ss.ss	Ground Elevation (meters)	Nacelle Height (meters)	Rotor Diameter (meters)	Total Height (meters)
Example 1	60 39 16.59	-110 36 14.01	126.00	100.00	96	274
1	44 54 26.91	-64 02 12.33	150	114	160	344
3	44 54 10.37	-64 02 56.27	161	114	160	355
4	44 53 52.62	-64 04 22.03	149	114	160	343
5	44 53 46.98	-64 03 54.14	167	114	160	361
6	44 53 38.68	-64 03 30.31	178	114	160	372
7	44 53 41.07	-64 03 06.49	206	114	160	400
8	44 53 16.09	-64 03 38.18	183	114	160	377
9	44 52 52.68	-64 04 49.32	191	114	160	385
10	44 52 51.88	-64 04 11.64	190	114	160	384
11	44 52 42.89	-64 05 08.71	174	114	160	368
12	44 52 26.15	-64 04 44.03	181	114	160	375
13	44 52 21.68	-64 05 03.45	179	114	160	373

DND Contact Windturbines@forces.gc.ca



1 Canadian Air Division HQ
PO BOX 17000 STN Forces
Winnipeg, MB R3J 3Y5

Date of Electronic Signature

Mr. Ryan Hearn
Potentia Renewables Inc.
Project Manager
200 Wellington Street West
Suite 1102, PO box 169
Toronto Ontario, M5V3C7

LETTER OF PROJECT NON-OBJECTION FOR
ELLERSHOUSE 3 WIND LIMITED PARTNERSHIP

Dear Mr. Hearn,

Thank you for your patience on this matter and for considering DND radar, airport facilities, and radio-communication systems in your project development process. We have completed the detailed analysis of your proposed site, referenced in NAVCAN Land Use file# 22-1684, the Ellershouse 3 Wind Limited Partnership (LP) near Ellershouse NS. The results of the detailed analysis and subsequent technical and operational impact assessments have confirmed there is likely to be minimal or no interference with DND radar, flight operations, and radio-communication systems. Therefore, as a result of these findings we have no objections with your project as submitted. If however, the layout were to change/move, please re-submit that proposal for another assessment.

The concurrence for this site is valid for 24 months from date of this correspondence. If the project should be cancelled or delayed during this timeframe please advise the point of contact. It should be noted that each submission is assessed on a case by case basis and as such, concurrence on this submission in no way constitutes a concurrence for similar projects in the same area, nor does it indicate that similar concurrence might be offered in another region. The issuance of this Letter of Non-Objection shall not constitute a waiver or alienation of any existing or future legal rights of the DND/CAF nor shall it be construed to create any exemptions, indemnification, approvals, rights, acceptances in favour of Ellershouse 3 Wind LP or Potentia Renewables Inc.

DND/CF expressly reserves its rights to take legal action or seek remedy for any and all liability, loss, harm, degradation of services or equipment, litigation costs, damages, judgements or expenses that arise from the adverse effects, whether incidental, indirect or causal, of the referenced NAVCAN Land Use file# 22-1684, the Ellershouse 3 Wind LP near Ellershouse NS upon the DND/CAF radars, equipment and its provision of Air Traffic Services.

At present DND is working with Transport Canada to make obstruction lighting compliance with Night Vision Goggles (NVG) mandatory. At present DND cannot stipulate that proponents of wind turbine farms utilize NVG compliant lighting. However, as you can imagine, the safety of our aircrews is a top priority, and as such, we ask that you consider lighting your turbines with NVG compliant lighting so that they are visible to pilots during NVG operations.

I trust that you will find this satisfactory. If you have any technical questions or concerns regarding any aspect of this investigation, please contact the undersigned.

Kind regards.

D.M. Blakely
Lieutenant-Colonel
Senior Staff Officer Aerospace
Capabilities and Readiness



February 7, 2023

**Canadian Coast Guard
Vessel Traffic Systems Radars**

Email: windfarm.coordinator@dfo-mpo.gc.ca

To Whom It May Concern:

**Re: Ellershouse 3 Wind Project
Ellershouse, Nova Scotia**

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by Ellershouse 3 Wind Limited Partnership (our client) to support with the proposed Ellershouse 3 Wind Project (the "Project") in the Municipality of West Hants.

On behalf of our client, Strum is conducting an electromagnetic interference ("EMI") study on the placement of 12 wind turbines on private lands currently used for forestry and silviculture near the communities of Ellershouse and Hartville, Nova Scotia.

As an aspect of our investigation, we would like to formally consult with you on the Project and provide a discussion opportunity with respect to the proposed turbine layout.

More specifically, Strum is soliciting feedback, details, and specifications of existing operations from stakeholders to determine if there would be any potential interference with your existing operations as a result of the proposed wind turbine installations. The turbine specifications are as follows:

- Total of 12 turbines
- Tip height of each turbine is 206.5 metres
- Hub height of each turbine is 125 metres
- 3-blade rotor; turbine blade sweep diameter is 163 metres (blade length is 81.5 metres)

A map showing the proposed locations of the turbines has been attached (Drawing 1); and a summary of the proposed turbine details, including coordinates and elevations, is included in Table 1, below.

Engineering • Surveying • Environmental

Head Office
Railside, 1355 Bedford Hwy.
Bedford, NS B4A 1C5
t. 902.835.5560 (24/7)
f. 902.835.5574

Antigonish Office
3-A Vincent's Way
Antigonish, NS B2G 2X3
t. 902.863.1465 (24/7)
f. 902.863.1389

Moncton Office
45 Price Street
Moncton, NB E1A 3R1
t. 1.855.770.5560 (24/7)
f. 902.835.5574

St. John's Office
#E120 - 120 Torbay Road
St. John's, NL A1A 2G8
t. 709.738.8478 (24/7)
f. 709.738.8494

Table 1: Proposed Turbine Locations & Specifications

Turbine ID	Easting (UTM Z20)	Northing (UTM Z20)	Latitude	Longitude	Base of Turbine Elevation (m)	Turbine Hub Height (m)	Blade Length (m)	Total Elevation (m)
1	418156	4973195	44.907	-64.037	149.7	125	81.5	356.2
2	417176	4972654	44.902	-64.049	158.5	125	81.5	365.0
3	415313	4972140	44.897	-64.072	140.2	125	81.5	346.7
4	415971	4971997	44.896	-64.064	160.2	125	81.5	366.7
5	416394	4971730	44.894	-64.059	178.6	125	81.5	385.1
6	416925	4971775	44.895	-64.052	196.6	125	81.5	403.1
7	416295	4971103	44.889	-64.022	168.2	125	81.5	374.7
8	414675	4970332	44.881	-64.08	176.5	125	81.5	383.0
9	415501	4970297	44.881	-64.07	180.5	125	81.5	387.0
10	414273	4970033	44.878	-64.085	160.1	125	81.5	366.6
11	414780	4969512	44.873	-64.078	170.1	125	81.5	376.6
12	414367	4969376	44.872	-64.084	166.3	125	81.5	372.8

Thank you for your time and consideration of this Project. Upon review, should you have any questions, concerns, or identify a need for additional information, please do not hesitate to contact a member of our team and we will follow up with you directly. Your feedback and support in this matter is most appreciated.

Thank you,





Shawn Duncan, BSc.
 President
sduncan@strum.com

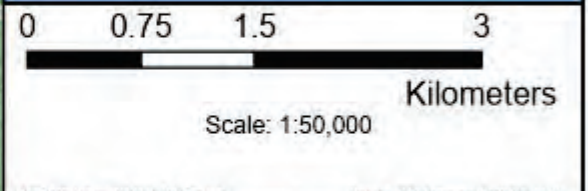
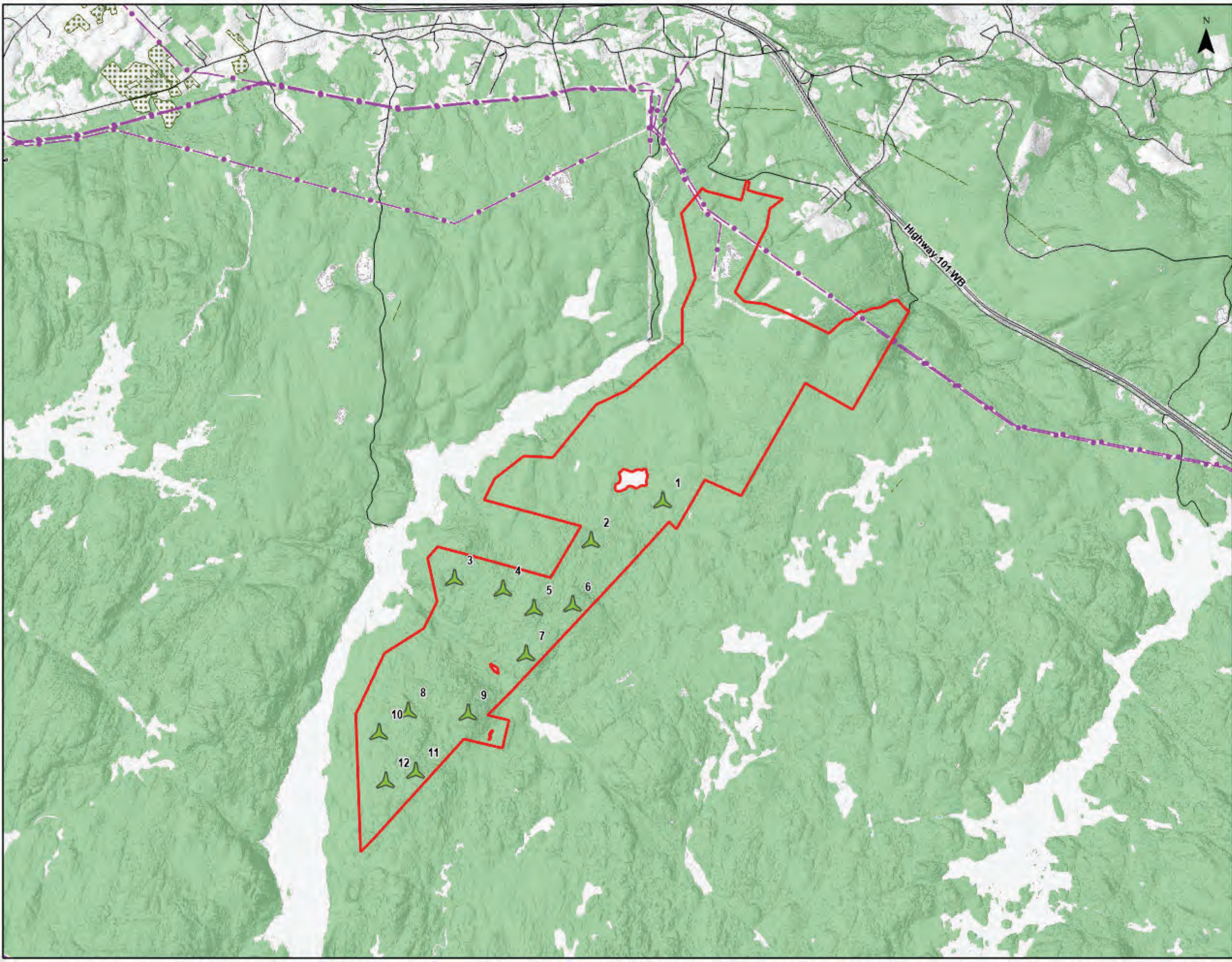
Scott Dickey, BSc. (Hons), MREM
 Manager, Environmental Sciences
sdickey@strum.com

Ellershouse 3 Wind Project

Proposed Turbine Layout Overview

Legend

-  Study Area
-  Proposed Turbine Location
-  Existing Transmission Line
- Transportation**
 -  Public Roads
- Water Features**
 -  Mapped Stream
 -  Mapped Indefinite Stream
 -  Mapped Lakes and Rivers



Date:	January 2023	Project #:	20-7536
Drawn By:	E. Johnson	Drawing #:	1
Checked By:	S. Dickey		



Engineering - Surveying - Environmental
Bedford - Antigonish - Moncton - St. John's



General Mailbox <general@strum.com>

RE: Ellershouse 3 Wind Project

1 message

Grégoire, Martin <Martin.Gregoire@dfo-mpo.gc.ca>
To: General Mailbox <general@strum.com>

Mon, Feb 13, 2023 at 10:13 AM

Hello,

The proposed wind farm (Ellershouse 3) is located within the 60 km consultation zone of 2 radar sites (Shannon Hill and Georges Island), however it is located outside the coverage zone of the radars. Therefore no interference issues are anticipated.

Regards / Salutations,

Martin Grégoire

Canadian Coast Guard

Garde côtière canadienne

From: General Mailbox <general@strum.com>

Sent: Tuesday, 7 February, 2023 4:10 PM

To: CCG Wind Farm Coordinator / Coordinateur Parc Éolien GCC (DFO/MPO) <DFO.CCGWindFarmCoordinator-CoordinateurParcEolienGCC.MPO@dfo-mpo.gc.ca>

Subject: Ellershouse 3 Wind Project

Hi there,

Please find attached an updated notification letter for the proposed Ellershouse 3 Wind Project development located in the Municipality of West Hants. A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Thank you,

Courtney Morrison (she/her)

Community Engagement Coordinator



Engineering • Surveying • Environmental

Bedford • Antigonish • Moncton • St. John's

Email: general@strum.com

Sarah Palmer

From: Ryan Hearn
Sent: May 2, 2022 4:08 PM
To: Sarah Palmer; Jonathan Bitoun
Subject: FW: Ellershhouse 3 Wind Project NAVCAN Land Use Submission - 2MAY2022
Attachments: 2MAY2022 Ellershhouse III Wind Project NAVCAN Land Use signed.pdf; 2MAY2022 - Ellershhouse 3 NAVCAN Coords.xlsx; Turbines, Ellershhouse III 2MAY2022.kmz

From: Ryan Hearn <rhearn@potentiarenewables.com>
Sent: May 2, 2022 4:07:45 PM (UTC-05:00) Eastern Time (US & Canada)
To: Land Use <LandUse@navcanada.ca>
Cc: Ellershhouse III Wind <ellershouseiiiwind@potentiarenewables.com>; Regulatory Notices <regnotices@potentiarenewables.com>
Subject: Ellershhouse 3 Wind Project NAVCAN Land Use Submission - 2MAY2022

Dear NAV CANADA, Land Use,

Ellershhouse 3 Wind Limited Partnership is proposing to build a wind farm near the town of Ellershhouse, Nova Scotia. I am writing on behalf of the project entity to request a NAV CANADA Land Use evaluation. The current layout includes 12 turbine locations consisting of turbines with a total height of 194 metres.

Attached to this email is a Land Use Submission Form, an excel spreadsheet with turbine coordinates, and a Google Earth KMZ file with proposed turbine locations. I trust this is sufficient for your review, but please reach out with any questions or for additional information.

Thank you,

Ryan Hearn
Project Manager, Environment and Community Consultation

Potentia Renewables Inc.

200 Wellington Street West
Suite 1102, PO Box 169
Toronto, Ontario M5V 3C7

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Land Use Proposal Submission Form – General

NAV CANADA file N° / Ref N°	Transport Canada File N° / Ref N°
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GENERAL INFORMATION

Company/Owner Name: Ellershose 3 Wind Limited Partnership		Contact Person: Ryan Hearn		
Address: 1102-200 Wellington Street W		City: Toronto	Prov: ON	Postal Code: M5V 3C7
Tel:	Cell: 647-618-2117	Email: regnotices@potentiarenewables.com		
Applicant: Potentia Renewables Inc.		Contact Person: Ryan Hearn		
Address: Same as above		City:	Prov: --	Postal Code:
Tel:	Cell:	Email:		

DETAILS OF PROPOSAL

- Please provide the data in the highest degree of accuracy available.
- For geographic coordinates, provide up to four (4) decimal places of a second.
- For ground elevation and tower height, provide up to four (4) decimal places.

Additional document(s) to be submitted:

- Map:** either 1:50,000 Topographical map (<http://atlas.gc.ca/site/english/toporama/index.html>) or a Google Earth map/kmz location of the proposed structure needs to be clearly marked; paper or digital surveys are always welcomed.

Project Identification: Ellershose 3 Wind Project	Nearest Town: Ellershose
Street Address, etc.:	Province: NS

Geographic Coordinates of Site in NAD 83: Degrees Minutes Seconds Degrees Minutes Seconds
 Lat. N / / Long. W / /

For submissions containing more than one set of coordinates, please complete the Multiple Obstacle Template and return in Excel format. (Examples: Linear Structures, Wind Farms, Building Corner Coordinates, etc.)

Type of Structure: Wind Power Project	New Structure? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
	A. Ground Elevation (Above Sea Level)		<input type="checkbox"/> ft <input type="checkbox"/> m
	B. Structure Height Addition		<input type="checkbox"/> ft <input type="checkbox"/> m
	C. Structure Total Height (Above Ground Level) Include all appurtenances		<input type="checkbox"/> ft <input type="checkbox"/> m
	Total Height (Above Sea Level) (A + C)		<input type="checkbox"/> ft <input type="checkbox"/> m

Cranes to be used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes: Crane details shall be submitted separately using the Land Use Proposal Submission Form – Crane(s).	Approximate Duration of Construction: 12 months
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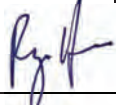
Proposed Construction Start Date: 28-Aug-23	If Temporary Structure, indicate Removal Date: Select
---	--

Comments: Ellershouse 3 Limited Partnership is proposing to build a wind farm consisting of 12 wind turbines. Each wind turbine will have hub height of 114 m and blade length of 80 m for a structure height of 194 m. Construction is planned to start in Q3 2023.

Known co-location with/on NAV CANADA Site: Yes No

A Third-Party Submission Form may be required for complex applications, fee applicable.

Applicant/Representative Signature



Print Name

Ryan Hearn

Date

2-May-22

Acknowledgement of reading [Detailed Land Use Proposal Guidelines](#) (Submitter's Initials) RH

For a detailed description on NAV CANADA's requirements and additional information, refer to the NAV CANADA website at www.navcanada.ca > Aeronautical Information > [Land Use Program](#).

NAV CANADA's land use evaluation is based on information known as of the date of this letter and is valid for a period of up to 18 months, subject to any legislative changes impacting land use submissions. Our assessment is limited to the impact of the proposed physical structure on the air navigation system and installations; it neither constitutes nor replaces any approvals or permits required by Transport Canada, other Federal Government departments, Provincial or Municipal land use authorities or any other agency from which approval is required. Innovation, Science and Economic Development Canada addresses any spectrum management issues that may arise from your proposal and consults with NAV CANADA Engineering as deemed necessary.

Please submit by email to landuse@navcanada.ca



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Obstacle Information for Assessment							Upon completion		
Obstacle ID	LAT dd mm ss.ss	LONG -ddd mm ss.ss	Ground Elevation (Feet)	Structure Height (Feet)	Total Height (Feet)	Crane Swing Radius (Feet)	Lighted Y/N	Painted Y/N	Construction Date
Example 1	60 39 16.59	-110 36 14.01	2162.5001	463.0001	2625.5002		Y	N	15-Jun-07
1	44 54 26.91	-64 02 12.33	492.1	636.5	1128.6				
3	44 54 10.37	-64 02 56.27	528.2	636.5	1164.7				
4	44 53 52.62	-64 04 22.03	488.8	636.5	1125.3				
5	44 53 46.98	-64 03 54.14	547.9	636.5	1184.4				
6	44 53 38.68	-64 03 30.31	584.0	636.5	1220.5				
7	44 53 41.07	-64 03 06.49	675.9	636.5	1312.3				
8	44 53 16.09	-64 03 38.18	600.4	636.5	1236.9				
9	44 52 52.68	-64 04 49.32	626.6	636.5	1263.1				
10	44 52 51.88	-64 04 11.64	623.4	636.5	1259.8				
11	44 52 42.89	-64 05 08.71	570.9	636.5	1207.3				
12	44 52 26.15	-64 04 44.03	593.8	636.5	1230.3				
13	44 52 21.68	-64 05 03.45	587.3	636.5	1223.8				

Contact landuse@navcanada.ca
 Form <https://www.navcanada.ca/en/aeronautical-information/land-use-program.aspx>



February 10, 2023

Your file
Ellershouse III Wind Project
Our file
22-1684

Mr. Ryan Hearn
Ellershouse 3 Wind Limited
1102-200 Wellington St W
Toronto ON
M5V 3C7

**RE: Wind Farm: Wind Turbine(s) - Ellershouse, NS
(See attached document(s))**

Mr. Hearn,

NAV CANADA has evaluated the captioned proposal and finds it conditionally acceptable provided the impacts below can be mitigated as informed by email 09FEB2023.

Our assessment has revealed the following impacts to Nav Canada Instrument Procedures for Halifax / Stanfield INTL (CYHZ):

- (Minimum Vectoring Altitude) MVA: Sector 1 impacted by Turbine #1:
 - Sector 1 altitude to be raised from 2000/2100 to 2200/2300, or
 - Exclusion #4 enlarged and raised from 2100/2300 to 2400/2500 to encompass all turbines
- (Minimum Safe Altitude) MSA: ILS RWY 14, ILS RWY 23, ILS CAT II RWY 23 and LOC RWY 05 :
 - NW MSA to be raised from 2200 to 2400
- (Minimum Safe Altitude) MSA: RNAV (GNSS) Z RWY 05, RNAV (RNP) Y RWY 05, RNAV (GNSS) Z RWY 14, RNAV (RNP) Y RWY 14, RNAV (GNSS) Z RWY 23, RNAV (RNP) Y RWY 23, RNAV (GNSS) Z RWY 32 and RNAV (RNP) Y RWY 32
 - MSA to be raised from 2200 to 2400
- Engineering Analysis finds that the proposed turbines have potential impact to both Halifax and Moncton RADAR creating a constant source of false targets which could mask real aircraft in the vicinity of the wind farm. Further analysis is required upon final project design for mitigation.

IFP Design has assessed that the impacts can be mitigated by the suggested following changes to Turbine #1 making the proposal acceptable to NAV CANADA:

- Turbine #1 lowered to max total height of 950' ASL or moved northwest of a line defined by N44 55 41.07 W064 03 6.49 (position of Turbine #7) and N44 55 00 W064 03 00

In addition to NAV CANADA's findings, a third-party Direct Approach Consulting Inc External Design Organization has revealed that these turbines would affect CHQE COPTER RNAV (GNSS) 234° approach Minimum Sector Altitude (MSA), and therefore we require advance notification if constructed. Please contact Marinus Waterberg for additional details at 1-604-970-2527 or marinus@directapproach.ca

Our assessment does not constitute an approval and/or permit from other agencies.

The nature and magnitude of electronic interference to NAV CANADA ground-based navigation aids, including RADAR, due to wind turbines depends on the location, configuration, number, and size of turbines; all turbines must be considered together for analysis. The interference of wind turbines to certain navigation aids is cumulative and while initial turbines may be approved, continued development may not always be possible.

In the interest of aviation safety, it is incumbent on NAV CANADA to maintain up-to-date aeronautical publications and issue NOTAM as required. To assist us in that end, **you must notify us at least 10 business days prior to the start of construction.** This notification requirement can be satisfactorily met by returning a completed, signed copy of the attached form and an Excel copy of the attached spreadsheet by email at landuse@navcanada.ca or fax at 613-248-4094. In the event that you should decide not to proceed with this project or if the structure is dismantled, please advise us accordingly so that we may formally close the file.



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navcanada.ca

If you have any questions, contact the Land Use Department by email at landuse@navcanada.ca.

NAV CANADA's land use evaluation is based on information known as of the date of this letter and is valid for a period of 18 months, subject to any legislative changes impacting land use submissions. Our assessment is limited to the impact of the proposed physical structure on the air navigation system and installations; it neither constitutes nor replaces any approvals or permits required by Transport Canada, other Federal Government departments, Provincial or Municipal land use authorities or any other agency from which approval is required. Innovation, Science and Economic Development Canada addresses any spectrum management issues that may arise from your proposal and consults with NAV CANADA engineering as deemed necessary.

This document contains information proprietary to NAV CANADA. Any disclosure or use of this information or any reproduction of this document for other than the specific purpose for which it is intended is expressly prohibited except as NAV CANADA may otherwise agree in writing.

Regards,

Land Use Office
NAV CANADA

cc ATLR - Atlantic Region, Transport Canada



April 21, 2022

**Environment Canada and Climate Change
Canadian Wildlife Service**

PO Box 6227
17 Waterfowl Lane
Sackville, NB
E4L 1G6

Re: Potentia Renewables Inc. – Proposed Wind Energy Development in Ellershouse, NS

To Whom It May Concern:

In 2021 the province of Nova Scotia committed that by 2030 it would provide 80% of its electricity from renewable resources and reduce greenhouse gas emissions by over 50%. To accomplish these goals, the province is contracting for 350 Megawatts (MW) of electricity from new renewable energy projects (i.e., wind and solar) to be developed throughout Nova Scotia.

With respect to this initiative, Potentia Renewables Inc. (PRI), hopes to support the province's renewable energy goals through the development of the Ellershouse III Wind Project (the Project), near Ellershouse, NS. This letter is to provide preliminary information on the Project and to solicit your feedback.

Company Background

Potentia Renewables Inc. (PRI) is a Canadian developer, owner, and operator of renewable energy assets with over 1,100 MW across ~800 solar and wind projects that are in operation, under construction or under contract. PRI is owned by Power Energy Corp., a wholly-owned subsidiary of Power Corporation Canada, a company listed on the Toronto Stock Exchange. PRI's team has developed and constructed, and/or owns and operates, one-third of the rooftop solar installations and 10% of built wind capacity in Canada.

From our initial review of Nova Scotia's renewable resource potential, the Ellershouse region of the province stood out as an ideal location for wind development. It has an energetic wind regime, accessible transmission lines with available capacity in a provincially-preferred transmission zone, and local landowners who have expressed interest in wind farm expansion. The area has also had previous success in wind development with the existing Ellershouse I & II wind farms, and as such these factors inspired us to begin development on the Ellershouse III Project.

The Project is in early development and is targeting individual capacity of 66 MW which would be generated by up to 12 turbines. The Project Study Area within which Potentia Renewables Inc. wishes to pursue the proposed wind energy development is provided below:

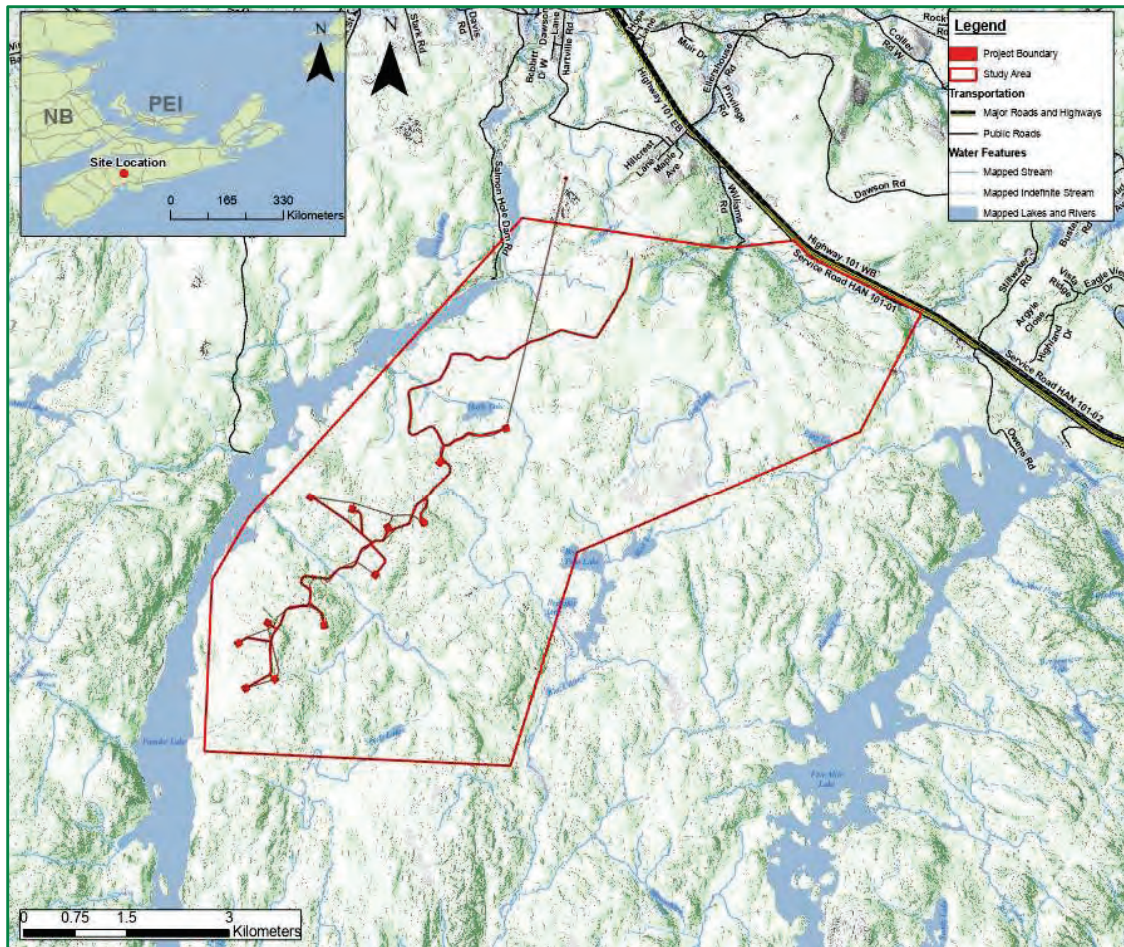


Figure A - Project Study Area and Preliminary Layout for the Ellershouse III Wind Project.

Project Communications

To date, Potentia Renewables Inc. has engaged in community consultation with nearby landowners and stakeholders to solicit feedback on our proposed Project within the respective Project Study Area. Project information can also be found via the following website: www.ellershouseiiiwind.com

For Project Questions, please contact:

Jonathan Bitoun, Manager, Project Development
 Email: Ellershouseiiiwind@potentia Renewables.com
 Phone: 647.979.9471

For Environmental Questions, please contact:

Shawn Duncan, President, Strum Consulting
 Email: general@strum.com
 Phone: 902.835.5560

Upon review, should you have any comments or questions, please do not hesitate to reach out. We thank you for your time in reviewing this letter and look forward to receiving your feedback.

Yours truly,



Jonathan Bitoun
 Manager, Project Development

220421 - Agency Project Intro ECC CWS PRI

Final Audit Report

2022-04-22

Created:	2022-04-21
By:	Ryan Hearn (rhearn@potentiarenewables.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAsXyLv7k1y7-GjZyRdP6xJZVQk8Qn8TNI

"220421 - Agency Project Intro ECC CWS PRI" History

-  Document created by Ryan Hearn (rhearn@potentiarenewables.com)
2022-04-21 - 8:18:10 PM GMT- IP address: 134.41.33.64
-  Document emailed to Jonathan Bitoun (jbitoun@potentiarenewables.com) for signature
2022-04-21 - 8:18:32 PM GMT
-  Email viewed by Jonathan Bitoun (jbitoun@potentiarenewables.com)
2022-04-22 - 2:12:55 PM GMT
-  Document e-signed by Jonathan Bitoun (jbitoun@potentiarenewables.com)
Signature Date: 2022-04-22 - 2:13:32 PM GMT - Time Source: server
-  Agreement completed.
2022-04-22 - 2:13:32 PM GMT

From: [Ryan Hearn](#)
To: [Sarah Palmer](#); [Jonathan Bitoun](#)
Subject: FW: Ellershouse 3 Wind Project ECCC Weather Radar Assessment - 2MAY2022
Date: May 2, 2022 4:49:04 PM

From: Radar (ECCC) <radarsmeteo-weatherradars@ec.gc.ca>
Sent: May 2, 2022 4:48:58 PM (UTC-05:00) Eastern Time (US & Canada)
To: Ryan Hearn <rhearn@potentiarenewables.com>
Cc: Ellershouse III Wind <ellershouseiiiwind@potentiarenewables.com>; Regulatory Notices <regnotices@potentiarenewables.com>; Radar (ECCC) <radarsmeteo-weatherradars@ec.gc.ca>
Subject: RE: Ellershouse 3 Wind Project ECCC Weather Radar Assessment - 2MAY2022

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Mr. Hearn,

No worries at all, thank you very much for the information/clarification.

Calvin

From: Ryan Hearn <rhearn@potentiarenewables.com>
Sent: May 2, 2022 4:37 PM
To: Radar (ECCC) <radarsmeteo-weatherradars@ec.gc.ca>
Cc: Ellershouse III Wind <ellershouseiiiwind@potentiarenewables.com>; Regulatory Notices <regnotices@potentiarenewables.com>
Subject: RE: Ellershouse 3 Wind Project ECCC Weather Radar Assessment - 2MAY2022

Hi Calvin,

Thanks for the follow up, and apologies for missing this. The requested information is below:

- Coordinates: provided in excel spreadsheet
- Number of turbines: 12
- Tower height/hub height: 114m
- Turbine blade length: 80m
- Total height: 194m

Please reach out if you have any additional questions.

Thank you,

Ryan

From: Radar (ECCC) <radarsmeteo-weatheradars@ec.gc.ca>
Sent: May 2, 2022 5:34 PM
To: Ryan Hearn <rhearn@potentiarenewables.com>
Cc: Ellershouse III Wind <ellershouseiiiwind@potentiarenewables.com>; Regulatory Notices <regnotices@potentiarenewables.com>; Radar (ECCC) <radarsmeteo-weatheradars@ec.gc.ca>
Subject: RE: Ellershouse 3 Wind Project ECCC Weather Radar Assessment - 2MAY2022

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Mr. Hearn,

Thank you for this information, it is well noted. However, to provide you with an official response on behalf of Environment and Climate Change Canada, we will need more specific information on the proposed wind turbines to complete our preliminary assessment (please refer to the instructions indicated on our [website](#)).

In summary, here is the information we would need to complete this preliminary analysis:

- **Hub Height of each turbine**
 - **The height provided in your email (194 m) is the “total height” – does this include the length of the blades as well or is this value just the tower/hub height?**
- **The diameter of the turbine blade sweep (or blade length)**

Regards,

Calvin Kwok

Networks Optimization and Design | Optimisation et conception des réseaux
Meteorological Service of Canada | Service météorologique du Canada
Environment and Climate Change Canada | Environnement et Changement climatique Canada

From: Ryan Hearn <rhearn@potentiarenewables.com>
Sent: May 2, 2022 4:08 PM
To: Radars Météo / Weather Radars (EC) <ec.radarsmeteo-weatheradars.ec@canada.ca>
Cc: Ellershouse III Wind <ellershouseiiiwind@potentiarenewables.com>; Regulatory Notices <regnotices@potentiarenewables.com>
Subject: Ellershouse 3 Wind Project ECCC Weather Radar Assessment - 2MAY2022

Dear Environment Canada,

Ellershouse 3 Wind Limited Partnership is proposing to build a wind farm near the town of Ellershouse, Nova Scotia. I am writing on behalf of the project entity to request an evaluation of potential interference with ECCC Weather Radar. The current layout includes 12 turbine locations consisting of turbines with a total height of 194 metres.

Attached to this email is an excel spreadsheet with turbine coordinates. I trust this is sufficient for your review, but please reach out with any questions or for additional information.

Thank you,

Ryan Hearn

Project Manager, Environment and Community Consultation

Potentia Renewables Inc.

200 Wellington Street West
Suite 1102, PO Box 169
Toronto, Ontario M5V 3C7

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ENVIRONMENT CANADA

Weather Radar Interference Assessment Update

UTM Zone 20			
Obstacle ID	Easting	Northing	Anticipated Construction Start Date
1	418156.0000	4973194.9999	Q3 2023
3	417186.0000	4972697.0000	Q3 2023
4	415298.0000	4972173.9999	Q3 2023
5	415907.3100	4971991.8218	Q3 2023
6	416426.7514	4971729.0488	Q3 2023
7	416950.0000	4971795.9999	Q3 2023
8	416244.9924	4971033.9994	Q3 2023
9	414674.7405	4970332.2474	Q3 2023
10	415501.1471	4970296.5231	Q3 2023
11	414245.4610	4970035.8973	Q3 2023
12	414780.0000	4969511.9999	Q3 2023
13	414352.0000	4969380.0000	Q3 2023

EC Contact radarsmeteo-weatheradars@ec.gc.ca

Turbine Number	LAT dd mm ss.ss	LONG -ddd mm ss.ss	Ground Elevation (meters)
<i>Example 1</i>	<i>60 39 16.59</i>	<i>-110 36 14.01</i>	<i>126.00</i>
1	44 54 26.91	-64 02 12.33	150
3	44 54 10.37	-64 02 56.27	161
4	44 53 52.62	-64 04 22.03	149
5	44 53 46.98	-64 03 54.14	167
6	44 53 38.68	-64 03 30.31	178
7	44 53 41.07	-64 03 06.49	206
8	44 53 16.09	-64 03 38.18	183
9	44 52 52.68	-64 04 49.32	191
10	44 52 51.88	-64 04 11.64	190
11	44 52 42.89	-64 05 08.71	174
12	44 52 26.15	-64 04 44.03	181
13	44 52 21.68	-64 05 03.45	179

Nacelle Height (meters)	Rotor Diameter (meters)	Total Height (meters)
<i>100.00</i>	<i>96</i>	<i>274</i>
114	160	344
114	160	355
114	160	343
114	160	361
114	160	372
114	160	400
114	160	377
114	160	385
114	160	384
114	160	368
114	160	375
114	160	373



Sept. 23rd, 2022

Ryan Hearn
Potentia Renewables Inc.

Subject: Ellershouse 3 Wind Project – Updated Preliminary Analysis of Impacts on ECCC Radars (Gore Radar)

Dear Mr. Hearn,

Thank you for contacting the Meteorological Service of Canada, a branch of Environment and Climate Change Canada (ECCC), regarding your wind energy intentions.

When assessing the potential impact of all new wind farm projects, ECCC's main goal is to avoid significant interference that would hinder the timely and accurate production of watches and warnings of significant weather.

We have reviewed the information you have provided to us via email on May 2, 2022, for the proposed Ellershouse 3 Wind Project (located 34 km away from ECCC's Gore Radar - Gore, NS). Our preliminary assessment of the proposed project indicates that any potential interference that may be created, should not be severe for our radar operations. Consequently, ***we do not have objections to the current proposal***. This being said, we are noticing a growing number of turbines in this area and we are monitoring the impacts of the global interference footprint on our radar operations. If the impacts become more significant in the future, we could contact you to discuss potential mitigation measures.

If your plans are modified in any manner (e.g. number of turbines, height, placement or materials) this analysis would no longer be valid and an updated analysis must be conducted. Please contact us at: radarsmeteo-weatheradars@ec.gc.ca

Thank you for your ongoing cooperation and we wish you success with your wind energy project.

Sincerely,

Robert Daigle

Directeur, Surveillance atmosphérique et services de données
Service Météorologique du Canada, Environnement et Changement Climatique Canada
Director, Atmospheric Monitoring and Data Services
Meteorological Service of Canada, Environment and Climate Change Canada

From: [Ryan Hearn](#)
To: [Sarah Palmer](#); [Jonathan Bitoun](#)
Subject: FW: Ellershouse 3 Wind Project RCMP Network Assessment - 2MAY2022
Date: May 2, 2022 4:06:02 PM
Attachments: [2MAY2022 - Ellershouse 3 RCMP DND Coords.xlsx](#)

From: Ryan Hearn <rhearn@potentiarenewables.com>
Sent: May 2, 2022 4:05:55 PM (UTC-05:00) Eastern Time (US & Canada)
To: Windfarm_Coordinator <windfarm_coordinator@rcmp-grc.gc.ca>
Cc: Ellershouse III Wind <ellershouseiiiwind@potentiarenewables.com>; Regulatory Notices <regnotices@potentiarenewables.com>
Subject: Ellershouse 3 Wind Project RCMP Network Assessment - 2MAY2022

Dear RCMP,

Ellershouse 3 Wind Limited Partnership is proposing to build a wind farm near the town of Ellershouse, Nova Scotia. I am writing on behalf of the project entity to request an evaluation of potential interference with the RCMP Radiocommunication network. The current layout includes 12 turbine locations consisting of turbines with a total height of 194 metres.

Attached to this email is an excel spreadsheet with turbine coordinates. I trust this is sufficient for your review, but please reach out with any questions or for additional information.


Thank you,

Ryan Hearn
Project Manager, Environment and Community Consultation

Potentia Renewables Inc.

200 Wellington Street West
Suite 1102, PO Box 169
Toronto, Ontario M5V 3C7

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Turbine Number	LAT dd mm ss.ss	LONG -ddd mm ss.ss	Ground Elevation (meters)	Nacelle Height (meters)	Rotor Diameter (meters)	Total Height (meters)
Example 1	60 39 16.59	-110 36 14.01	126.00	100.00	96	274
1	44 54 26.91	-64 02 12.33	150	114	160	344
3	44 54 10.37	-64 02 56.27	161	114	160	355
4	44 53 52.62	-64 04 22.03	149	114	160	343
5	44 53 46.98	-64 03 54.14	167	114	160	361
6	44 53 38.68	-64 03 30.31	178	114	160	372
7	44 53 41.07	-64 03 06.49	206	114	160	400
8	44 53 16.09	-64 03 38.18	183	114	160	377
9	44 52 52.68	-64 04 49.32	191	114	160	385
10	44 52 51.88	-64 04 11.64	190	114	160	384
11	44 52 42.89	-64 05 08.71	174	114	160	368
12	44 52 26.15	-64 04 44.03	181	114	160	375
13	44 52 21.68	-64 05 03.45	179	114	160	373

RCMP Contact windfarm_coordinator@rcmp-grc.gc.ca

Protected A

Ryan Hearn
Potentia Renewables Inc.

GV 1620-7-3

May 10, 2022

SUBJECT: Ellerhouse 3 Wind Project

Ref. # 2022-05-02_0003

Greetings,

Reference is made to your email request dated May 2, 2022, on your plans for the wind farm project called "Ellerhouse 3" in the province of Nova Scotia.

According to the Radio Advisory Board of Canada (RABC) and Canadian Wind Energy Association (CanWea), the radius of the consultation zone for fixed Land Mobile Radio (LMR) sites is 1 km. The RCMP currently have no "owned" radio towers or Point-To-Point (PTP) microwave links in this area.

However, the **surrounding area is receiving radio coverage from TMR2** operated as a leased system through Bell Canada. We do recommend that you request coordination with Bell who are acting on behalf of RCMP in the province of Nova Scotia with leased towers.

Should you require additional information, please direct any questions or concerns to the undersigned.

Sincerely,

Phil Tanguay

Wind Farm Coordinator, National Radio Services
Royal Canadian Mounted Police (RCMP) / Government of Canada
windfarm_coordinator@rcmp-grc.gc.ca / Tel: 343-552-1290

Coordonnateur parc éolien, Services de radio nationaux
Gendarmerie royale du Canada (GRC) / Gouvernement du Canada
windfarm_coordinator@rcmp-grc.gc.ca / Tél: 343-552-1290

Sarah Palmer

From: Ryan Hearn
Sent: May 2, 2022 4:07 PM
To: aviation.atl@tc.gc.ca
Cc: Ellershouse III Wind; Regulatory Notices
Subject: Ellershouse 3 Wind Project Transport Canada AAF Submission - 2MAY2022
Attachments: 2MAY2022 Ellershouse 3 Wind Project Transport Canada AAF.pdf; 2MAY2022 - Ellershouse 3 Transport Canada Coords.xlsx

Dear Transport Canada,

Ellershouse 3 Wind Limited Partnership is proposing to build a wind farm near the town of Ellershouse, Nova Scotia. I am writing on behalf of the project entity to request a Transport Canada Aeronautical Assessment. The current layout includes 12 turbine locations consisting of turbines with a total height of 194 metres.

Attached to this email is an Aeronautical Assessment Form with the proposed location and structure information. I trust this is sufficient for your review, but please reach out with any questions or for additional information.

Thank you,

Ryan Hearn
Project Manager, Environment and Community Consultation

Potentia Renewables Inc.

200 Wellington Street West
Suite 1102, PO Box 169
Toronto, Ontario M5V 3C7

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Transport Canada number
Applicant number

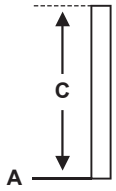
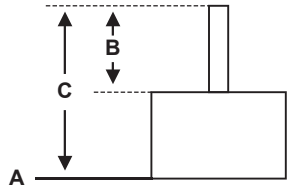
AERONAUTICAL ASSESSMENT FORM for obstacle notice and assessment

Owner (company name) Ellershouse 3 Wind Limited Partnership		
City Toronto	Province/Territory Ontario	Postal code (A1A 1A1) M5V 3C7
Telephone number (999-999-9999) 647-618-2117	Email Address regnotices@potentiarenewables.com	

Applicant (company name) Potentia Renewables Inc.		
City Same as above	Province/State	Postal code (A1A 1A1)
Telephone number (999-999-9999)	Email Address	

Geographic Coordinates NAD83 NAD27 WGS84
 For extensive structures submit geographical coordinates separately (e.g. windturbines, transmission lines, building corners).

N Latitude deg _____ min _____ sec _____
 W Longitude deg _____ min _____ sec _____

HEIGHTS	Feet	Metres	Structure alone	Structure with an addition
A Ground Elevation (AMSL)				
B Height of an addition to a structure				
C Total structure height including B (AGL)				
Overall height (A plus C) (AMSL)	Attached			

Is the location on lands affected by **Airport Zoning Regulations (AZRs)**? Yes No
 Where the object is on lands affected by **AZRs**, a legal survey attesting conformance is required.

Nearest Aerodrome Stanley Airport	Have you contacted the aerodrome? <input type="radio"/> Yes <input checked="" type="radio"/> No
---	--

Description of Project (or attached)
Ellershouse 3 Wind Limited Partnership is proposing to build a wind farm consisting of 12 wind turbines. Each wind turbine will have hub height of 114 m (374 ft) and blade length of 80 m (262 ft) for a structure height of 194 m (636 ft).

Notice of <input checked="" type="radio"/> New Structure <input type="radio"/> Change to existing structure	Duration <input checked="" type="radio"/> Permanent <input type="radio"/> Temporary
--	--

Proposed Construction Date: From (yyyy-mm-dd): **2023-08-28** To (yyyy-mm-dd): **2024-11-01**

Applicant Name Ryan Hearn	Telephone (999-999-9999) 647-618-2117	Date (yyyy-mm-dd) 2022-05-02
-------------------------------------	---	--

TRANSPORT CANADA ASSESSMENT (Transport Canada use only)

Marking and lighting required (as per Standard 621)
 Night Protection Day Protection Temporary Lighting No protection required

Completion of this form does not constitute authorization for construction nor replace other approvals or permits.

Transport Canada Civil Aviation Inspector Name	Date (yyyy-mm-dd)
--	-------------------

Note 1: This assessment expires 18 months from the date of assessment unless extended, revised, or terminated by the issuing office.
 Note 2: If there is a change to the intended installation, a new submittal is required.

INSTRUCTIONS FOR COMPLETING FORM

Submittal: An Aeronautical Assessment Form (AAF) is submitted, if requested by Transport Canada or if there is intent for installation of the following types of construction or alteration, including any appurtenance of more than 12m in height:

- (a) of an overall height that exceeds 90 m AGL at the site;
- (b) of a height that exceeds an airport OIS (obstacle identification surface) or OLS (obstacle limitation surface) as specified in *Aerodrome Standards and Recommended Practices - TP312*;
- (c) for aerodromes (including airports), of a height that exceeds an imaginary surface extending outward and upward at a slope of 2%, from the nearest point of the nearest runway for a horizontal distance of 4500 m and thereafter exceeds a 90m height out to 6km;
- (d) for water aerodromes, as (c) except a slope of 4% with the start of the imaginary surface taken as the GPS location published in the Canada Water Aerodromes Supplement (CWAS);
- (e) for a heliport, of a height that exceeds an imaginary surface extending outward and upward at a slope of 4%, from the nearest point of the nearest landing and takeoff area, for a horizontal distance of 2250 m and thereafter exceeds a 90 m height out to 6 km;
- (f) for catenaries and similar crossings (e.g. bridges), of a height such that any portion of the object exceeds 60 m AGL above the crossed river or valley bottom; or
- (g) on lands affected by an Airport Zoning Regulation (AZR) a legal land survey is required with the submittal proving conformance to the AZR.

Completed applications are to be forwarded to the applicable Transport Canada Regional office listed in Standard 621, Appendix A.

Nav Canada: A separate submittal is made to NAV CANADA. Refer NAV CANADA Land Use Program website <http://www.navcanada.ca/EN/products-and-services/Pages/land-use-program.aspx>

Note: Transport Canada and NAV CANADA Land Use are notified, if the proposed construction does not take place.

Geographic Coordinates: Provide GPS coordinates [in degrees, minutes and seconds] of the object. For extensive objects (e.g. windfarms), provide a separate listing of GPS coordinates for each element of the object (e.g. each windturbine). For buildings, provide coordinates for each corner, and coordinates of the dominant structure on the roof.

Heights: Provide height of the ground elevation Above Mean Sea Level (AMSL), the total structure height Above Ground Level (AGL) and the combined overall height AMSL. For extensive obstacles composed of several objects, provide a separate listing of heights corresponding to GPS coordinates.

Description of Project:

- (a) Indicate the type of structure. (e.g. antenna, crane, building, power line, landfill, water tank, wind farm, moored balloon, kite, catenary/cable crossing, etc.)
- (b) For catenaries [e.g. electrical power transmission line crossings], include a drawing of the configuration of the wires and the supporting structures with their heights. Indicate the placement of marking/lighting [if used] on the wires.
- (c) For existing structures, explain the reason for notifying Transport Canada (e.g. corrections, request for new assessment, etc.).
- (d) If the object is on lands affected by Airport Zoning Regulations (AZRs), provide a legal land survey indicating conformance to AZR surfaces.
- (e) For a wind farm, include a spreadsheet with individual turbine identification numbers [ID], geographic coordinates [in minutes, degrees and seconds], ground elevation AMSL and the overall height of the object AGL. Identify those windturbines which will have lighting.
- (f) Indicate what obstacle marking, lighting and monitoring will be applied. It is the responsibility of the owner to apply the appropriate lighting/marketing/monitoring in accordance with Standard 621.

Nearest Aerodrome: Identify the nearest aerodrome. Certified / registered land aerodromes/heliports are contained in the Canada Flight Supplement (CFS) and certified / registered water aerodromes in the Canada Water Aerodrome Supplement (CWAS); both available directly from NAV CANADA.

This form does not constitute authority for construction. Nor does this form replace any approvals, permits or assessments required by NAV CANADA, Industry Canada, other Federal Government departments, Provincial or Municipal landuse authorities or any other agency from which approval/assessment is required.

Turbine Coordinates Table
Ellershouse 3 Wind Project
MAY 2022 - Enercon E160 Layout

Turbine Number	Latitude dd mm ss.ss	Longitude -ddd mm ss.ss	Ground Elevation (feet)	Structure Height (feet)	Total Height (feet)	Lighted Y/N	Painted Y/N	Construction Date
1	44 54 26.91	-64 02 12.33	492.1	636.48	1128.61	Y	Y	Q3 2023
3	44 54 10.37	-64 02 56.27	528.2	636.48	1164.70	Y	Y	Q3 2023
4	44 53 52.62	-64 04 22.03	488.8	636.48	1125.33	Y	Y	Q3 2023
5	44 53 46.98	-64 03 54.14	547.9	636.48	1184.38	Y	Y	Q3 2023
6	44 53 38.68	-64 03 30.31	584.0	636.48	1220.47	N	Y	Q3 2023
7	44 53 41.07	-64 03 06.49	675.9	636.48	1312.33	Y	Y	Q3 2023
8	44 53 16.09	-64 03 38.18	600.4	636.48	1236.87	Y	Y	Q3 2023
9	44 52 52.68	-64 04 49.32	626.6	636.48	1263.12	N	Y	Q3 2023
10	44 52 51.88	-64 04 11.64	623.4	636.48	1259.84	Y	Y	Q3 2023
11	44 52 42.89	-64 05 08.71	570.9	636.48	1207.35	Y	Y	Q3 2023
12	44 52 26.15	-64 04 44.03	593.8	636.48	1230.31	Y	Y	Q3 2023
13	44 52 21.68	-64 05 03.45	587.3	636.48	1223.75	Y	Y	Q3 2023

Contact aviation.pnraaf-rpnfea@tc.gc.ca

Form https://wwwapps.tc.gc.ca/Corp-Serv-Gen/5/forms-formulaires/download/26-0427_BO_PX



Service Nova Scotia and
Internal Services
Public Safety and Field Communications

780 Windmill Road, 3rd Floor
Dartmouth, NS, B3B 1T3

To: Ryan Hearn
Project Manager, Environment and Community Consultation
Potentia Renewables Inc.
200 Wellington Street West
Suite 1102, PO Box 169
Toronto, Ontario M5V 3C7

Re: Wind Farm Mobile Network Interference Assessment, Ellerhouse 3 and Panuke Lake

Reference is made to your emails of June 16th and June 22nd, 2022 regarding the potential impact the proposed wind projects Ellerhouse 3 and Panuke Lake may have on NSIMRS radio communication systems. Please note that this assessment only pertains to NSIMRS; we are still waiting on feedback from Bell as our vendor for TMR2.

We have reviewed the information provided on June 22nd, 2022 for the proposed wind turbine projects. Based on this information, we do not anticipate the proposed wind projects will significantly impact the performance of NSIMRS's microwave radio system or VHF land mobile radio (LMR) system. The closest LMR site (Willow Hill) is 9km away from the nearest turbine, well outside the recommended 1km consultation zone defined in the RABC CanWEA Guidelines. The closest microwave link is 2.5km away the nearest turbine, well outside the 3xF1 (60m in this case) consultation zone defined in the RABC CanWEA Guidelines. The attached Google Earth screen shots show the closest LMR radio site (Wilow Hill) and microwave radio links in proximity to the wind projects.

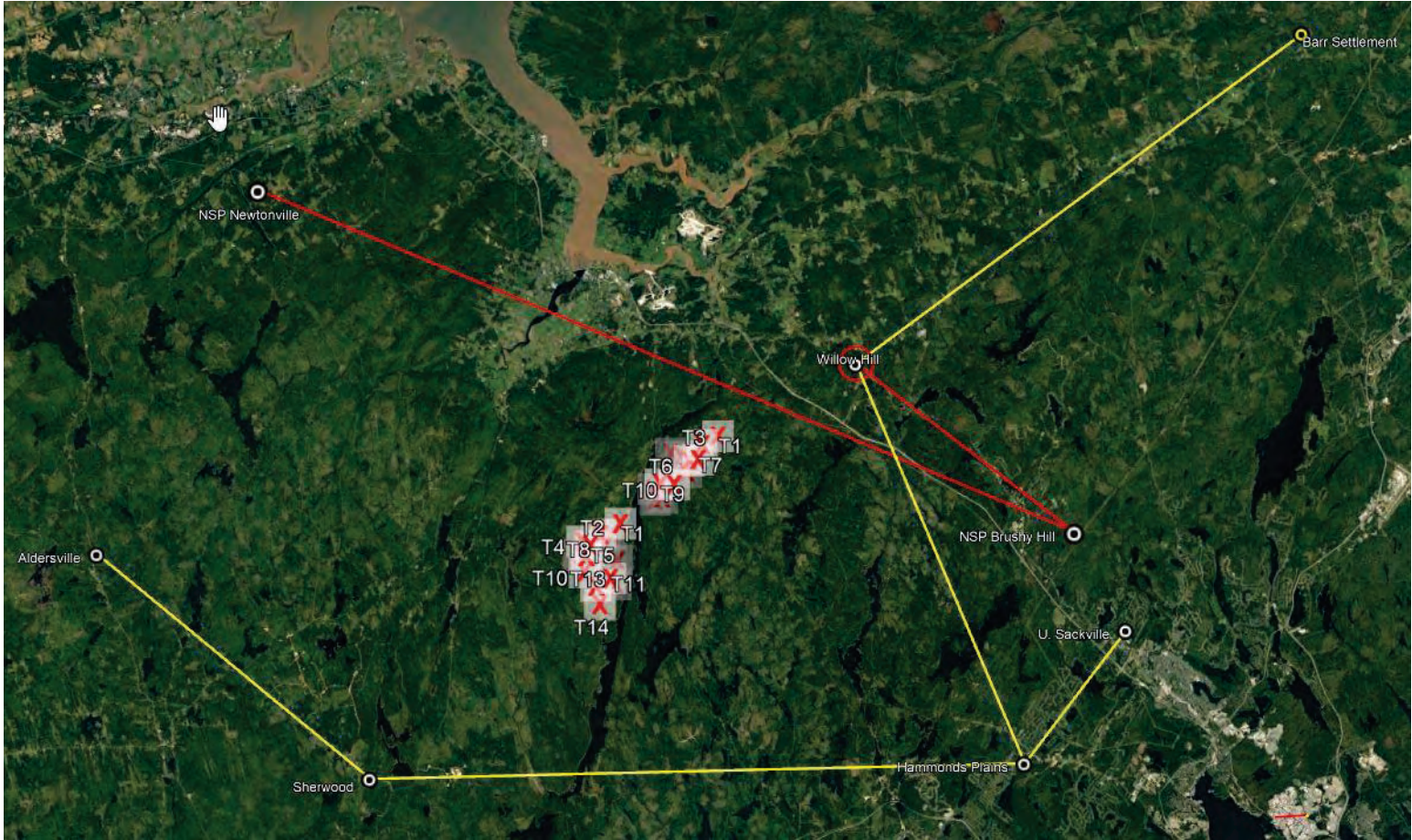
Please keep us informed of any significant changes in the location or the extent of the wind projects that may occur during detailed design stages that may warrant a follow up review.

Thank you,

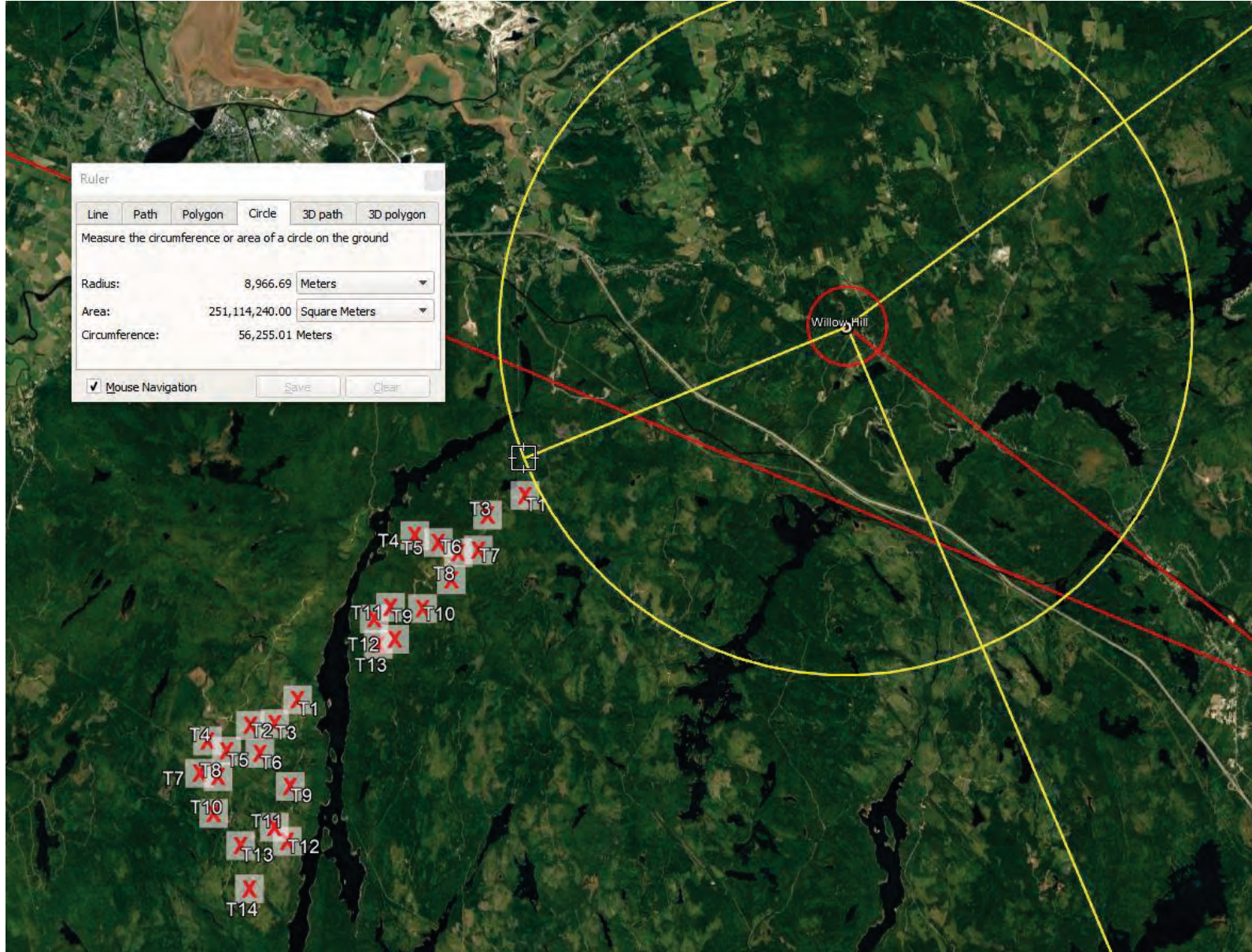


Matthew Boyle, Director, Public Safety and Field Communications

PNS Microwave Links wrt to Ellerhouse Panuke Turbines:



Willow Hill Mobile Radio – 1km Radius:





February 7, 2023

Innovation, Science and Economic Development Canada
50 Brown Avenue
Dartmouth NS B3B 1X8
Email: ic.spectrumnsd-spectredne.ic@canada.ca

To Whom It May Concern:

Re: Ellershouse 3 Wind Project
Ellershouse, Nova Scotia

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by Ellershouse 3 Wind Limited Partnership (our client) to support with the proposed Ellershouse 3 Wind Project (the "Project") in the Municipality of West Hants.

On behalf of our client, Strum is conducting an electromagnetic interference ("EMI") study on the placement of 12 wind turbines on private lands currently used for forestry and silviculture near the communities of Ellershouse and Hartville, Nova Scotia.

As an aspect of our investigation, we would like to formally consult with you on the Project and provide a discussion opportunity with respect to the proposed turbine layout.

More specifically, Strum is soliciting feedback, details, and specifications of existing operations from stakeholders to determine if there would be any potential interference with your existing operations as a result of the proposed wind turbine installations. The turbine specifications are as follows:

- Total of 12 turbines
- Tip height of each turbine is 206.5 metres
- Hub height of each turbine is 125 metres
- 3-blade rotor; turbine blade sweep diameter is 163 metres (blade length is 81.5 metres)

A map showing the proposed locations of the turbines has been attached (Drawing 1); and a summary of the proposed turbine details, including coordinates and elevations, is included in Table 1, below.

Engineering • Surveying • Environmental

Head Office
Railside, 1355 Bedford Hwy.
Bedford, NS B4A 1C5
t. 902.835.5560 (24/7)
f. 902.835.5574

Antigonish Office
3-A Vincent's Way
Antigonish, NS B2G 2X3
t. 902.863.1465 (24/7)
f. 902.863.1389

Moncton Office
45 Price Street
Moncton, NB E1A 3R1
t. 1.855.770.5560 (24/7)
f. 902.835.5574

St. John's Office
#E120 - 120 Torbay Road
St. John's, NL A1A 2G8
t. 709.738.8478 (24/7)
f. 709.738.8494

Table 1: Proposed Turbine Locations & Specifications

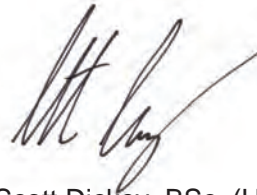
Turbine ID	Easting (UTM Z20)	Northing (UTM Z20)	Latitude	Longitude	Base of Turbine Elevation (m)	Turbine Hub Height (m)	Blade Length (m)	Total Elevation (m)
1	418156	4973195	44.907	-64.037	149.7	125	81.5	356.2
2	417176	4972654	44.902	-64.049	158.5	125	81.5	365.0
3	415313	4972140	44.897	-64.072	140.2	125	81.5	346.7
4	415971	4971997	44.896	-64.064	160.2	125	81.5	366.7
5	416394	4971730	44.894	-64.059	178.6	125	81.5	385.1
6	416925	4971775	44.895	-64.052	196.6	125	81.5	403.1
7	416295	4971103	44.889	-64.022	168.2	125	81.5	374.7
8	414675	4970332	44.881	-64.08	176.5	125	81.5	383.0
9	415501	4970297	44.881	-64.07	180.5	125	81.5	387.0
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Thank you for your time and consideration of this Project. Upon review, should you have any questions, concerns, or identify a need for additional information, please do not hesitate to contact a member of our team and we will follow up with you directly. Your feedback and support in this matter is most appreciated.

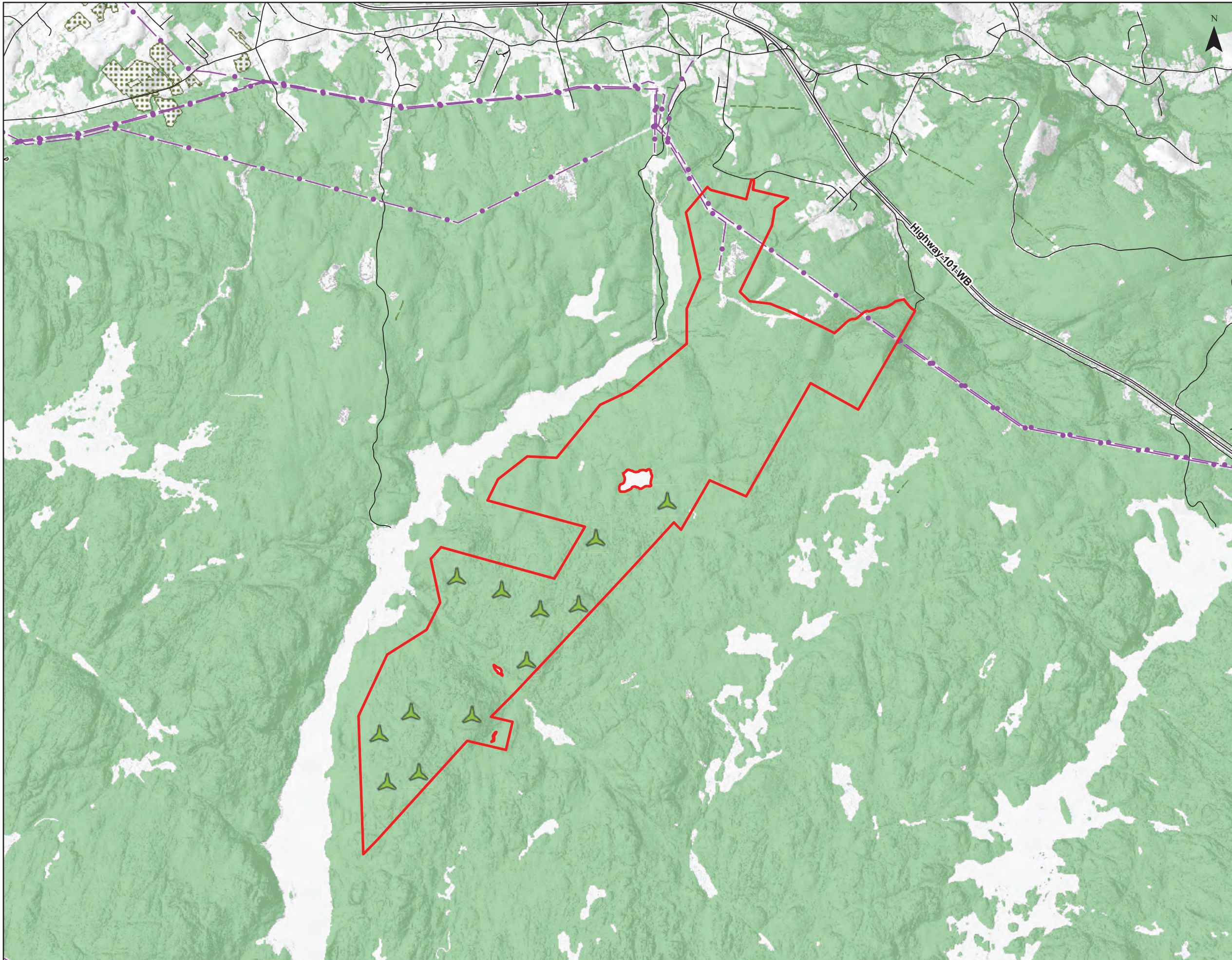
Thank you,



Shawn Duncan, BSc.
 President
sduncan@strum.com



Scott Dickey, BSc. (Hons), MREM
 Manager, Environmental Sciences
sdickey@strum.com

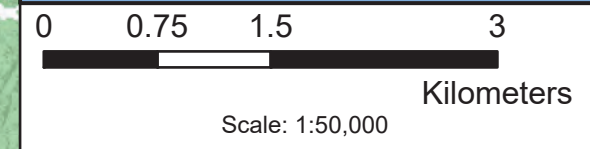


Ellershouse Wind Project

Proposed Turbine Layout Overview

Legend

- Study Area
- ▲ Proposed Turbine Location
- Existing Transmission Line
- Transportation**
- Public Roads
- Water Features**
- Mapped Stream
- - - Mapped Indefinite Stream
- Mapped Lakes and Rivers



Coordinate System: NAD83 UTM Zone 20N Sources: ESRI Basemaps, GeoNOVA, NSTD

Date:	December 2022	Project #:	20-7536
Drawn By:	E. Johnson	1	Drawing #:
Checked By:	S. Dickey		





General Mailbox <general@strum.com>

RE: Ellershouse 3 Wind Project

1 message

DuChene, Bethany (ISED/ISDE) <bethany.duchene@ised-isde.gc.ca>
To: "general@strum.com" <general@strum.com>

Tue, Feb 21, 2023 at 2:54 PM

Good afternoon,

This is to confirm receipt of the updated proposal for the Ellershouse 3 Wind Project. Comments on the proposal are as follows:

- There are non-disclosed assignments (e.g. police, military) within 15km of the proposed turbines. Please ensure all agencies listed in Table 1 of the RABC/CanWEA guidelines document are consulted with.
- Rogers operates a point-to-point microwave link crossing the area, and consultation may be required as per Table 2.

Please let me know if you have any questions or concerns.

Regards,

Bethany DuChene

Spectrum Management Officer, STS-Atlantic and Ontario Regions
Innovation, Science and Economic Development Canada / Government of Canada
bethany.duchene@ised-isde.gc.ca / Tel: 902-499-9258 / TTY: 1-866-694-8389

Agente de gestion du spectre, SST-Regions de l'Atlantique et de l'Ontario
Innovation, Sciences et Développement économique Canada / Gouvernement du Canada
bethany.duchene@ised-isde.gc.ca / Tél. : 902-499-9258 / ATS : 1-866-694-8389

From: General Mailbox <general@strum.com>
Sent: February 7, 2023 5:09 PM
To: ic.spectrumnsd-spectredne.ic@canada.ca
Subject: Ellershouse 3 Wind Project

Hi there,

Please find attached an updated notification letter for the proposed Ellershouse 3 Wind Project development located in the Municipality of West Hants. A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Thank you,

Courtney Morrison (she/her)

Community Engagement Coordinator



Courtney Morrison <cmorrison@strum.com>

FW: Bell Mobility Network Assessment - 2022JUN27

cmorrison@strum.com <cmorrison@strum.com>
To: cmorrison@strum.com

Fri, Feb 3, 2023 at 2:46 PM

From: Van der Est, Paul <paul.vanderest@bell.ca>
Sent: Thursday, August 18, 2022 10:55 AM
To: Ryan Hearn <rhearn@potentiarenewables.com>
Cc: Ellershous III Wind <ellershouseiiiwind@potentiarenewables.com>; Panuke Lake Wind <panukelakewind@potentiarenewables.com>; Jonathan Bitoun <jbitoun@potentiarenewables.com>
Subject: RE: Bell Mobility Network Assessment - 2022JUN27

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Ryan,

I'm following up on this item as I don't see further discussion in my inbox and want to be sure it's closed off. I see the analysis results shows 0 land mobile stations requiring coordination and I also double-checked the coordinates and see out towers are outside the coordination zone. Based on this, our legal team doesn't see a need for a letter.

I appreciate you proactively reaching out on this as it lets all parties involved stay ahead of potential issues, particularly with microwave. So, for future projects, please don't hesitate to reach out.

Thanks,

Paul

From: Ryan Hearn <rhearn@potentiarenewables.com>
Sent: July-18-22 2:49 PM
To: Van der Est, Paul <paul.vanderest@bell.ca>
Cc: Ellershous III Wind <ellershouseiiiwind@potentiarenewables.com>; Panuke Lake Wind <panukelakewind@

potentiarenewables.com>; Jonathan Bitoun <jbitoun@potentiarenewables.com>

Subject: [EXT]RE: Bell Mobility Network Assessment - 2022JUN27

Hi Paul,

Thanks for the information on the TMR2 microwave sites. Please let me know if your microwave team finds anything to be concerned about.

I included a copy of a non-objection letter that Alberta First Responders Radio Communication System (AFRRCS) for one of our Alberta wind projects. AFRRCS owns the radio network used by the RCMP in Alberta. I've also included a non-objection email from Environment Canada for the same project. Please let me know if something like this could be an option. If an official letter is not typical for Bell, email works fine as well.

Our EMI study did include the frequency bands you reference. See a snippet from the EMI study. That assessment concluded low potential for interference with land mobile networks.

Table 2: Summary of Licensees near Project Lands

ITU Class ^a	No. of Licensee Stations in Search Area	No. of Licensee Stations Requiring Consultations	Station Type	Frequency Category	Potential for Interference ^b	Consultation Zone
AL	0	0	Aeronautical radio navigation land station		Moderate	1000m; up to 15 km (VOR)
AX	0	0	Aeronautical fixed station		N/A	
BC	2	0	Broadcasting station, sound	AM - TX < 3 MHz	N/A	5 km; up to 15 km
BC	50	0	Broadcasting station, sound	FM - TX > 80 MHz	Low	2000 m
BT	9	2	Broadcasting station, television	Television	Moderate	
EX	0	0	Experimental		N/A	
FA	0	0	Aeronautical station		Low	1000 m
FB	579	0	Base station	Other - TX < 890 MHz	Moderate	1000 m
FB	3	0	Base station	Cellular/Paging - TX > 890 MHz	Low	1000 m
FC	263	0	Coast station		N/A	
FL	0	0	Land station		N/A	
FX	5472	0	Fixed station	Land mobile network or low capacity station < 890 MHz	Low	1000 m
FX	1184	0	Fixed station	Microwave TX > 890 MHz	Low	1000 m
FX	732	2	Microwave Link	Microwave TX > 890 MHz	High	Link Fresnel zone
LR	0	0	Radiolocation land station		Low	
ML	7538	0	Land mobile station		Low	
MO	0	0	Mobile station		Low	
NL	0	0	Maritime radio navigation land station		N/A	
RC	0	0	Non-directional radio beacon		N/A	
SM	0	0	Meteorological aids station	Radar	Low	
TC	13	0	Earth station in the fixed satellite service	Satellite	Low	
TE	2	0	Earth station in the satellite service— search and rescue	Satellite	N/A	
TM	2	0	Earth station in the meteorological-satellite service	Satellite	Low	500 m + satellite link

Thanks Paul. Please reach out if you have any questions.

Ryan

Ryan Hearn

Project Manager, Environment and Community Consultation

Potentia Renewables Inc.

200 Wellington Street West

Suite 1102, PO Box 169

Toronto, Ontario M5V 3C7

M • 647.618.2117 | www.potentiarenewables.com

From: Van der Est, Paul <paul.vanderest@bell.ca>
Sent: Thursday, July 7, 2022 11:40 AM
To: Ryan Hearn <rhearn@potentiarenewables.com>
Cc: Ellershose III Wind <ellershouseiiiwind@potentiarenewables.com>; Panuke Lake Wind <panukelakewind@potentiarenewables.com>; Jonathan Bitoun <jbitoun@potentiarenewables.com>
Subject: RE: Bell Mobility Network Assessment - 2022JUN27

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Thanks Ryan

None of the TMR2 sites surrounding the project area use microwave, so I do not have any concerns for microwave on the TMR2 sites. I've sent the data to our microwave team in case there is any other Bell microwave to be concerned about.

Regarding your request for a non-objection letter, our legal team has some questions. They have requested an example of a non-objection letter so that they can better understand the request. Do you have an example letter you can share with us?

How is the study on TMR2 coming along? If it helps the search on the ISED database, the frequency band TMR2 operates in is 769-775MHz downlink and 799-805uplink. The specific frequencies that each site uses should be in the publically searchable ISED database.

Paul

From: Ryan Hearn <rhearn@potentiarenewables.com>
Sent: June-27-22 5:23 PM
To: Van der Est, Paul <paul.vanderest@bell.ca>
Cc: Ellershose III Wind <ellershouseiiiwind@potentiarenewables.com>; Panuke Lake Wind <panukelakewind@potentiarenewables.com>; Jonathan Bitoun <jbitoun@potentiarenewables.com>
Subject: [EXT]Bell Mobility Network Assessment - 2022JUN27

+

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WARNING: Your email security system detected a macro in the attached file(s). Before opening the attachment(s) please verify if the sender is trusted (**Sender:** Ryan Hearn <rhearn@potentiarenewables.com> <rhearn@potentiarenewables.com> / **File Name(s):** Turbines, Ellershouse III 2MAY2022.kmz, 2022JUN22 - Ellershouse 3 Turbine Coords.xlsx, Turbines, Panuke Lake.kmz, 2022JUN22 - Panuke Lake Turbine Coords.xlsx / **File Size(s):** 2293, 20321, 2421, 22215).

If you have concerns regarding the sender/file please do not open it and contact CSD at 1-888-920-8888 or 514-523-5523 (Montreal Region).

+++

AVERTISSEMENT: Votre système de sécurité de la messagerie a détecté une macro dans un fichier attaché. Assurez-vous que l'expéditeur soit de confiance avant d'ouvrir les fichiers joints. (**Expéditeur:** Ryan Hearn <rhearn@potentiarenewables.com> <rhearn@potentiarenewables.com> / **Nom des fichiers:** Turbines, Ellershouse III 2MAY2022.kmz, 2022JUN22 - Ellershouse 3 Turbine Coords.xlsx, Turbines, Panuke Lake.kmz, 2022JUN22 - Panuke Lake Turbine Coords.xlsx / **Taille des fichiers:** 2293, 20321, 2421, 22215).

Si vous avez des doutes concernant les fichiers joints ou l'expéditeur du message, SVP ne pas ouvrir les fichiers joints et contactez le centre d'assistance au 1-888-920-8888 ou 514-523-5523 (Région de Montréal).

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Hi Paul,

Thanks for the call earlier. Following up with a .KMZ and excel workbook with the proposed turbine locations for both of the projects we are developing. If you could provide an assessment of potential interference for the private microwave link system, that would be helpful for our layout design. For your reference, I've also included some more project information below.

Ellershouse 3 Wind Project

- Proponent: Ellershouse 3 Wind Limited Partnership
- Coordinates: provided in excel spreadsheet
- Number of turbines: 12 (note: turbine numbering skips turbine #2 in the excel and kmz)
- Tower height/hub height: 114m
- Turbine blade length: 80m
- Total height: 194m

Panuke Lake Wind Project

- Proponent: Panuke Lake Wind Limited Partnership
- Coordinates: provided in excel spreadsheet
- Number of turbines: 14
- Tower height/hub height: 114m
- Turbine blade length: 80m

- Total height: 194m

Please let me know if you need more information for your assessment.

We will conduct our own assessment on the TMR system data you mentioned that is available on the ISED spectrum management database. We will forward the results of that assessment when available.

Thanks again Paul. Please reach out anytime with questions.

Ryan

Ryan Hearn

Project Manager, Environment and Community Consultation

Potentia Renewables Inc.

200 Wellington Street West

Suite 1102, PO Box 169

Toronto, Ontario M5V 3C7

M • 647.618.2117 | www.potentiarenewables.com

From: Van der Est, Paul <paul.vanderest@bell.ca>
Sent: Monday, June 27, 2022 4:38 PM
To: Ryan Hearn <rhearn@potentiarenewables.com>
Subject: Paul van der Est contact info

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

See below for my contact information:

Paul van der Est, P.Eng

2/3/23, 2:50 PM

Strum Consulting Mail - FW: Bell Mobility Network Assessment - 2022JUN27

Specialist, Radio Engineering, Bell Mobility – Radio Division

15 Western Parkway, Bedford, NS B4B 0V1

P: (902) 487-5972 | M: (902) 717-8000

paul.vanderest@bell.ca

External Email: Please use caution when opening links and attachments / Courriel externe: Soyez prudent avec les liens et documents joints

External Email: Please use caution when opening links and attachments / Courriel externe: Soyez prudent avec les liens et documents joints



February 7, 2023

Rogers Communications Inc.
333 Bloor Street East, 10th Floor
Toronto, ON M4W 1G9

To Whom It May Concern:

Re: Ellershouse 3 Wind Project
Ellershouse, Nova Scotia

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by Ellershouse 3 Wind Limited Partnership (our client) to support with the proposed Ellershouse 3 Wind Project (the "Project") in the Municipality of West Hants.

On behalf of our client, Strum is conducting an electromagnetic interference ("EMI") study on the placement of 12 wind turbines on private lands currently used for forestry and silviculture near the communities of Ellershouse and Hartville, Nova Scotia.

As an aspect of our investigation, we would like to formally consult with you on the Project and provide a discussion opportunity with respect to the proposed turbine layout.

More specifically, Strum is soliciting feedback, details, and specifications of existing operations from stakeholders to determine if there would be any potential interference with your existing operations as a result of the proposed wind turbine installations. The turbine specifications are as follows:

- Total of 12 turbines
- Tip height of each turbine is 206.5 metres
- Hub height of each turbine is 125 metres
- 3-blade rotor; turbine blade sweep diameter is 163 metres (blade length is 81.5 metres)

A map showing the proposed locations of the turbines has been attached (Drawing 1); and a summary of the proposed turbine details, including coordinates and elevations, is included in Table 1, below.

Engineering • Surveying • Environmental

Head Office
Railside, 1355 Bedford Hwy.
Bedford, NS B4A 1C5
t. 902.835.5560 (24/7)
f. 902.835.5574

Antigonish Office
3-A Vincent's Way
Antigonish, NS B2G 2X3
t. 902.863.1465 (24/7)
f. 902.863.1389

Moncton Office
45 Price Street
Moncton, NB E1A 3R1
t. 1.855.770.5560 (24/7)
f. 902.835.5574

St. John's Office
#E120 - 120 Torbay Road
St. John's, NL A1A 2G8
t. 709.738.8478 (24/7)
f. 709.738.8494

Table 1: Proposed Turbine Locations & Specifications

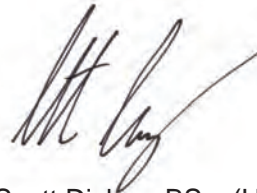
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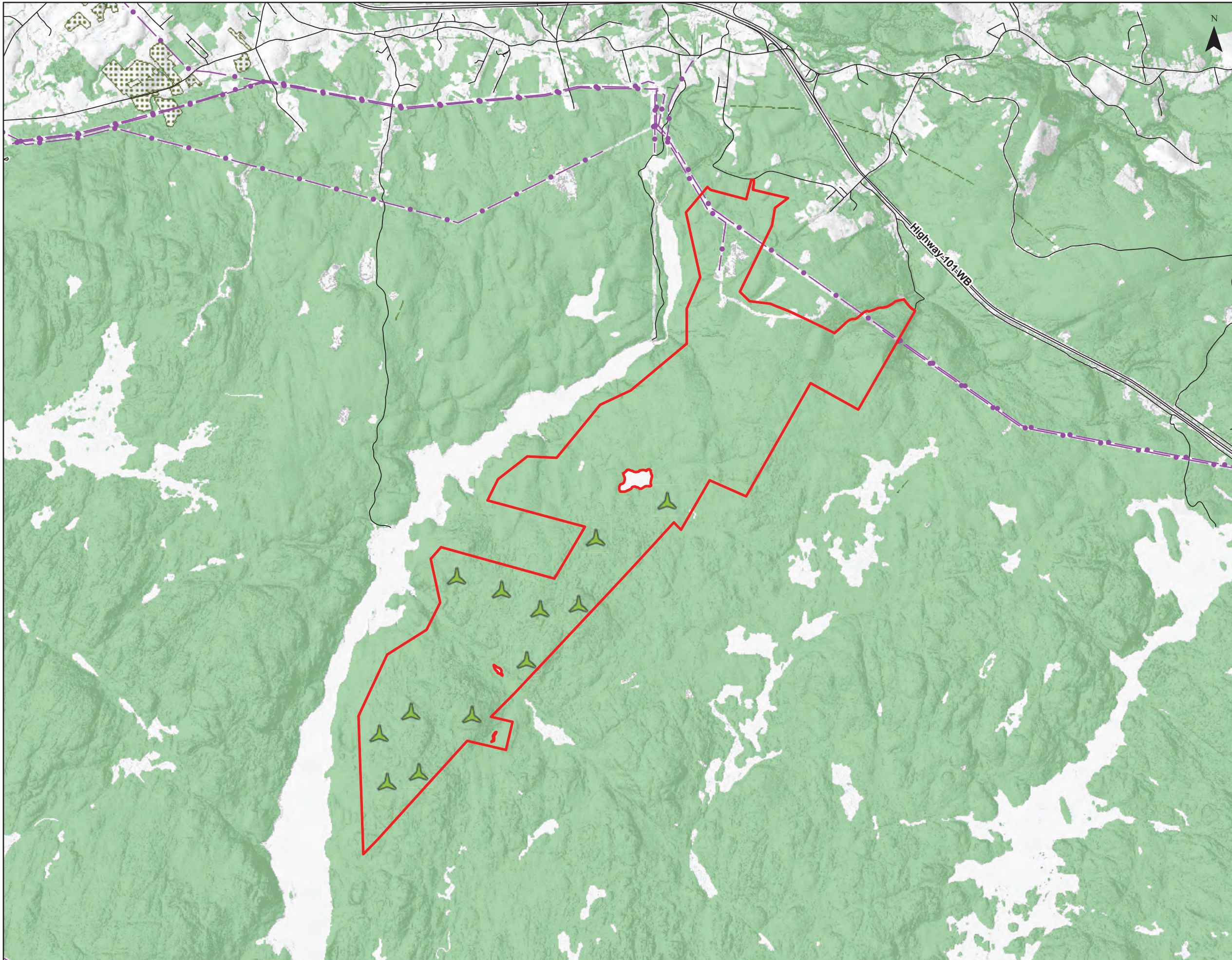
Thank you,



Shawn Duncan, BSc.
 President
sduncan@strum.com



Scott Dickey, BSc. (Hons), MREM
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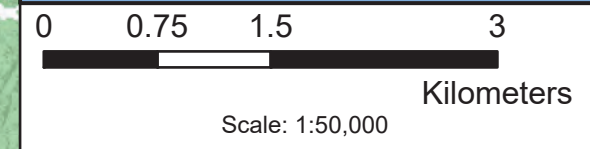


Ellershouse Wind Project

Proposed Turbine Layout Overview

Legend

- Study Area
- ▲ Proposed Turbine Location
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- Mapped Stream
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Coordinate System: NAD83 UTM Zone 20N Sources: ESRI Basemaps, GeoNOVA, NSTD

Date:	December 2022	Project #:	20-7536
Drawn By:	E. Johnson	1	Drawing #:
Checked By:	S. Dickey		





February 7, 2023

Seaside Communications
1318 Grand Lake Road
P.O. Box # 4558
Reserve Mines, NS B1E 1L2

To Whom it May Concern,

Re: Ellershouse 3 Wind Project
Ellershouse, Nova Scotia

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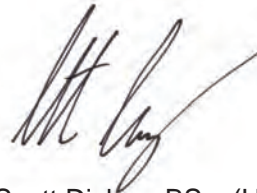
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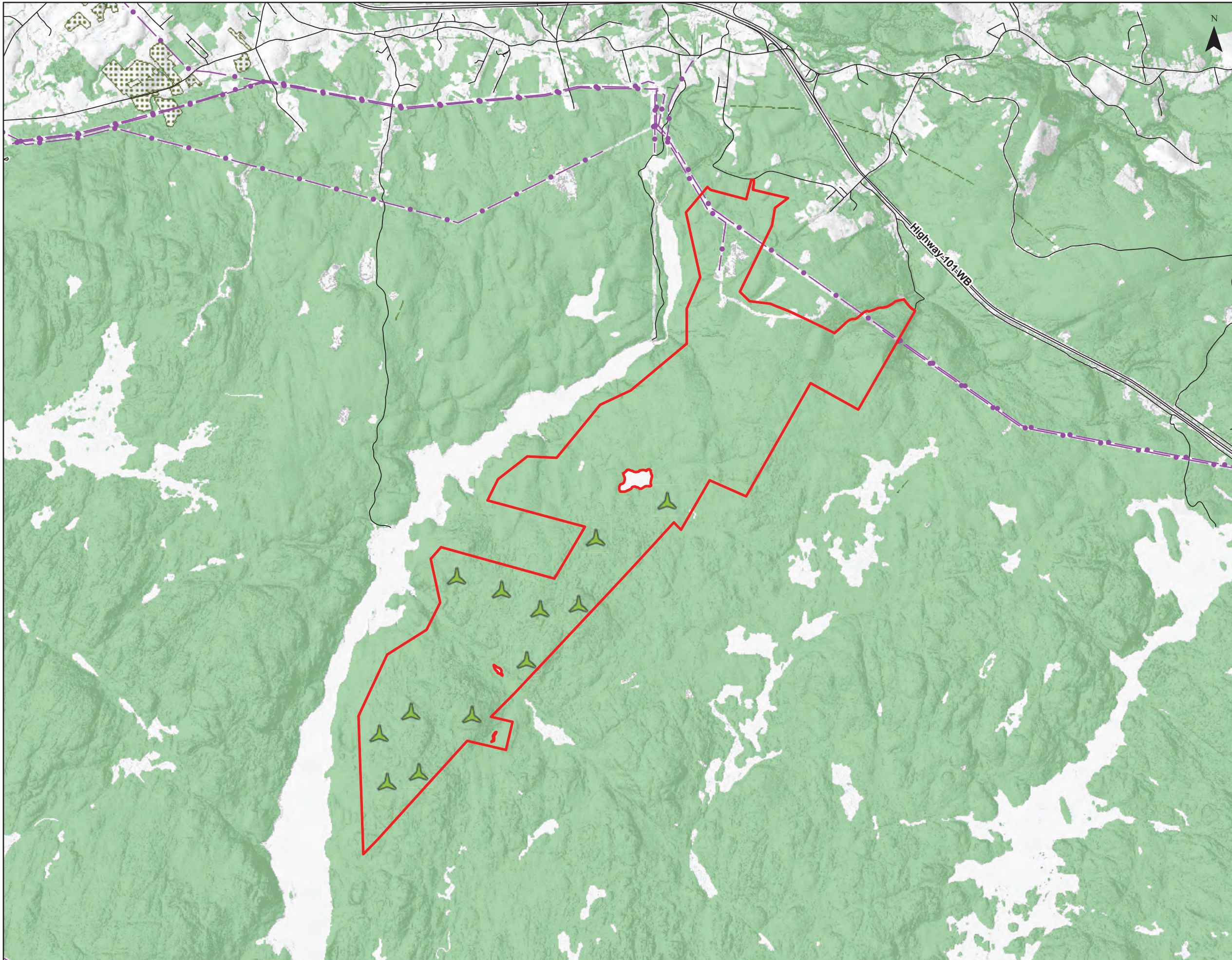
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President
sduncan@strum.com



Scott Dickey, BSc. (Hons), MREM
Manager, Environmental Sciences
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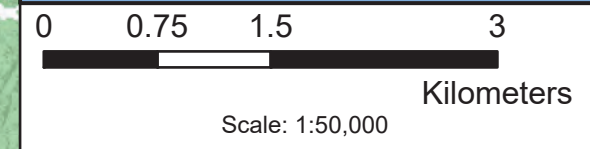


Ellershouse Wind Project

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Date:	December 2022	Project #:	20-7536
Drawn By:	E. Johnson	1	Drawing #:
Checked By:	S. Dickey		





February 7, 2023

Chief Ryan Richard
Brooklyn Volunteer Fire Department
995 Hwy 215
Newport, NS B0N 2A0

Dear Chief Richard,

Re: Ellershouse 3 Wind Project
Ellershouse, Nova Scotia

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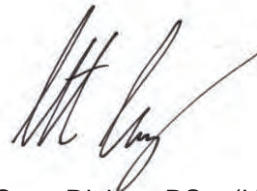
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3	415313	4972140	44.897	-64.072	140.2	125	81.5	346.7
4	415971	4971997	44.896	-64.064	160.2	125	81.5	366.7
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Thank you for your time and consideration of this Project. Upon review, should you have any questions, concerns, or identify a need for additional information, please do not hesitate to contact a member of our team and we will follow up with you directly. Your feedback and support in this matter is most appreciated.

Thank you,



Shawn Duncan, BSc.
 President
sduncan@strum.com







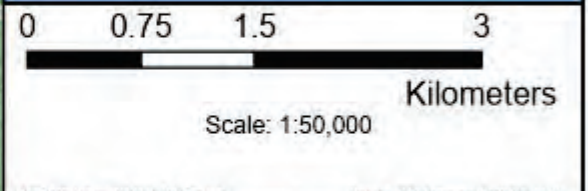
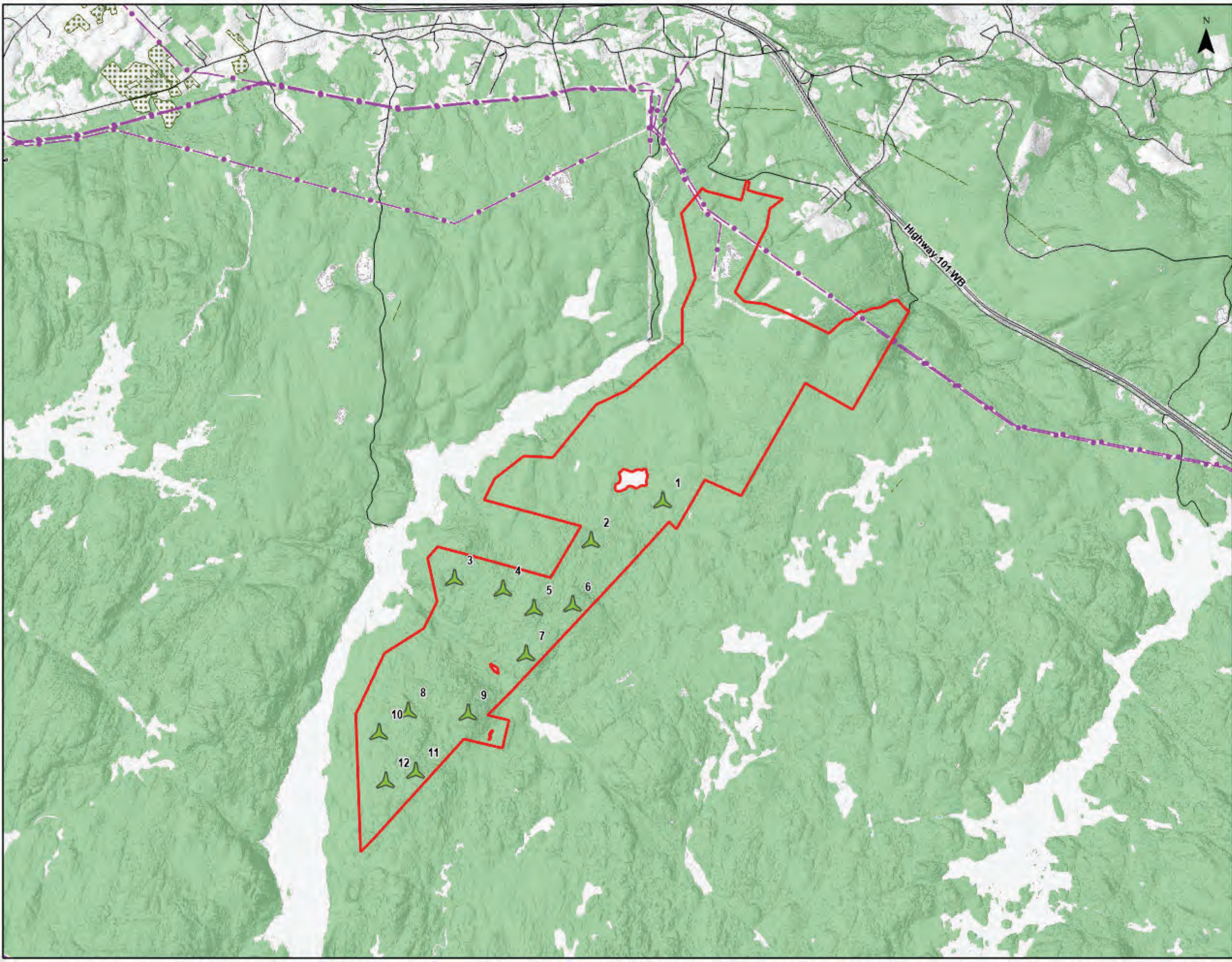
Scott Dickey, BSc. (Hons), MREM
 Manager, Environmental Sciences
sdickey@strum.com

Ellershouse 3 Wind Project

Proposed Turbine Layout Overview

Legend

-  Study Area
-  Proposed Turbine Location
-  Existing Transmission Line
- Transportation**
 -  Public Roads
- Water Features**
 -  Mapped Stream
 -  Mapped Indefinite Stream
 -  Mapped Lakes and Rivers



Date:	January 2023	Project #:	20-7536
Drawn By:	E. Johnson	Drawing #:	1
Checked By:	S. Dickey		



Engineering - Surveying - Environmental
Bedford - Antigonish - Moncton - St. John's



February 7, 2023

Karrie Ritchie, Deputy Chief of Administration
Hantsport Fire Department
5 Oak St.
Hantsport, NS B0P 1P0
kritchie@westhants.ca

Dear Deputy Chief of Administration,

Re: Ellershouse 3 Wind Project
Ellershouse, Nova Scotia

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by Ellershouse 3 Wind Limited Partnership (our client) to support with the proposed Ellershouse 3 Wind Project (the "Project") in the Municipality of West Hants.

On behalf of our client, Strum is conducting an electromagnetic interference ("EMI") study on the placement of 12 wind turbines on private lands currently used for forestry and silviculture near the communities of Ellershouse and Hartville, Nova Scotia.

As an aspect of our investigation, we would like to formally consult with you on the Project and provide a discussion opportunity with respect to the proposed turbine layout.

More specifically, Strum is soliciting feedback, details, and specifications of existing operations from stakeholders to determine if there would be any potential interference with your existing operations as a result of the proposed wind turbine installations. The turbine specifications are as follows:

- Total of 12 turbines
- Tip height of each turbine is 206.5 metres
- Hub height of each turbine is 125 metres
- 3-blade rotor; turbine blade sweep diameter is 163 metres (blade length is 81.5 metres)

A map showing the proposed locations of the turbines has been attached (Drawing 1); and a summary of the proposed turbine details, including coordinates and elevations, is included in Table 1, below.

Engineering • Surveying • Environmental

Head Office
Railside, 1355 Bedford Hwy.
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t. 902.835.5560 (24/7)
f. 902.835.5574

Antigonish Office
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Antigonish, NS B2G 2X3
t. 902.863.1465 (24/7)
f. 902.863.1389

Moncton Office
45 Price Street
Moncton, NB E1A 3R1
t. 1.855.770.5560 (24/7)
f. 902.835.5574

St. John's Office
#E120 - 120 Torbay Road
St. John's, NL A1A 2G8
t. 709.738.8478 (24/7)
f. 709.738.8494

Table 1: Proposed Turbine Locations & Specifications

Turbine ID	Easting (UTM Z20)	Northing (UTM Z20)	Latitude	Longitude	Base of Turbine Elevation (m)	Turbine Hub Height (m)	Blade Length (m)	Total Elevation (m)
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Thank you for your time and consideration of this Project. Upon review, should you have any questions, concerns, or identify a need for additional information, please do not hesitate to contact a member of our team and we will follow up with you directly. Your feedback and support in this matter is most appreciated.

Thank you,








Shawn Duncan, BSc.
 President
sduncan@strum.com

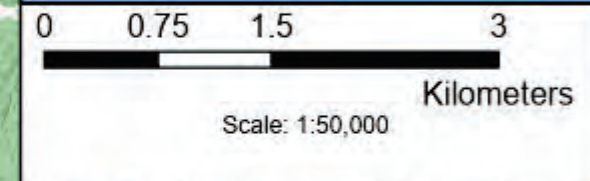
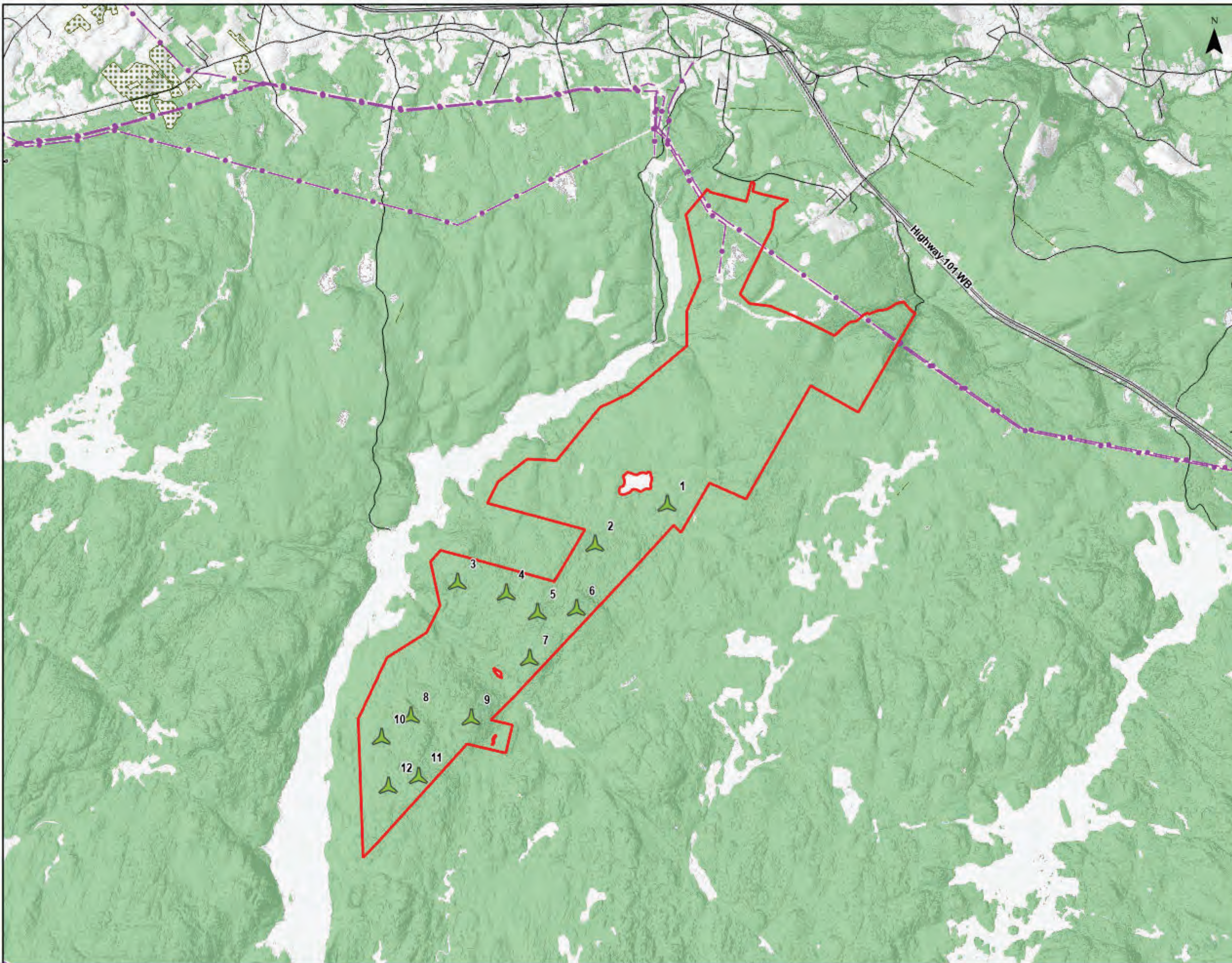
Scott Dickey, BSc. (Hons), MREM
 Manager, Environmental Sciences
sdickey@strum.com

Ellershouse 3 Wind Project

Proposed Turbine Layout Overview

Legend

-  Study Area
-  Proposed Turbine Location
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- Transportation**
 -  Public Roads
- Water Features**
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<small>Coordinate System: NAD83 UTM Zone 21N</small>		<small>Source: ESRI/Basemap, GeoBC/W, RSTO</small>	
Date:	January 2023	Project #:	20-7536
Drawn By:	E. Johnson	Drawing #:	1
Checked By:	S. Dickey		



Engineering - Surveying - Environmental
Bedford - Antigonish - Moncton - St. John's



General Mailbox <general@strum.com>

RE: Ellershouse 3 Wind Project

1 message

Karrie Ritchie <KRitchie@westhants.ca>
To: General Mailbox <general@strum.com>

Wed, Feb 8, 2023 at 7:51 AM

Received 😊



Karrie Ritchie
Public Works Administrative Assistant
West Hants Regional Municipality
PO Box 3000, 100 King Street, Windsor, NS, B0N2T0

T 902-798-8391 Ext.125
E KRitchie@westhants.ca
W www.westhants.ca

From: General Mailbox <general@strum.com>
Sent: Tuesday, February 7, 2023 5:14 PM
To: Karrie Ritchie <KRitchie@westhants.ca>
Subject: Ellershouse 3 Wind Project

Caution [External Email]

This email comes from an outside sender. Verify the sender and use caution with any requests, links or attachments.

Dear Karrie Ritchie,

Please find attached an updated notification letter for the proposed Ellershouse 3 Wind Project development located in the Municipality of West Hants. A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Thank you,

Courtney Morrison (she/her)

Community Engagement Coordinator



Engineering • Surveying • Environmental

Bedford • Antigonish • Moncton • St. John's



February 7, 2023

Chief Brian Supple
Uniacke & District Volunteer Fire Department
654 Highway 1,
Mount Uniacke, NS B0N 1Z0
udvfd@uniackefire.ca

Dear Chief Supple,

Re: Ellershouse 3 Wind Project
Ellershouse, Nova Scotia

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by Ellershouse 3 Wind Limited Partnership (our client) to support with the proposed Ellershouse 3 Wind Project (the "Project") in the Municipality of West Hants.

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Table 1: Proposed Turbine Locations & Specifications

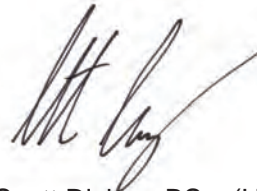
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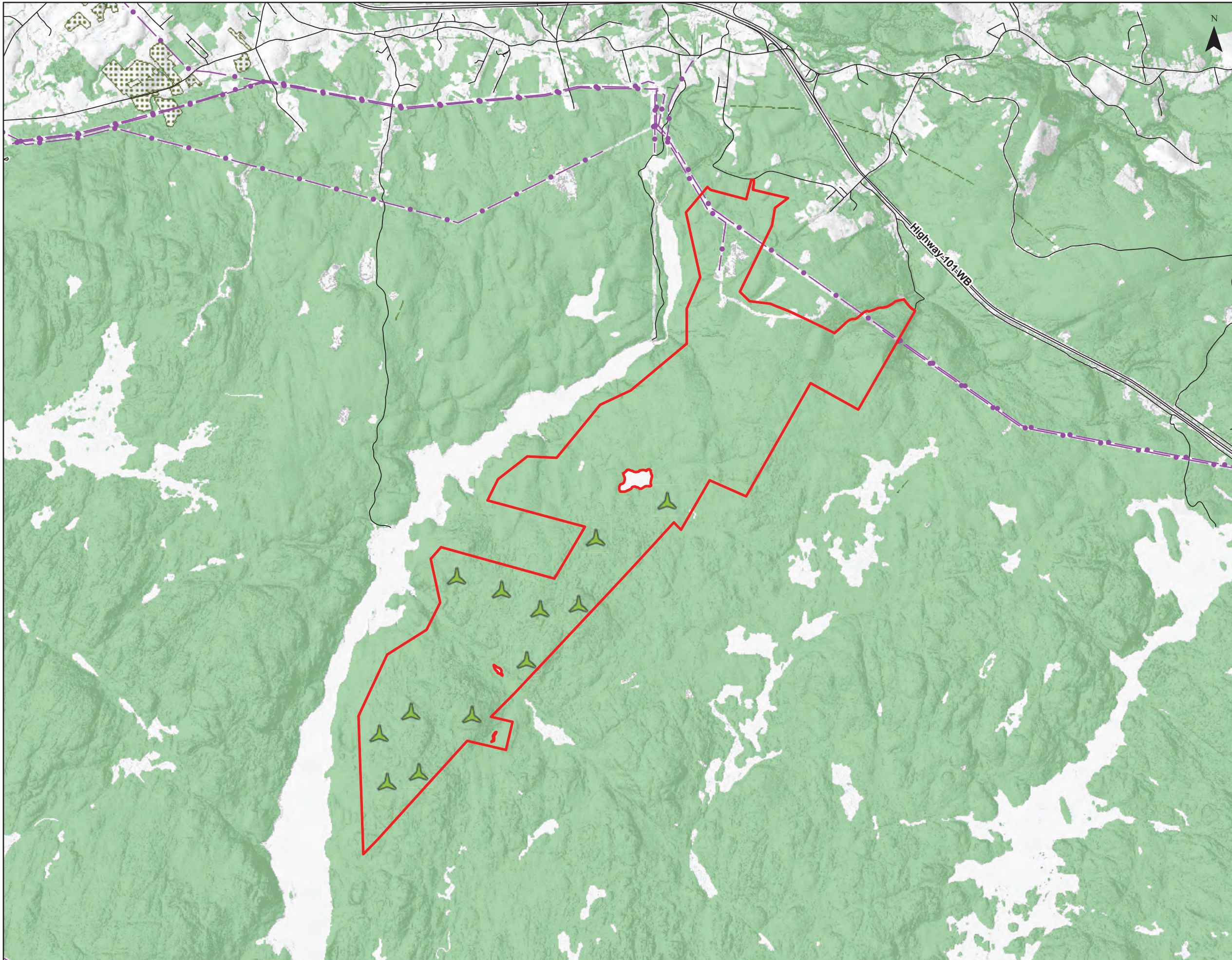
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Shawn Duncan, BSc.
 President
sduncan@strum.com



Scott Dickey, BSc. (Hons), MREM
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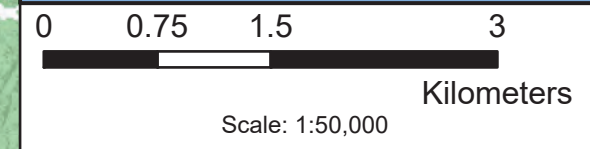


Ellershouse Wind Project

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Coordinate System: NAD83 UTM Zone 20N Sources: ESRI Basemaps, GeoNOVA, NSTD

Date:	December 2022	Project #:	20-7536
Drawn By:	E. Johnson	1	Drawing #:
Checked By:	S. Dickey		





February 7, 2023

Chief Jamie Juteau
Windsor Fire Department
100 King St.
Windsor, NS B0N 2T0
jjuteau@westhants.ca

Dear Chief Juteau,

Re: Ellershouse 3 Wind Project
Ellershouse, Nova Scotia

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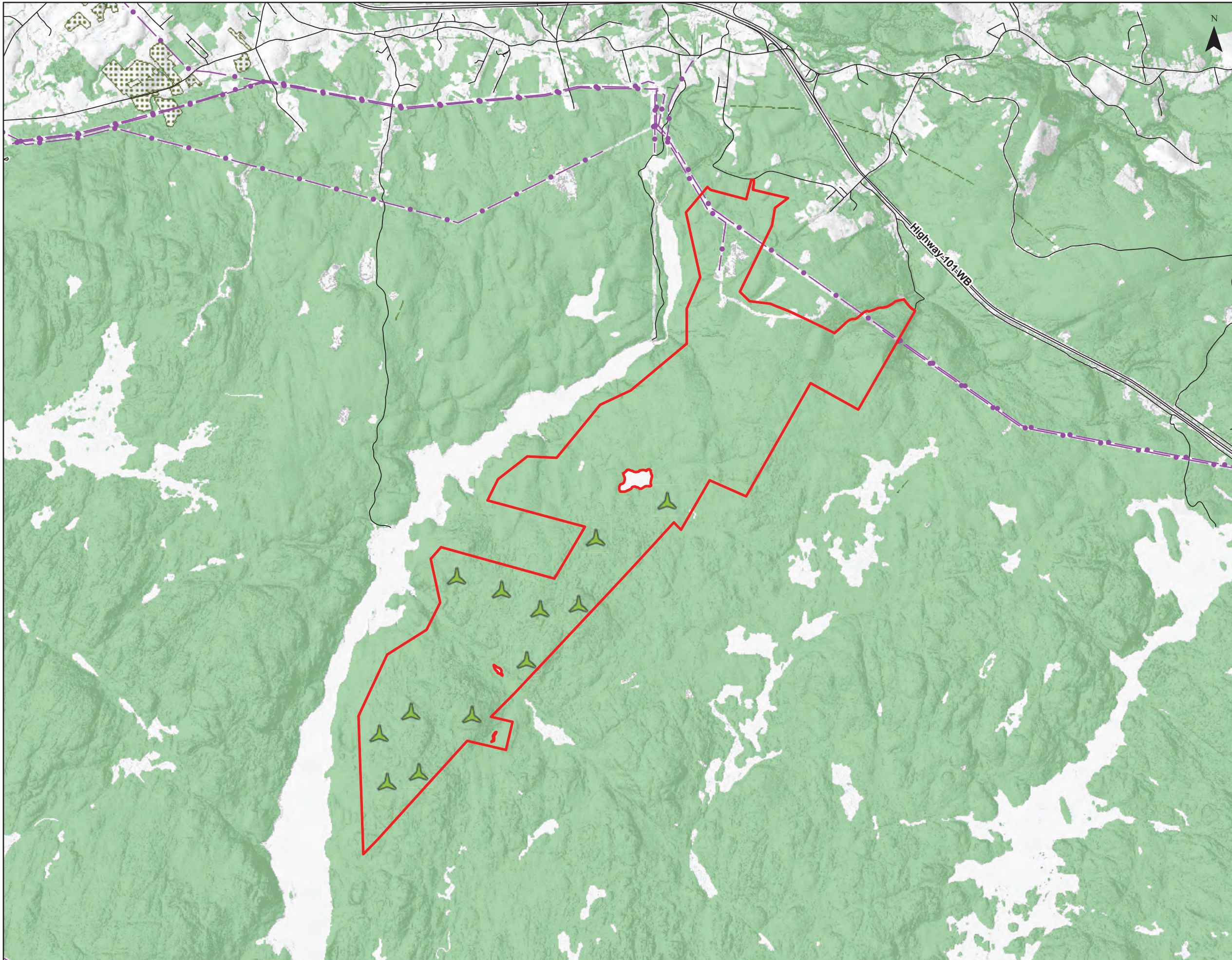
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sduncan@strum.com



Scott Dickey, BSc. (Hons), MREM
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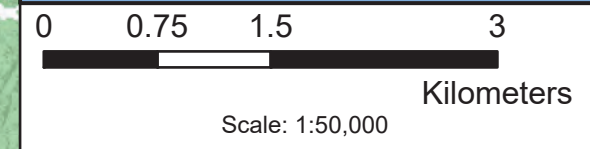


Ellershouse Wind Project

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Coordinate System: NAD83 UTM Zone 20N Sources: ESRI Basemaps, GeoNOVA, NSTD

Date:	December 2022	Project #:	20-7536
Drawn By:	E. Johnson	1	Drawing #:
Checked By:	S. Dickey		





General Mailbox <general@strum.com>

Fwd: Ellershouse 3 Wind Project

1 message

Jamie Juteau <JJuteau@westhants.ca>

Tue, Feb 7, 2023 at 5:30 PM

To: General Mailbox <general@strum.com>, Ryan Richard <RRichard@westhants.ca>

Hi Courtney,

This is actually Chief Ryan Richard's District (Brooklyn Fire), I have added him to this email and forwarded the letter for his review.

Thanks, JJJ

Get [Outlook for Android](#)**Jamie Juteau**

Fire Chief

District 4 - Windsor Fire Department

District 5 - South West Hants Fire

West Hants Regional Municipality

PO Box 3000, 100 King Street, Windsor, NS, B0N2T0

T 902-798-8391 Ext. 218

M 902-798-7643

E JJuteau@westhants.ca

W www.westhants.ca

From: General Mailbox <general@strum.com>**Sent:** Tuesday, February 7, 2023 5:11:51 PM**To:** Jamie Juteau <JJuteau@westhants.ca>**Subject:** Ellershouse 3 Wind Project**Caution [External Email]**

This email comes from an outside sender. Verify the sender and use caution with any requests, links or attachments.

Hi Chief Jamie Juteau,

Thanks for taking my call today! Please find attached an updated notification letter for the proposed Ellershouse 3 Wind Project development located in the Municipality of West Hants. A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Thank you,

Courtney Morrison (she/her)

Community Engagement Coordinator

**Engineering • Surveying • Environmental**

Bedford • Antigonish • Moncton • St. John's

Email: general@strum.com

Tel: 902.835.5560 (24/7)

Fax: 902.835.5574

APPENDIX N
SHADOW FLICKER

SHADOW - Main Result

Calculation: Ellershouse Real Case Shadow Flicker - EA
 Assumptions for shadow calculations

Maximum distance for influence
 Calculate only when more than 20 % of sun is covered by the blade
 Please look in WTG table

Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [KENTVILLE]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 2.53 3.50 4.28 4.96 6.33 7.24 7.51 7.27 5.85 4.44 2.81 1.86

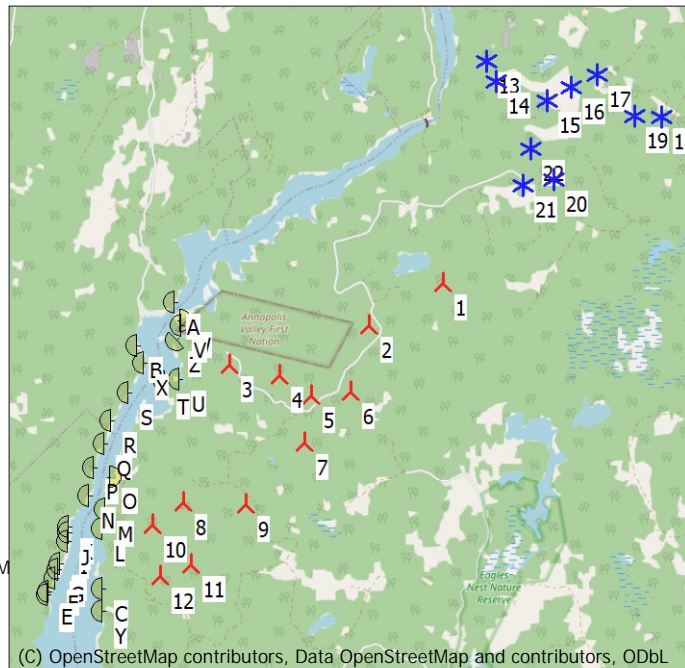
Operational hours are calculated from WTGs in calculation and wind distribution:
 Ellershouse METEO

Operational time
 N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 745 333 221 248 408 635 1,037 865 683 885 1,255 1,116 8,431
 Idle start wind speed 3.0m/s

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Elevation Grid Data Object: Ellershouse_WindFarm_FEB2023_EM
 Obstacles used in calculation
 Receptor grid resolution: 1.0 m
 Topographic shadow included in calculation

All coordinates are in
 UTM (north)-NAD83(NSRS/CSRS) (US+CA GPS meas. at curr. year), GRS80 Zone: 20



Scale 1:100,000
 ▲ New WTG
 ● Shadow receptor
 * Existing WTG

WTGs

WTG ID	Easting	Northing	Z [m]	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.	Type-generator				Calculation [m]	RPM
1	418,156.00	4,973,195.00	149.8	NORDEX N163/5.9 5900 163.0 !O! hub: 12... Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
2	417,176.34	4,972,653.90	158.5	NORDEX N163/5.9 5900 163.0 !O! hub: 12... Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
3	415,313.25	4,972,140.31	140.2	NORDEX N163/5.9 5900 163.0 !O! hub: 12... Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
4	415,970.85	4,971,996.91	160.2	NORDEX N163/5.9 5900 163.0 !O! hub: 12... Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
5	416,394.34	4,971,730.32	178.5	NORDEX N163/5.9 5900 163.0 !O! hub: 12... Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
6	416,925.09	4,971,775.28	196.6	NORDEX N163/5.9 5900 163.0 !O! hub: 12... Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
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9	415,501.15	4,970,296.52	180.5	NORDEX N163/5.9 5900 163.0 !O! hub: 12... Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
10	414,272.78	4,970,033.35	160.1	NORDEX N163/5.9 5900 163.0 !O! hub: 12... Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
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12	414,367.25	4,969,376.19	166.3	NORDEX N163/5.9 5900 163.0 !O! hub: 12... Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
13	418,770.38	4,976,114.25	139.9	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: ...Yes	Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	1,516	17.0
14	418,901.30	4,975,852.41	154.9	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: ...Yes	Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	1,516	17.0
15	419,551.93	4,975,590.58	176.9	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: ...Yes	Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	1,516	17.0
16	419,878.71	4,975,765.64	177.7	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: ...Yes	Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	1,516	17.0
17	420,228.27	4,975,912.87	176.5	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: ...Yes	Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	1,516	17.0
18	421,076.30	4,975,356.83	175.1	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: ...Yes	Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	1,516	17.0
19	420,715.76	4,975,369.52	171.1	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: ...Yes	Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	1,516	17.0
20	419,644.29	4,974,546.87	178.7	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: ...Yes	Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	1,516	17.0
21	419,225.35	4,974,468.16	179.3	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: ...Yes	Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	1,516	17.0
22	419,337.06	4,974,953.12	175.7	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: ...Yes	Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	1,516	17.0

Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Degrees from south cw	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]	[°]		[m]
A	414,599.05	4,972,980.09	84.7	3.0	2.0	2.0	-90.0	90.0	Fixed direction	4.0
B	414,098.36	4,972,423.26	84.4	1.0	1.0	2.0	-90.0	90.0	Fixed direction	3.0

To be continued on next page...

SHADOW - Main Result

Calculation: Ellershouse Real Case Shadow Flicker - EA

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Elevation	Degrees from	Slope of	Direction mode	Eye height
			[m]	[m]	[m]	a.g.l.	south cw	of window		(ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]	[°]		[m]
C	413,585.25	4,969,213.84	86.6	1.0	1.0	2.0	-90.0	90.0	Fixed direction	3.0
D	412,874.67	4,969,155.67	83.2	2.0	2.0	2.0	-90.0	90.0	Fixed direction	4.0
E	412,886.71	4,969,191.81	85.0	1.0	1.0	2.0	-90.0	90.0	Fixed direction	3.0
F	412,964.03	4,969,364.60	84.0	2.0	2.0	2.0	-90.0	90.0	Fixed direction	4.0
G	413,014.08	4,969,473.99	84.8	2.0	2.0	2.0	-90.0	90.0	Fixed direction	4.0
H	413,042.81	4,969,558.87	83.1	2.0	2.0	2.0	-90.0	90.0	Fixed direction	4.0
I	413,141.04	4,969,834.91	83.5	2.0	1.0	2.0	-90.0	90.0	Fixed direction	3.0
J	413,158.45	4,969,955.48	82.9	5.0	2.0	2.0	-90.0	90.0	Fixed direction	4.0
K	413,151.26	4,970,044.26	83.7	4.0	2.0	2.0	-90.0	90.0	Fixed direction	4.0
L	413,600.11	4,970,004.06	82.6	0.5	1.0	2.0	-90.0	90.0	Fixed direction	3.0
M	413,650.49	4,970,244.25	85.6	0.5	0.5	2.0	-90.0	90.0	Fixed direction	2.5
N	413,435.85	4,970,446.41	84.1	2.0	2.0	2.0	-90.0	90.0	Fixed direction	4.0
O	413,714.61	4,970,676.03	83.2	1.5	1.5	2.0	90.0	90.0	Fixed direction	3.5
P	413,508.42	4,970,816.57	83.5	0.5	1.0	2.0	-90.0	90.0	Fixed direction	3.0
Q	413,646.24	4,971,129.95	83.1	2.0	4.0	2.0	-90.0	90.0	Fixed direction	6.0
R	413,747.55	4,971,436.65	85.6	1.0	3.0	2.0	-90.0	90.0	Fixed direction	5.0
S	413,976.14	4,971,800.20	82.0	1.0	1.0	2.0	-90.0	90.0	Fixed direction	3.0
T	414,459.90	4,971,926.48	83.1	1.0	1.0	2.0	-90.0	90.0	Fixed direction	3.0
U	414,640.55	4,971,962.01	85.5	0.5	0.5	2.0	-90.0	90.0	Fixed direction	2.5
V	414,684.38	4,972,679.14	83.5	2.0	2.0	2.0	-90.0	90.0	Fixed direction	4.0
W	414,672.07	4,972,743.27	84.6	2.0	2.0	2.0	90.0	90.0	Fixed direction	4.0
X	414,187.12	4,972,190.12	85.2	2.0	1.0	2.0	-90.0	90.0	Fixed direction	3.0
Y	413,583.93	4,968,931.86	83.7	0.5	0.5	2.0	-90.0	90.0	Fixed direction	2.5
Z	414,622.02	4,972,486.69	82.8	0.5	0.5	2.0	-135.0	90.0	Fixed direction	2.5

Calculation Results

Shadow receptor

Shadow, expected values

No. Shadow hours

per year

[h/year]

A	7:20
B	3:42
C	21:54
D	3:10
E	3:07
F	7:06
G	12:54
H	14:57
I	15:48
J	15:04
K	13:59
L	14:35
M	13:51
N	15:28
O	0:00
P	11:07
Q	4:23
R	8:26
S	4:27
T	18:29
U	27:46
V	13:47
W	0:00
X	4:49
Y	0:00
Z	12:17

Total amount of flickering on the shadow receptors caused by each WTG

No. Name

Worst case
[h/year]

Expected
[h/year]

1 NORDEX N163/5.9 5900 163.0 !OI hub: 125.0 m (TOT: 206.5 m) (84)	0:00	0:00
2 NORDEX N163/5.9 5900 163.0 !OI hub: 125.0 m (TOT: 206.5 m) (85)	0:00	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: Eilershouse Real Case Shadow Flicker - EA

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
3	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (86)	275:59	65:19
4	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (87)	54:13	12:42
5	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (88)	7:17	1:52
6	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (89)	0:00	0:00
7	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (90)	0:00	0:00
8	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (91)	107:25	25:12
9	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (92)	0:00	0:00
10	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (93)	242:59	60:08
11	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (94)	69:03	16:54
12	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (95)	195:49	47:18
13	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: 98.4 m (TOT: 144.4 m) (1)	0:00	0:00
14	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: 98.4 m (TOT: 144.4 m) (2)	0:00	0:00
15	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: 98.4 m (TOT: 144.4 m) (3)	0:00	0:00
16	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: 98.4 m (TOT: 144.4 m) (4)	0:00	0:00
17	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: 98.4 m (TOT: 144.4 m) (5)	0:00	0:00
18	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: 98.4 m (TOT: 144.4 m) (6)	0:00	0:00
19	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: 98.4 m (TOT: 144.4 m) (7)	0:00	0:00
20	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: 98.4 m (TOT: 144.4 m) (8)	0:00	0:00
21	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: 98.4 m (TOT: 144.4 m) (9)	0:00	0:00
22	ENERCON E-92 2,3 MW 2350 92.0 !-! hub: 98.4 m (TOT: 144.4 m) (10)	0:00	0:00

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

The calculation of the total expected values for a given receptor assumes a weighted average directional reduction for all WTGs contributing to shadow flicker within the same day. In the case where shadow flicker from different WTGs is not concurrent within the day, the total expected time at a given receptor may deviate marginally from the individual flicker time caused by each turbine separately.

APPENDIX O

SOUND

Overview of Infrasound

Infrasound is an inaudible range of low frequency sound between one and 10 Hz generated as a result of large masses/objects in motion. Infrasound is emitted from both natural sources (e.g., wind, oceans) and artificial sources such as road traffic, ventilation systems, and aircrafts (Keith, 2018). Levels of infrasound emitted from large-scale wind turbines attenuate over space as a function of site-specific characteristics (i.e., topography, structures, etc.) and climatic conditions (Rod & Heiger-Bernays, 2012; Schmidt & Klokke, 2014). Generally, frequencies below 100 Hz are attenuated by three dBA over a doubling of distance when downwind of turbines (between distances of 0.3 to 20 km) and six dBA over a doubling of distance when upwind of turbines (between distances of 0.4 to 3 km) (Shepherd & Hubbard, 1991). Health Canada reported that infrasound generated by wind turbines can be measured up to 10 km away, however, in many cases was below background levels (Health Canada, 2014; Keith, 2018).

When evaluating potential effects of infrasound, it is important that these frequencies be discussed in the context of the sound pressure levels, or in other words, the loudness of the sound. Studies show that the lower the frequency of the sound, the louder the sound needs to be in order to be audible/perceived. For instance, very loud sounds at very low frequencies (i.e., 165 dB at 2 Hz, reducing to 145 dB at 20 Hz) may result in pain (Leventhall, 2006) and infrasound has been shown to cause annoyance, when the sound level exceeds the threshold of hearing (i.e., the lowest sound levels that a listener can detect) (HGC, 2010). Further, research shows that to be physically felt, infrasound must exceed 100–110 dB (Ellenbogen et al., 2012). While there is some variation in the literature and between individual sensitivities, there is fairly good agreement on the level of the threshold of hearing among the various studies that have been completed (Figure O.1).

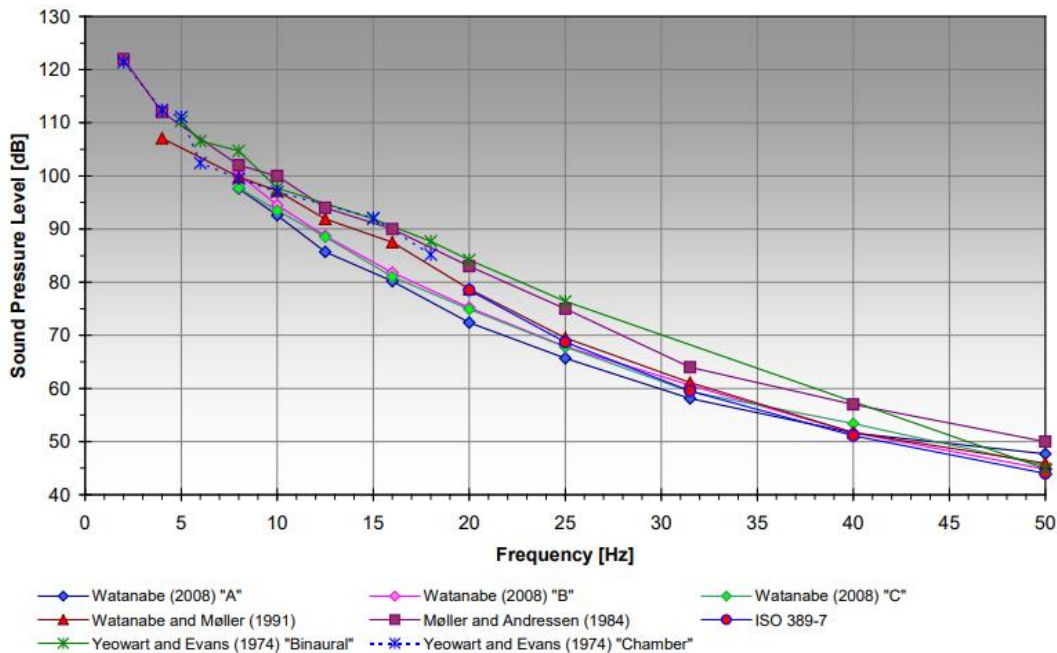


Figure O.1. Threshold of Hearing Data from Various Papers (Source: HGC, 2010)

Measuring Infrasound

In 2010, Sonus, an acoustic consulting firm based in South Australia, completed a study to measure infrasound produced by a range of natural and manmade sources using a methodology specifically designed to measure infrasound (Table O.1). Sound levels measured using the G-weighting filters, expressed as dBG. The G-weighting network was applied to the measured infrasound pressure levels as it has been standardized to determine the human perception (i.e. threshold of hearing) and annoyance due to noise that lies within the infrasound frequency range. By comparison, when measuring audible sound levels, meters are usually equipped with weighting circuits to simulate the frequency response characteristics of the human ear.

Table O.1: Measured Levels of Infrasound from Natural & Manmade Sources

Source	Infrasound Level (dBG)
Threshold of Hearing	85
Ambient Infrasound <i>(As measured 100 m from nearest wind turbine with negligible wind and no turbine operation)</i>	62
Natural Sources	
Adjacent to Beach – 25 m from high water	75
Cliff Face – 250 m from coastline	69
Inland Forest – 8 km from coastline	57
Anthropogenic Sources	
Business District (70 m from two major road corridors)	76
Gas Fired Power Station (350 m away)	74
Wind Farm – 100 m downwind	66
Wind Farm – 200 m downwind	63
Wind Farm – 360 m downwind	61
Outside Residence – 1.2 km from nearest wind turbine	58

Source: Sonus 2010

The results of the study indicate that while turbines do produce infrasound, levels are well below established levels that can be perceived by humans and are comparable to natural and urban sources that are common in the environment.

Infrasound and Potential Health Concerns

Concerns about infrasound from wind turbines is thought to have originated from the experience of neighbours of early wind turbine designs with downwind rotors (rotors downwind of the tower). In contrast, all modern utility scale wind turbines have upwind rotors that produce significantly lower infrasound emissions (Bastasch et al., 2006). Several studies and panels have been assembled to evaluate the perceived health effects associated with wind turbines.

A study by Evans et al. (2013) concluded that measured infrasound levels at rural locations both near to and away from wind farms were no higher than infrasound levels measured at the urban locations. Human activity and traffic were the main sources of infrasound within urban locations, while localized wind conditions were found to be the main source of infrasound in rural locations. All measurements were below the levels that can be perceived by humans, with most by a significant margin (Evans et al., 2013).

A scientific advisory panel with expertise in audiology, acoustics, occupational/environmental medicine, and public health was assembled by the wind industry in early 2009 to conduct a review of current literature available on the issue of perceived health effects of wind turbines (Colby et al., 2009). Following their review and analysis of the information, the panel reached consensus on the following conclusions:

- There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects.
- The ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans.
- Sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequencies of the sounds and the panel’s experience with sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences.

The Chief Medical Officer of Health in Ontario also conducted a review of papers and reports (from 1970 to 2010) on wind turbines and health from scientific bibliographic databases, grey literature, and from a structured Internet search. The report concluded that “low frequency sound and infrasound from current generation upwind model turbines are well below the pressure sound levels at which known health effects occur. Further, there is no scientific evidence to date that vibration from low frequency wind turbine noise causes adverse health effects” (CMOH of Ontario, 2010).

The Massachusetts panel concluded that “measured levels of infrasound produced by modern upwind wind turbines at distances as close as 68 m are well below that required for non-auditory perception”. Further, the panel concluded that “the weight of the evidence suggests no association between noise from wind turbines and measures of psychological distress or mental health problems” (Ellenbogen et al., 2012).

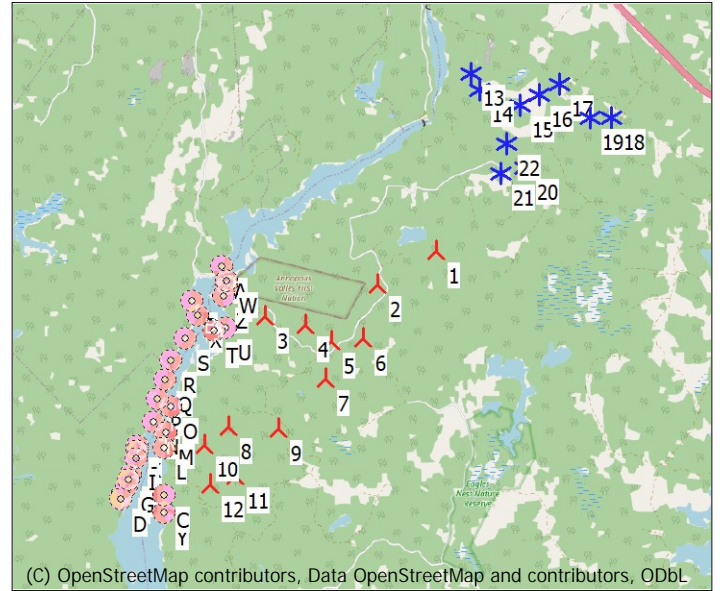
A new study found that infrasound (generated acoustically as part of the study to correspond to real world wind farms) had no influence on reported annoyance or on the measured response on the autonomic nervous system (Maijila et al., 2021). The study concluded that participants did not detect infrasonic ranges of simulated wind turbine noise.

Overall, potential impacts on nearby residents as a result of Project generated infrasound are anticipated to be negligible based on the scientific findings discussed above and distances to nearby receptors.

DECI BEL - Main Result

Calculation: Ellershouse 3 Noise Model w/ Existing Turbines

Noise calculation model:
 ISO 9613-2 General
 Wind speed (in hubheight):
 Loudest up to 95% rated power
 Ground attenuation:
 General, Ground factor: 1.0
 Meteorological coefficient, CO:
 0.0 dB
 Type of demand in calculation:
 1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
 Noise values in calculation:
 All noise values are mean values (Lwa) (Normal)
 Pure tones:
 Fixed penalty added to source noise of WTGs with pure tones
 WTG catalogue
 Height above ground level, when no value in NSA object:
 1.5 m; Allow override of model height with height from NSA object
 Uncertainty margin:
 0.0 dB; Uncertainty margin in NSA has priority
 Deviation from "official" noise demands. Negative is more restrictive,
 positive is less restrictive.:
 0.0 dB(A)
 Noise reflections according to ISO 9613-2 included



All coordinates are in
 UTM (north)-NAD83(NSRS/CSRS) (US+CA GPS meas. at curr. year), GRS80 Zone: 20

Scale 1:125,000
 ▲ New WTG ★ Existing WTG ▲ Noise sensitive area

WTGs

	Easting	Northing	Z	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data Creator	Noise data Name	Wind speed [m/s]	LwA,ref [dB(A)]
					Valid	Manufact.								
1	418,156.00	4,973,195.00	149.8	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
2	417,176.34	4,972,653.90	158.5	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
3	415,313.25	4,972,140.31	140.2	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
4	415,970.85	4,971,996.91	160.2	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
5	416,394.34	4,971,730.32	178.5	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
6	416,925.09	4,971,775.28	196.6	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
7	416,294.94	4,971,103.42	168.1	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
8	414,674.74	4,970,332.25	176.5	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
9	415,501.15	4,970,296.52	180.5	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
10	414,272.78	4,970,033.35	160.1	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
11	414,780.00	4,969,512.00	170.1	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
12	414,367.25	4,969,376.19	166.3	NORDEX N163/5.9 5900... Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	N163/5.X_R05 HH120_STE STE Mode 0	8.8	106.9	
13	418,770.38	4,976,114.25	139.9	ENERCON E-92 2,3 MW ... Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	EMD	Mode 00 - OM 0 s (2350 kW)	10.0	103.6	
14	418,901.30	4,975,852.41	154.9	ENERCON E-92 2,3 MW ... Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	EMD	Mode 00 - OM 0 s (2350 kW)	10.0	103.6	
15	419,551.93	4,975,590.58	176.9	ENERCON E-92 2,3 MW ... Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	EMD	Mode 00 - OM 0 s (2350 kW)	10.0	103.6	
16	419,878.71	4,975,765.64	177.7	ENERCON E-92 2,3 MW ... Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	EMD	Mode 00 - OM 0 s (2350 kW)	10.0	103.6	
17	420,228.27	4,975,912.87	176.5	ENERCON E-92 2,3 MW ... Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	EMD	Mode 00 - OM 0 s (2350 kW)	10.0	103.6	
18	421,076.30	4,975,356.83	175.1	ENERCON E-92 2,3 MW ... Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	EMD	Mode 00 - OM 0 s (2350 kW)	10.0	103.6	
19	420,715.76	4,975,369.52	171.1	ENERCON E-92 2,3 MW ... Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	EMD	Mode 00 - OM 0 s (2350 kW)	10.0	103.6	
20	419,644.29	4,974,546.87	178.7	ENERCON E-92 2,3 MW ... Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	EMD	Mode 00 - OM 0 s (2350 kW)	10.0	103.6	
21	419,225.35	4,974,468.16	179.3	ENERCON E-92 2,3 MW ... Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	EMD	Mode 00 - OM 0 s (2350 kW)	10.0	103.6	
22	419,337.06	4,974,953.12	175.7	ENERCON E-92 2,3 MW ... Yes	ENERCON	E-92 2,3 MW-2,350	2,350	92.0	98.4	EMD	Mode 00 - OM 0 s (2350 kW)	10.0	103.6	

Calculation Results

Sound level

No.	Name	Easting	Northing	Z	Immission height [m]	Noise [dB(A)]	From WTGs [dB(A)]	Demands fulfilled?
A	Noise Sensitive Point 1	414,599.05	4,972,980.09	84.7	2.0	40.0	32.8	Yes
B	Noise Sensitive Point 2	414,098.36	4,972,423.26	84.4	2.0	40.0	32.1	Yes
C	Noise Sensitive Point 3	413,585.25	4,969,213.84	86.6	2.0	40.0	36.4	Yes
D	Noise Sensitive Point 4	412,874.67	4,969,155.67	83.2	2.0	40.0	30.8	Yes
E	Noise Sensitive Point 5	412,886.71	4,969,191.81	85.0	2.0	40.0	30.9	Yes
F	Noise Sensitive Point 6	412,964.03	4,969,364.60	84.0	2.0	40.0	31.8	Yes
G	Noise Sensitive Point 7	413,014.08	4,969,473.99	84.8	2.0	40.0	32.3	Yes
H	Noise Sensitive Point 8	413,042.81	4,969,558.87	83.1	2.0	40.0	32.6	Yes

To be continued on next page...

DECI BEL - Main Result

Calculation: Ellershouse 3 Noise Model w/ Existing Turbines

...continued from previous page

Noise sensitive area				Immission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Demands fulfilled ? Noise	
No.	Name	Easting	Northing					
I	Noise Sensitive Point 9	413,141.04	4,969,834.91	83.5	2.0	40.0	33.6	Yes
J	Noise Sensitive Point 10	413,158.45	4,969,955.48	82.9	2.0	40.0	33.7	Yes
K	Noise Sensitive Point 11	413,151.26	4,970,044.26	83.7	2.0	40.0	33.6	Yes
L	Noise Sensitive Point 12	413,600.11	4,970,004.06	82.6	2.0	40.0	37.9	Yes
M	Noise Sensitive Point 13	413,650.49	4,970,244.25	85.6	2.0	40.0	38.0	Yes
N	Noise Sensitive Point 14	413,435.85	4,970,446.41	84.1	2.0	40.0	35.2	Yes
O	Noise Sensitive Point 15	413,714.61	4,970,676.03	83.2	2.0	40.0	36.3	Yes
P	Noise Sensitive Point 16	413,508.42	4,970,816.57	83.5	2.0	40.0	34.2	Yes
Q	Noise Sensitive Point 17	413,646.24	4,971,129.95	83.1	2.0	40.0	33.6	Yes
R	Noise Sensitive Point 18	413,747.55	4,971,436.65	85.6	2.0	40.0	32.8	Yes
S	Noise Sensitive Point 19	413,976.14	4,971,800.20	82.0	2.0	40.0	32.8	Yes
T	Noise Sensitive Point 20	414,459.90	4,971,926.48	83.1	2.0	40.0	35.4	Yes
U	Noise Sensitive Point 21	414,640.55	4,971,962.01	85.5	2.0	40.0	37.1	Yes
V	Noise Sensitive Point 22	414,684.38	4,972,679.14	83.5	2.0	40.0	35.1	Yes
W	Noise Sensitive Point 23	414,672.07	4,972,743.27	84.6	2.0	40.0	34.6	Yes
X	Noise Sensitive Point 24	414,187.12	4,972,190.12	85.2	2.0	40.0	33.2	Yes
Y	Noise Sensitive Point 25	413,583.93	4,968,931.86	83.7	2.0	40.0	35.0	Yes
Z	Noise Sensitive Point 26	414,622.02	4,972,486.69	82.8	2.0	40.0	35.7	Yes

Distances (m)

NSA	WTG																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
A	3563	2598	1102	1688	2187	2620	2529	2649	2831	2965	3473	3611	5218	5173	5599	5969	6347	6900	6567	5283	4860	5132
B	4130	3087	1247	1920	2398	2900	2563	2169	2548	2396	2990	3059	5954	5901	6307	6677	7054	7570	7244	5939	5520	5818
C	6061	4973	3399	3666	3771	4209	3303	1561	2201	1070	1231	799	8631	8505	8733	9085	9434	9688	9420	8072	7708	8125
D	6649	5545	3854	4202	4361	4824	3936	2150	2864	1651	1938	1509	9120	9009	9273	9631	9987	10282	10005	8654	8280	8682
E	6617	5512	3819	4169	4330	4794	3908	2121	2838	1622	1920	1492	9085	8974	9240	9597	9953	10251	9973	8622	8247	8649
F	6452	5344	3636	3996	4167	4637	3757	1965	2703	1470	1822	1403	8903	8794	9064	9423	9780	10085	9806	8455	8078	8476
G	6347	5238	3521	3887	4064	4538	3663	1869	2620	1377	1766	1357	8788	8680	8953	9312	9670	9980	9699	8348	7970	8367
H	6274	5164	3438	3810	3993	4470	3600	1806	2567	1318	1738	1337	8705	8598	8874	9233	9592	9907	9625	8274	7895	8289
I	6037	4922	3168	3561	3765	4253	3399	1612	2405	1149	1670	1309	8433	8330	8616	8976	9337	9667	9381	8031	7648	8037
J	5956	4840	3069	3475	3691	4183	3340	1562	2367	1117	1681	1340	8332	8231	8522	8884	9245	9585	9296	7947	7561	7947
K	5914	4797	3011	3430	3655	4152	3317	1550	2363	1122	1713	1387	8272	8173	8469	8831	9194	9541	9251	7901	7514	7897
L	5562	4451	2738	3097	3284	3767	2910	1124	1923	673	1278	991	8004	7893	8163	8522	8880	9195	8912	7561	7181	7577
M	5386	4271	2522	2908	3120	3615	2781	1028	1851	657	1346	1126	7789	7683	7963	8323	8683	9016	8728	7378	6994	7383
N	5462	4343	2529	2972	3225	3734	2934	1244	2071	933	1637	1419	7783	7687	7992	8355	8719	9082	8788	7440	7049	7425
O	5106	3987	2168	2614	2880	3393	2615	1020	1826	851	1578	1454	7425	7328	7631	7994	8358	8724	8429	7081	6689	7064
P	5221	4102	2238	2731	3027	3549	2801	1263	2059	1094	1822	1677	7467	7379	7702	8067	8434	8825	8525	7181	6784	7147
Q	4960	3845	1949	2481	2813	3342	2649	1302	2034	1263	1976	1896	7148	7065	7401	7767	8136	8548	8243	6903	6502	6856
R	4746	3638	1717	2293	2663	3196	2569	1442	2092	1498	2184	2152	6864	6787	7138	7505	7876	8311	8001	6667	6261	6604
S	4406	3312	1380	2004	2419	2949	2421	1626	2142	1792	2425	2455	6449	6378	6742	7111	7484	7941	7626	6299	5888	6219
T	3908	2812	880	1513	1944	2470	2011	1609	1934	1902	2436	2552	6010	5928	6273	6641	7012	7453	7141	5809	5401	5740
U	3725	2628	696	1331	1769	2292	1864	1630	1875	1963	2454	2600	5856	5770	6106	6473	6843	7276	6966	5632	5225	5568
V	3510	2492	828	1456	1956	2416	2253	2347	2519	2678	3169	3318	5338	5278	5672	6042	6418	6930	6604	5300	4881	5179
W	3513	2506	880	1498	1998	2452	2307	2411	2583	2739	3233	3381	5307	5249	5650	6020	6397	6917	6590	5289	4869	5162
X	4094	3025	1127	1794	2255	2769	2371	1921	2305	2158	2743	2820	6034	5970	6352	6722	7096	7582	7262	5944	5529	5844
Y	6251	5173	3645	3885	3966	4387	3474	1775	2353	1299	1329	901	8859	8727	8942	9291	9638	9870	9608	8262	7904	8328
Z	3604	2560	773	1435	1927	2410	2171	2155	2360	2478	2979	3121	5511	5444	5826	6196	6570	7064	6741	5428	5012	5321

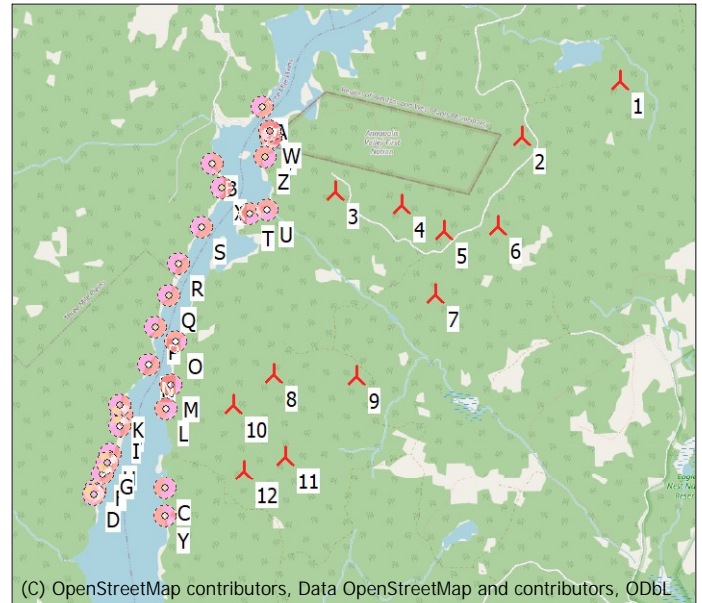
DECIBEL - Main Result

Calculation: Ellershouse - Low Frequency - EA - April 2023

Noise calculation model:
 Finland Low frequency
 Wind speed (in 10 m height):
 Highest noise value at receptor
 Spectral distribution:
 From 20.0 Hz to 200.0 Hz
 Meteorological coefficient, CO:
 0.0 dB
 Type of demand in calculation:
 1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
 Noise values in calculation:
 All noise values are mean values (Lwa) (Normal)
 Pure tones:
 Pure tone penalty is subtracted from demand
 Model: 5.0 dB(A)
 Height above ground level, when no value in NSA object:
 4.0 m; Don't allow override of model height with height from NSA object
 Uncertainty margin:
 0.0 dB; Uncertainty margin in NSA has priority
 Deviation from "official" noise demands. Negative is more restrictive,
 positive is less restrictive.:
 0.0 dB(A)

All coordinates are in
 UTM (north)-NAD83(NSRS/CSRS) (US+CA GPS meas. at curr. year), GRS80 Zone: 20

All coordinates are in
 UTM (north)-NAD83(NSRS/CSRS) (US+CA GPS meas. at curr. year), GRS80 Zone: 20



WTGs

Easting	Northing	Z	Row data/Description	WTG type			Power, rated	Rotor diameter	Hub height	Noise data		First wind speed [m/s]	LwaRef [dB(A)]	Last wind speed [m/s]	LwaRef [dB(A)]
				Valid	Manufact.	Type-generator				Creator	Name				
		[m]				[kW]	[m]	[m]							
1	418,156.00	4,973,195.00	149.8 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
2	417,176.34	4,972,653.90	158.5 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
3	415,313.25	4,972,140.31	140.2 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
4	415,970.85	4,971,996.91	160.2 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
5	416,394.34	4,971,730.32	178.5 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
6	416,925.09	4,971,775.28	196.6 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
7	416,294.94	4,971,103.42	168.1 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
8	414,674.74	4,970,332.25	176.5 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
9	415,501.15	4,970,296.52	180.5 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
10	414,272.78	4,970,033.35	160.1 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
11	414,780.00	4,969,512.00	170.1 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f
12	414,367.25	4,969,376.19	166.3 NORDEX N163/5.9 5900 ...Yes	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2 f

f) From other hub height

Calculation Results

Sound level

No.	Name	Easting	Northing	Z	Immission height	Most critical demand			WTG noise	Demands fulfilled ?
						Frequency	Noise	Noise		
				[m]	[m]	[Hz]	[dB]	[dB]	Noise	
A	Noise Sensitive Point 1	414,599.05	4,972,980.09	84.7	4.0	100.0	43.0	28.8	Yes	
B	Noise Sensitive Point 2	414,098.36	4,972,423.26	84.4	4.0	100.0	43.0	28.5	Yes	
C	Noise Sensitive Point 3	413,585.25	4,969,213.84	86.6	4.0	100.0	43.0	31.2	Yes	
D	Noise Sensitive Point 4	412,874.67	4,969,155.67	83.2	4.0	100.0	43.0	27.3	Yes	
E	Noise Sensitive Point 5	412,886.71	4,969,191.81	85.0	4.0	100.0	43.0	27.4	Yes	
F	Noise Sensitive Point 6	412,964.03	4,969,364.60	84.0	4.0	100.0	43.0	28.0	Yes	
G	Noise Sensitive Point 7	413,014.08	4,969,473.99	84.8	4.0	100.0	43.0	28.4	Yes	
H	Noise Sensitive Point 8	413,042.81	4,969,558.87	83.1	4.0	100.0	43.0	28.6	Yes	
I	Noise Sensitive Point 9	413,141.04	4,969,834.91	83.5	4.0	100.0	43.0	29.3	Yes	
J	Noise Sensitive Point 10	413,158.45	4,969,955.48	82.9	4.0	100.0	43.0	29.4	Yes	
K	Noise Sensitive Point 11	413,151.26	4,970,044.26	83.7	4.0	100.0	43.0	29.3	Yes	
L	Noise Sensitive Point 12	413,600.11	4,970,004.06	82.6	4.0	100.0	43.0	32.4	Yes	
M	Noise Sensitive Point 13	413,650.49	4,970,244.25	85.6	4.0	100.0	43.0	32.4	Yes	
N	Noise Sensitive Point 14	413,435.85	4,970,446.41	84.1	4.0	100.0	43.0	30.5	Yes	
O	Noise Sensitive Point 15	413,714.61	4,970,676.03	83.2	4.0	100.0	43.0	31.4	Yes	

To be continued on next page...

DECIBEL - Main Result

Calculation: Eilershouse - Low Frequency - EA - April 2023

...continued from previous page

Noise sensitive area				Most critical demand			Predicted sound level	Demands fulfilled ?	
No.	Name	Easting	Northing	Z	Immission height	Frequency	Noise	WTG noise	Noise
				[m]	[m]	[Hz]	[dB]	[dB]	
P	Noise Sensitive Point 16	413,508.42	4,970,816.57	83.5	4.0	100.0	43.0	29.9	Yes
Q	Noise Sensitive Point 17	413,646.24	4,971,129.95	83.1	4.0	100.0	43.0	29.6	Yes
R	Noise Sensitive Point 18	413,747.55	4,971,436.65	85.6	4.0	100.0	43.0	29.1	Yes
S	Noise Sensitive Point 19	413,976.14	4,971,800.20	82.0	4.0	100.0	43.0	30.8	Yes
T	Noise Sensitive Point 20	414,459.90	4,971,926.48	83.1	4.0	100.0	43.0	31.9	Yes
U	Noise Sensitive Point 21	414,640.55	4,971,962.01	85.5	4.0	100.0	43.0	30.4	Yes
V	Noise Sensitive Point 22	414,684.38	4,972,679.14	83.5	4.0	100.0	43.0	30.0	Yes
W	Noise Sensitive Point 23	414,672.07	4,972,743.27	84.6	4.0	100.0	43.0	29.3	Yes
X	Noise Sensitive Point 24	414,187.12	4,972,190.12	85.2	4.0	100.0	43.0	30.1	Yes
Y	Noise Sensitive Point 25	413,583.93	4,968,931.86	83.7	4.0	100.0	43.0	30.8	Yes
Z	Noise Sensitive Point 26	414,622.02	4,972,486.69	82.8	4.0	100.0	43.0	30.8	Yes

*)Spectral distribution, please see details in report "Detailed results"

Distances (m)

NSA	WTG											
	1	2	3	4	5	6	7	8	9	10	11	12
A	3563	2598	1102	1688	2187	2620	2529	2649	2831	2965	3473	3611
B	4130	3087	1247	1920	2398	2900	2563	2169	2548	2396	2990	3059
C	6061	4973	3399	3666	3771	4209	3303	1561	2201	1070	1231	799
D	6649	5545	3854	4202	4361	4824	3936	2150	2864	1651	1938	1509
E	6617	5512	3819	4169	4330	4794	3908	2121	2838	1622	1920	1492
F	6452	5344	3636	3996	4167	4637	3757	1965	2703	1470	1822	1403
G	6347	5238	3521	3887	4064	4538	3663	1869	2620	1377	1766	1357
H	6274	5164	3438	3810	3993	4470	3600	1806	2567	1318	1738	1337
I	6037	4922	3168	3561	3765	4253	3399	1612	2405	1149	1670	1309
J	5956	4840	3069	3475	3691	4183	3340	1562	2367	1117	1681	1340
K	5914	4797	3011	3430	3655	4152	3317	1550	2363	1122	1713	1387
L	5562	4451	2738	3097	3284	3767	2910	1124	1923	673	1278	991
M	5386	4271	2522	2908	3120	3615	2781	1028	1851	657	1346	1126
N	5462	4343	2529	2972	3225	3734	2934	1244	2071	933	1637	1419
O	5106	3987	2168	2614	2880	3393	2615	1020	1826	851	1578	1454
P	5221	4102	2238	2731	3027	3549	2801	1263	2059	1094	1822	1677
Q	4960	3845	1949	2481	2813	3342	2649	1302	2034	1263	1976	1896
R	4746	3638	1717	2293	2663	3196	2569	1442	2092	1498	2184	2152
S	4406	3312	1380	2004	2419	2949	2421	1626	2142	1792	2425	2455
T	3908	2812	880	1513	1944	2470	2011	1609	1934	1902	2436	2552
U	3725	2628	696	1331	1769	2292	1864	1630	1875	1963	2454	2600
V	3510	2492	828	1456	1956	2416	2253	2347	2519	2678	3169	3318
W	3513	2506	880	1498	1998	2452	2307	2411	2583	2739	3233	3381
X	4094	3025	1127	1794	2255	2769	2371	1921	2305	2158	2743	2820
Y	6251	5173	3645	3885	3966	4387	3474	1775	2353	1299	1329	901
Z	3604	2560	773	1435	1927	2410	2171	2155	2360	2478	2979	3121

APPENDIX P
PROJECT TEAM CURRICULUM VITAE

PROFESSIONAL ASSOCIATIONS

- Environmental Services Association of Nova Scotia (ESANS)
- Canadian Land Reclamation Association (former Board Member)
- Halifax Chamber of Commerce
- OTANS member

AREAS OF SPECIALIZATION

- Project Management
- Environmental Impact Assessment
- Public and Regulatory Consultation
- Permitting
- Infrastructure Planning and Construction
- Environmental Management System
- Natural Resource Inventories

EDUCATION

- BSc., McGill University, Montreal (1990)

TRAINING

- M.Eng. (pending), University of New Brunswick, Fredericton
- CEEA Screening Training
- Contaminated Sites Assessment and Clean-up
- EMS and Project Planning
- Conflict Management and Dispute Resolution
- Project Management Bootcamp, 2007
- ISO 14001 Orientation

RELEVANT EXPERIENCE

Mr. Duncan is the President of Strum Consulting based in Bedford Nova Scotia. Shawn has also worked for both provincial and federal government departments, as well as having senior environmental experience in the private sector for the oil and gas industry. He has worked professionally in the environmental field throughout Canada and internationally for over 30 years. His areas of specialization include project planning and management, environmental impact assessment, infrastructure planning and construction, public consultation and regulatory support.

REPRESENTATIVE PROJECTS AND ROLES

NATURAL RESOURCE INVENTORIES AND SURVEYS:

Environmental Effects Monitoring Programs, Paper Mills, NB – Project Manager: Involved in the development, design, and implementation of EEM programs for five pulp mills that were required under federal regulations. These programs were multi-year in scope and involved both freshwater and marine systems.

Assessment of Downstream Fish Migration, NB – Field Coordinator: Involved in the study of the downstream migration patterns of juvenile blue-backed herring and alewife on the St. John River.

Fish Habitat Assessments, NS, NB – Program Manager: Coordinated a fish habitat assessment program that assessed over 500 watercourses that intersected a proposed pipeline corridor, in support of the EIA and provincial and federal permitting.

Aerial Moose Survey, NB – Program Manager: Managed and conducted a provincial aerial winter survey for moose, using helicopter.

Development of Watershed Management Plan, Keswick River, NB – Program Manager: Developed a watershed management plan for the Keswick River System in conjunction with the federal Department of Fisheries and Oceans.

Numerous Fisheries and Aquatic Habitat Surveys, NS, NB – Project Manager: Coordinated a number of freshwater fisheries and aquatic habitat surveys throughout the Atlantic provinces to provide baseline and monitoring data for a number of projects and developments.

Identification of Fish Habitat Improvement Opportunities, NB – Project Manager: Identified particularly beneficial opportunities for fish habitat improvement in New Brunswick, and determined strategies for project implementation.

Development of Fisheries Management Plans, Recreational Fisheries Developments, NB – Technical Support: Involved in the preparation of fisheries management plans to provide improved recreational salmonid fishing on private landholdings.

Tropical Ecology, Bellairs Institute, Barbados – Field Assistant: Attended a field course on tropical ecology and participated in research surveys of mangrove environments, reef ecosystems, and marine fisheries.

Fish Behavioural Study, St. Andrews, NB – Field Assistant: Conducted a two-month study underwater survey to observe the behaviour of juvenile Pollock under induced threat from predation.

Marine Benthic Habitat Surveys, NS, NB – Field Assistant: Conducted a number of marine benthic habitat and sampling surveys for the federal government to support dredging or wharf construction activities.

ENVIRONMENTAL ASSESSMENTS:

Sydney Tar Ponds Environmental Impact Statement, Sydney, NS – Manager: Mr. Duncan managed the EIS for the cleanup, which involved managing a large team of professionals, working closely with the proponent and their engineering consultant to prepare the 7-volume EIS for submission to federal and provincial regulators. Components included public and regulatory consultation, environmental baseline field work and human and ecological risk assessments. He also provided testimony during the three week public hearing process as part of a joint review panel.

Environmental Impact Assessment, Keltic Petrochemical and LNG Facilities, NS – Project Manager: Mr. Duncan acted as Project Manager for the preparation of a provincial EIA and a federal CSR for this combined petrochemical and LNG project. Managed a large consulting team and coordinated consultation with the public, stakeholders, and the regulatory agencies. Shawn also acted as panel lead at the 8-day provincial hearings that were part of the NS review process.

Fundy Tidal Energy Project, NB – Senior Technical Reviewer: Mr. Duncan provided senior technical input and senior review for the combined federal and provincial EA that was required as part of the Fundy Tidal Energy Project.

Environmental Assessment, NB DoT, Route #11, NB – Senior Reviewer: Mr. Duncan acted as the senior reviewer for a provincial EA for a new 4 lane highway in northern NB. This Project also included compliance with the federal CEA Act and required a number of natural resource surveys.

Federal Comprehensive Study Report, Hamilton Harbour Clean-up, ON – Project Manager: Mr. Duncan was the Project Manager and Senior Technical Reviewer for the federal CSR that was required as part of the Randle Reef Project in Hamilton Harbour.

Environmental Impact Assessment, 25 MW Windfarm, Canso, NS – Project Manager: Mr. Duncan conducted the environmental impact assessment for a windfarm and associated infrastructure. Components included public and regulatory consultation, environmental baseline field work, turbine site selection, and environmental impact assessment.

Joint Federal-Provincial Environmental Assessment (Comprehensive Study) for the Black Point Quarry Project, Erdene Resource Development Corp, NS – Project Director: Mr. Duncan was the Project Director responsible for senior review and client management for the environmental assessment project and EA scoping; scoping and coordination of field studies; regulatory and public consultation plans; and report preparation.

Environmental Impact Assessment, Power Generating Facilities, Barbados – Project Manager: Mr. Duncan was the Project Manager for the environmental impact assessment for a 250 MW power production facility and associated transmission line. Options that were considered for the facility fuel design included low-speed diesel engines and natural gas engines. Components included public and regulatory consultation, environmental baseline field work, and environmental impact assessment.

Environmental Assessment, Maritimes & Northeast Pipeline, Mainline Expansion, NS, NB – Project Manager: Mr. Duncan provided project management and development of the federal CEEA screenings for four compressor stations. This involved detailed site selection, field surveys and public, regulatory, and First Nations consultation programs.

Environmental Impact Assessment, Terminal and Pipeline Facilities, Barbados – Project Manager: Mr. Duncan prepared the EIA for a petroleum terminal facility and associated transmission pipelines. The existing bulk storage facilities were relocated from a coastal location in Oistins to a location near the airport. Components included public and regulatory consultation, environmental baseline field work, and pipeline route selection.

Environmental Impact Assessment, Windfarm, Barbados – Project Manager: Mr. Duncan conducted the Environmental Impact Assessment for a windfarm near Lamberts, Barbados. The project consisted of eleven 900 kW wind turbines. The EIA included public and regulatory consultation, environmental baseline field work, and environmental impact assessment.

Environmental Impact Assessment, Prison Facility, Barbados – Project Manager: Mr. Duncan prepared the Environmental Assessment for a new prison facility in Dodds, St. Philip. The previous prison was destroyed by fire and therefore there was an accelerated timeline to build a new facility to house the inmates. The EIA was completed ahead of schedule.

Environmental Impact Assessment, Natural Gas Pipeline Route, Country Harbour, Nova Scotia to St. Stephen, New Brunswick – Assessor: Mr. Duncan participated in the technical aspects of the corridor selection and environmental impact assessment of a 558 km pipeline, which included providing input on the definition of VECs, prediction of environmental effects, identification and analysis of design and route alternatives, socioeconomic impacts, contingency planning and compensation.

ENERGY RELATED EXPERIENCE:

Regulatory Support and Joint Public Review, Sable Offshore Energy and Maritimes & Northeast Pipeline – Technical Support: Mr. Duncan participated in, and provided environmental support to expert witness panel members testifying before a Joint Public Review Panel which included representatives of the National Energy Board.

Detailed Route Assessment and Hearings Maritimes & Northeast Pipeline – Technical Support: Mr. Duncan conducted a detailed analysis for the routing of the detailed 25 m easement for the mainline 30-inch pipeline. He also provided technical support for a detailed regulatory review of this easement through a NEB panel review process.

Environmental Protection Plan, Maritimes & Northeast Pipeline – Management/Technical Support: Mr. Duncan provided management and technical support for the development of an environmental protection plan for construction of 550 km of 30 inch natural gas transmission pipeline. Construction practices and protection measures were outlined in the EPP which would minimize potential impacts to the receiving environment.

Maritimes & Northeast Pipeline – Construction Supervisor: For the construction of the M&NP mainline and the Halifax lateral, Mr. Duncan fulfilled the role of construction supervisor. He provided supervision of a team of 20 environmental inspectors to oversee the implementation of environmental commitments and regulatory requirements during construction activities.

Duke Energy, Environment, Health and Safety Audit, Natural Gas Distribution and Processing Facilities, Fort Nelson, British Columbia, and Northwestern Ontario – Lead Assessor: Mr. Duncan conducted an EH&S compliance audit of distribution pipeline facilities in Ontario, and a gas processing facility in Fort Nelson. He verified compliance with applicable provincial and federal legislation and/or permits related to environmental and health and safety requirements for these types of facilities.

Comprehensive Study, Halifax Lateral, Maritimes & Northeast Pipeline – Management/Technical Reviewer: Mr. Duncan provided management support and technical review of a comprehensive EIA for the construction and operation of 120 km of 12 inch natural gas pipeline into Halifax. Shawn also acted as the construction supervisor to oversee the implementation of required environmental measures.

Pipeline Evaluation and Coastal Mapping, Orimulsion Pipeline, NB – Project Manager: Mr. Duncan was involved in the evaluation of an Orimulsion pipeline and the development of a coastal mapping for use in contingency and spill response planning for the transportation of Orimulsion. The Orimulsion was being transported to the NB Power generating station in Dalhousie New Brunswick.

ENVIRONMENTAL MANAGEMENT:

Sydney Tar Ponds Remediation – Project Director and Regulatory Manager: Mr. Duncan fulfilled these senior roles during the Detailed Design of the Sydney Tar Ponds Clean-up and for the ongoing Construction Administration and Oversight for this Project.

Inventory of Fish Processing Facilities, Environment Canada, Atlantic Provinces – Project Manager: Managed a project that compiled and evaluated data and information of fish processing facilities in the Maritimes with the intent to evaluate waste treatment procedures for these operations.

Acid Rock Mitigation and Construction Response Plan, Maritimes & Northeast Pipeline – Technical Support: Participated in the development and implementation of a unique approach to the handling of acid rock during the planning and construction of the pipeline. A construction response plan (CRP) was developed in conjunction with regulators that addressed the identification, handling, and disposal of acid rock encountered during construction. In addition, the CRP outlined mitigation and risk analysis procedures that were developed for treatment of acid rock to be left on-site.

Environmental Evaluation and Management, Canadian International Development Agency, India – Technical Support: Assisted CIDA and the government of India in identifying hazardous waste streams and developing treatment strategies.

Environmental Sensitivity Atlas, Baie de Chaleur, NB – Assessor: Collected environmental information for the Baie de Chaleur region and used it to produce environmental sensitivity mapping for the region to support spill response planning.

Inland Waters and Coastal Oceanographic Information Network, NB – Technical Support: Provided technical support for a project to develop and apply an environmental information system for the Bay of Fundy and Chaleur Bay regions. The system combines metafiles, a knowledge-based system and a geographical information system. It is used both for EIAs of proposed projects and contingency planning and to identify development opportunities.

Corporate EMS, Industrial Client – Project Manager: Developed and provided implementation guidance for a corporate environmental management system that closely followed the requirements as set out in the ISO 14001 CSA standard.

Environmental Performance Evaluation Training, India – Technical Support: Provided technical input and conducted training to environmental professionals in India to provide an overview of EPE and the requirements under the ISO 14031 CSA standard.

Wilderness Recreation Potential Assessment, Halifax, NS – Project Manager: Prepared an assessment of the potential for wilderness recreational use of a forest area that will be bisected by the proposed Highway #113.

AREAS OF SPECIALIZATION

- Project Management
- Environmental Assessment
- Ecological Assessment
- Habitat Assessment
- Regulatory Permitting, Monitoring, and Compliance Assessments
- Environmental Protection Plans
- Wetland/Watercourse Alterations
- Wetland and Fish Habitat Compensation

RELEVANT EXPERIENCE

Ms. Smith is the Vice President of Environmental Assessments and Approvals. She has a strong background in a variety of environmental program and policy areas. Ms. Smith has extensive experience leading teams, as well as building relationships and communicating with the public, regulators, the Mi'kmaq of Nova Scotia, clients, experts, and other stakeholders.

Prior to her appointment as Vice President of Environmental Assessments and Approvals at Strum, Ms. Smith held a Team Lead position with the Impact Assessment Agency of Canada. That role included the following:

- Led a team of professionals in completing federal environmental and impact assessments to support the Minister in decision making.
- Managed all aspects of assembling project teams, executing priorities, performance, deliverables, and overall quality.
- Supported the team in conducting Indigenous consultation, coordinating with federal and provincial departments, communicating with proponents, and engaging with stakeholders.
- Supported the team in the technical review of regulatory submissions under the *Canadian Environmental Assessment Act, 2022* and the *Impact Assessment Act*.
- Advised senior Agency officials on complex regulatory considerations.

Ms. Smith also held multiple roles with Nova Scotia Environment which included the following responsibilities:

- Led the development, management, and implementation of the Risk-Based Audit Project. The purpose of this corporate priority project was to modernize inspection services by using risk to maximize the allocation of limited resources while fulfilling the Department's mandate.
- Conducted extensive cross-sector collaboration within the Department, including all regions, inspectorates, divisions, and staff levels to ensure the project met the needs of working level staff and the goals of senior management.
- Provided strategic policy support and analysis for departmental programs and policies using the Regulatory Management Process.
- Conducted focus group sessions, coordinated stakeholder consultation, and provided recommendations to senior management.
- Completed inspections, responded to complaints, reviewed applications, and generated approvals related to the protection and sustainable use of air, land, and water resources in NS.

EDUCATION

- MES, Dalhousie University, Halifax, NS (2004)
- BSc. (Honours), Environmental Science, Acadia University, Wolfville, NS (2001)

TRAINING

- GBA+ Micro-learning Series (2022)
- Cultural Safety (2021)
- Unconscious Bias (2021)
- Emergency First Aid (2021)
- Management Development Program (2019)
- Advanced Training, *Impact Assessment Act* (2019)
- Introduction to CEAA 2012 (November 2012)
- Water Management & Wetland Restoration Training Course, University of Guelph (2010)
- Screenings Under CEAA (2010)
- Aboriginal Relations Training (Ontario Ministry of the Environment) (2008)
- Negotiation and Mediation Training (Ontario Public Service) (2008)
- Orientation to CEAA (2007)
- Atlantic RBCA Applications (Dalhousie University) (2004)
- Management of Environmental Site Assessment (Dalhousie University) (2004)

At Strum, Ms. Smith previously held progressive management roles including acting as the Team Lead during a long-term secondment of a senior manager and managed all aspects of a variety of projects within the Environment Group, including environmental assessments, watercourse alteration applications, wetland alteration applications, wetland compensation, environmental protection plans, environmental monitoring, and ecological assessments. This also included successfully and simultaneously managing multiple provincial Environmental Assessments. Ms. Smith also has extensive experience creating budgets, schedules, staff resourcing and supervision, deliverables, and client communication. She has presented at public open houses, community liaison committee meetings, public hearings, and testified at a UARB hearing.

REPRESENTATIVE PROJECTS AND ROLES

Strum Consulting (current)

Wind Power Environmental Assessments, 2022-2023 – Project Manager/Team Lead: Providing senior review and management on several 100 MW+ wind farms in Nova Scotia.

Impact Assessment Agency

Boat Harbour Remediation Project, 2018-2022 – Team Lead: Team Lead for the Agency's technical review of this project, as well as associated consultation with the Mi'kmaq of Nova Scotia and public engagement. This project conducted the Agency's first external technical review as part of the process.

Beaver Dam Mine Project, Fifteen Mile Stream Project, 2017-2022– Team Lead: Team Lead for the Agency's technical review of these gold mining projects, as well as associated consultation with the Mi'kmaq of Nova Scotia and public engagement.

Canso Space Port, Northern Pulp Replacement Effluent Treatment System, Touquoy Mine Expansion, Goldboro Gold Mine, 2017-2021 – Team Lead: Team Lead for requests to the Minister for these projects to be subject to the *Impact Assessment Act*. Review and analysis involved input from federal departments and a decision package to the Minister.

Howse Property Iron Mine Project, 2018– Team Lead: Team Lead for the Minister's decision package for the Howse Property Iron Mine.

Strum Consulting (past)

Wind Power Environmental Assessments, 2011-2014 – Project Manager/Team Lead: Project managed and coordinated all aspects of the provincial EA process for seven wind power projects ranging in size from 4 MW to 10 MW. Project components included wetlands, watercourses, wildlife, avifauna, bats, sound, shadow flicker, visual aesthetics, socio-economic conditions, and effects assessment. Also highly involved in public engagement activities including participation at several municipal planning meetings and project open houses, as well as the preparation of presentation materials (e.g. posters, handouts, etc.).

South Canoe Wind Project, 2011-2013 – Project Manager/Team Lead: Project managed and coordinated the completion of numerous desktop and field studies in support of a 100 MW wind power project. Studies included exclusion mapping; a desktop review of site habitat, species at risk (including flora, fauna, and avian species), and archaeological resources; a sound and shadow flicker assessment; a visual impact assessment; and field assessment for wetlands, watercourses, wildlife, and avian species. Managed the launch of the project website and completed the effects assessment for the biophysical components of the provincial environmental assessment registration document. Also developed presentation materials for and attended three public open houses and delivered multiple technical presentations to the Community Liaison Committee and as part of the Development Agreement Public Hearing process.

CEAA Screening, Hansen Bridge Replacement, 2012 – Project Manager: Project managed field assessments (stream assessment, archaeological surveys, and habitat characterization), desktop review, and effects assessments for a bridge replacement project under CEAA. Consulted with Nova Scotia Environment, Transport Canada (TC), and DFO to ensure all regulatory requirements were met.

AREAS OF SPECIALIZATION

- Project Management
- Environmental Assessment
- Technical Program Development
- Wetland and Watercourse Alteration Permitting
- HADD Projects and DFO Authorizations

RELEVANT EXPERIENCE

Mr. Dickey is the Manager of Environmental Sciences at Strum where he oversees the company's Environmental Science Group in conducting environmental assessments, research, and field assessment programs, as well as wetland and watercourse permitting projects.

Mr. Dickey joined the Strum team in 2012. He received his Masters of Resource and Environmental Management degree from Dalhousie University that same year. While studying at Dalhousie, Scott specialized in environmental assessment, project management, regulatory compliance management, and natural resource management. Scott also obtained a Bachelor of Science degree with Honours from Mount Saint Vincent University in 2009.

Scott is active in managing consulting projects, conducting environmental assessments, overseeing wetland and watercourse alteration applications, and Fisheries and Oceans Canada (DFO) authorizations. He is knowledgeable with provincial and federal approvals processes, as well as best industry practices for assessment and data collecting protocols. Scott is also a technical specialist in a number of specialized areas such as acoustic assessments and compliance consulting, avian radar assessments, environmental ecology, and environmental geomatics systems.

REPRESENTATIVE PROJECTS AND ROLES

Various Wind Power Projects, NS, 2020-Present, Environmental Scientist – Coordinated and led the environmental assessment of several large (> 50 MW) wind power projects. This included the development of new services such as avian radar assessments, the coordination of several environmental research and assessment programs, regulatory consultation, and the coordination of the data analysis and technical reporting programs.

L8005 Transmission Line Project, NS, 2020-2022, Environmental Scientist – Managed and conducted several component studies as part of this transmission line project's environmental assessment, including an avifauna interaction study, wetland, watercourse and rare plant studies, and a Mainland Moose study.

Chaswood Wetland Compensation Project, NS, 2020-2022, Environmental Scientist – Identified, conceptualized, and developed a wetland expansion and enhancement project located near Chaswood, NS.

Melford Atlantic Gateway Terminal Project, NS, 2016-2022, Environmental Scientist – Managed and conducted several component studies, permitting programs, and prepared environmental management plans for this marine terminal project. This included conducting a wetland and watercourse assessment and obtaining alteration approvals for several dozen hydraulic features; preparing environmental management plans for the Project's construction and operation; and consulting with regulators and other stakeholders on the Project's regulatory requirements.

Boat Harbor Remediation Project, NS, 2021, Environmental Scientist – Researched, designed, and installed mitigations to improve water quality and reduce fish mortalities at the Boat Harbor remediation site.

EDUCATION

- Masters of Resource and Environmental Management (MREM) - Dalhousie University, Halifax, NS (2012)
- Bachelor of Science (Honours in Biology) - Mount Saint Vincent University, Halifax, NS (2009)

TRAINING

- First Aid & CPR Level A - St. John's Ambulance (2021)
- WHMIS Certification - Construction Safety Association of Nova Scotia (2018)
- Project Management for Environmental Professionals - Eco Canada (2013)
- Risk Communication and Conflict Resolution Training - Eco Canada (2013)
- Over 80 Hours of Project Management Coursework - Dalhousie University's Faculty of Management (2010 -2011)

Aulds Cove Avian Assessment, NS, 2015 to 2019, Environmental Scientist – Completed pre- and post-construction avian studies and developed a risk model for the transmission line project which is located in a migratory bird flyway.

Canso Spaceport Environmental Assessment, NS, 2018, Environmental Scientist – Completed ecological assessments including avian assessments, bat assessment, flora and fauna assessments, and wetland and freshwater habitat assessments as part of the Project's Environmental Assessment.

Windsor Forks Wetland Compensation Project, NS, 2014-2018, Environmental Scientist – Contributed to the design and construction of a wetland creation project in which a wetland was created in the site of a quarry near Windsor, NS.

Various Wind Power Project, NS, 2012-2018, Environmental Scientist – Completed environmental assessments, wetland assessments, flora and fauna surveys, avian assessments, and post-construction bird and bat monitoring programs. Projects include, the CBU Wind Power Project, the North Beaverbank Community Wind Project, the Nine Mile River Community Wind Project, the Pockwock Community Wind Project, the Truro Heights / Millbrook Community Wind Project, and the Whynotts Community Wind Project.

South Canoe Wind Project, NS, 2012-2018, Environmental Scientist – Completed wetland assessments, flora and fauna surveys, ambient sound assessments, wind turbine sound warranty test, and assisted in geotechnical assessments.

Canso Causeway Avian Study, NS, 2014-2016, Environmental Scientist – Completed avian studies over several years and developed risk analysis framework and mortality prediction model.

South Canoe Wetland Compensation Research Project, NS, 2014-2016, Environmental Scientist – Completed a comprehensive research project as partial fulfillment of the wetland compensation requirement for the South Canoe Wind Project's wetland alteration. This included a comprehensive assessment and monitoring program of a number of reference wetland sites in Nova Scotia, as well as GIS analysis, vegetation, soil and hydrology data analysis, and reporting for the Project.

Maritime Link Transmission Line Watercourse Assessment, NS, 2013- 2014, Environmental Scientist – The scope of this project included the design and coordination of desktop and field programs to assess watercourse crossings and fish habitat along the footprint of transmission and grounding lines for the purpose of construction planning and permitting. This involved the identification and assessment of watercourses within the 90 km (combined) transmission and grounding line corridors in Cape Breton, as well as all associated site facilities and access roads. Responsible for completing field assessments including fish habitat and fish population assessment, preparation and maintenance of field data, and general communications.

Trenton Generating Station, Benthic and Mixing Zone Studies, NS, 2013, Environmental Scientist – An ecological assessment was completed to evaluate ecosystems in three water bodies, which receive effluents from the Trenton Generating Station's ash management facilities. The assessment incorporated an evaluation of benthic community composition (*i.e.*, benthic macro-invertebrates and macrophytes), as well as a characterization of habitat in the receiving waters. The ecological assessment was completed simultaneously with a mixing zone study, which was designed to provide guidance on determining effluent discharge limits outlined in the Operating Approval for the Trenton Generating Station, by determining concentrations of compliance parameters in the mixing zones of receiving effluent waters. Involved in all aspects of the Project including study design, the coordination and completion of the field programs, water quality sampling and sample management, data management, and reporting.

AREAS OF SPECIALIZATION

- Water Quality Assessments and Monitoring
- Marine Ecology and Biology
- Fish and Fish Habitat Assessments
- Wetland/Watercourse Assessments and Permitting
- Vegetation Surveys
- Environmental Assessment
- Wildlife Assessments

RELEVANT EXPERIENCE

Ms. Mosher is an Environmental Scientist with Strum working in our Environmental Science Group. She has experience working in many aspects of technical projects and environmental assessments, including field surveys, interpretation of analytical results and data, conducting background research, reporting and regulatory permitting.

Ms. Mosher is an experienced field biologist and has conducted water quality sampling, sediment sampling, habitat assessment, and flora and fauna surveys. As a qualified wetland delineator in Nova Scotia, she has delineated numerous wetlands of a variety of habitat types and conducted multiple functional assessments for permitting and constraints assessments. She is knowledgeable of freshwater and marine fish species of the Maritimes and is proficient in fish sampling methodology. She has been active in fish habitat characterization and watercourse assessments and has performed water quality sampling at contaminated and remote sites. She has conducted an intensive study exploring the effect of anthropogenic pollution on terrestrial biogeochemical cycles.

Ms. Mosher has more than 12 years of experience conducting research and assessments in marine ecology. Her experience involves marine fish sampling, water quality assessments, benthic habitat surveys, and investigations into salt marsh communities. Her marine experience comprises projects in both academia and industry, as well as coordinating a stewardship program with coastal ecology community groups.

REPRESENTATIVE PROJECTS AND ROLES

Transmission Line Upgrade Environmental Assessment, NL (2020 - 2021) – Environmental Scientist: Completed a desktop review, assessment of environmental impacts, with special consideration of nearby salmon rivers, and reporting to fulfill the permitting requirements for an environmental assessment release for the upgrade and rebuilding of 60 km of transmission line in Central Newfoundland. Developed an Environmental Protection Plan to mitigate potential environmental impacts during construction as a condition of the EA release.

Substation Upgrades and Transmission Line Construction Environmental Assessment, NL (2020 - 2021) – Environmental Assessment – Environmental Scientist: Completed a desktop review, assessment of environmental impacts, with special consideration of a nearby salmon river, and reporting to fulfill the permitting requirements for an environmental assessment release for the upgrade of a substation, including 2 km of new transmission line, in Central Newfoundland. Developed an Environmental Protection Plan to mitigate potential environmental impacts during construction as a condition of the EA release.

Melford Atlantic Gateway Project, NS (2017 - 2021): Participated in the collection and reporting of supplemental information in support of provincial and federal permitting for the construction of a marine terminal and associate rail line. Field assessments included wetland delineation, rare plant surveys, fish sampling and watercourse assessments.

EDUCATION

- Master of Science (Earth and Atmospheric Sciences) - University of Alberta, Edmonton, AB (2013)
- Bachelor of Science (Hons.) – St. Francis Xavier University, Antigonish, NS (2010)

TRAINING

- Backpack Electrofishing – Canadian Rivers Institute (2017)
- WESP-AC Training Course (2016)
- Pleasure Craft Operator License (2016)
- NSCSA WHMIS (2015)
- Wetland Delineation and Wetland Plant Identification – Fernhill Institute (2013)
- Canada Safety Council Defensive Driving Course (2012)

Prepared applications and supporting documentation for submissions for wetland alteration, watercourse alterations and Fisheries Act applications, including the preparation of compensation and offsetting plans.

Windsor Forks Wetland Compensation Project, NS (2015 – ongoing) – Environmental Scientist: Contributed in the design and construction for the restoration of 10 ha former quarry into wetland habitat.

Wetland Delineation and Permitting, NS (2013 – ongoing) – Environmental Scientist: Completed wetland delineation, functional assessments, and permitting submissions at numerous sites around Nova Scotia. Project included post-construction and pre-construction monitoring, compensation planning, and erosion and sedimentation control plans.

Transmission Line Wetlands, Watercourses and Rare Plants Assessments, NS (2020) – Environmental Scientist: Conducted wetland, watercourse and rare plant surveys along 60 km of transmission line, including data compilation and reporting.

Marine Platform Installation Fisheries Act Application, NS (2020): Prepared an application under Section 35 of the federal *Fisheries Act* related to the harmful alteration, disruption and destruction of fish habitat (HADD) for an infilling project within an active harbour. Work involved a desktop review of the marine environment, interpretation of benthic video footage, and the evaluation of environmental impacts on the marine habitat.

Marine Aquaculture Facility Environmental Assessments, NS (2019 - 2020) – Environmental Scientist: Completed reporting and research for environmental assessment registration documents for 6 marine based aquaculture facilities located throughout coastal Nova Scotia.

Highway Interchange and Connector Road Environmental Screening and Permitting, NS (2018- 2020): Completed wetland delineation, watercourse assessments and fish sampling in support of design and environmental permitting for a new highway interchange and connector road. Prepared an environmental assessment report and supporting documents, and associated wetland permitting.

Lantz Development Wetland Assessments and Permitting, NS (2018 - 2020) – Environmental Scientist: Completed wetland delineation, functional assessments and reporting to fulfill the requirements for a wetland alteration permit in support of two mixed-used residential and commercial developments.

Drinking Water Supply Water Withdrawal Permit Renewal, NS (2018) – Environmental Scientist: Prepared a water withdrawal permit for a drinking water supply, including assessment of environmental impacts and review of water quality data.

Tidal Energy Environmental Assessment, NS (2017 - 2019) – Environmental Scientist: Completed field surveys and report writing for an environmental assessment for a marine tidal energy development. Work completed included benthic invertebrate assessment, marine mammal surveys, interpretation of benthic habitat surveys, wetland delineation and rare plant surveys.

Susie Lake Water Quality Monitoring Program, NS (2016-2018) – Environmental Scientist: Conducted a monthly water quality sampling program at watercourses and lakes adjacent to a busy commercial area and highway. Work included water sampling, interpretation of laboratory results and reporting.

Spaceport Environmental Assessment, NS (2017) – Environmental Scientist: Completed wetland assessments, rare plant surveys, and terrestrial mammal surveys at a remote coastal barren and bog site in Nova Scotia. Involved in the writing and assessment of environmental impacts to the surrounding environment from the development and operation of a rocket launch facility.

Drinking Water Reservoir Dam Replacement Environmental Assessment, NS (2016) – Environmental Scientist: Completed field assessments for vegetation, wetlands, and freshwater mussels. Contributed to the analysis of environmental effects on the surrounding aquatic and terrestrial environment for the replacement of a dam at a drinking water supply reservoir.

Hardwood Lands Community Wind Project Environmental Assessment, NS (2015) – Environmental Scientist: Involved in the completion of desktop research, wetland assessments, rare plant surveys, avian surveys, habitat mapping and moose surveys for a 6 MW wind power project environmental assessment.

Marine Surveys for Wastewater Treatment System Upgrade at a Salmon Hatchery, NB (2015) – Environmental Scientist: Completed desktop and field-based studies into environmental effects of effluent into a coastal bay off the Bay of Fundy. Studies include fish habitat assessment, dispersion modeling, water quality assessment and benthic habitat surveys.

Dam Decommissioning Wetland and Rare Plant Assessments, NS (2015) – Environmental Scientist: Completed wetland delineation, wetland functional assessments, and rare plant surveys at hydroelectric dam sites around Nova Scotia. Assessed the potential impact of dam decommissioning and changing water levels within reservoirs on sensitive environmental features.

Belmont Wetland Compensation, NS (2015 - ongoing) – Environmental Scientist: Concept design, pre-construction ecological monitoring and construction monitoring for the remediation of a former wetland at the Belmont Quarry in Belmont, NS, as part of wetland compensation.

Auld's Cove Transmission Project Avian Assessment, NS (2016) – Environmental Scientist: Conducted nocturnal bird surveys, audio surveys, desktop research and statistical analysis for an extensive avian assessment at the Auld's Cove transmission lines and the Canso Causeway.

Susie Lake Developments Environmental Assessment, NS (2015) – Environmental Scientist: Conducted desktop and field studies, including a mainland moose monitoring program, water quality sampling and socio-economic analysis for a large residential and commercial subdivision.

Safe, Clean Drinking Water Project Environmental Constraints Assessment, NB (2014) – Environmental Scientist: Participated in desktop analysis and field studies identifying environmental constraints for the construction and upgrade of a city-wide drinking water distribution system. Components included wetland delineation, fish sampling, rare plant surveys, fish habitat assessments, reporting and permitting consultation.

Safe, Clean Drinking Water Project Groundwater Site Environmental Assessment, NB (2014) – Environmental Scientist: Participated in the desktop analysis and field studies to determine the environmental baseline condition at the site of three proposed groundwater wells. Field studies included wetland delineation and functional assessment, fish sampling, and fish habitat assessment.

Marine Terminal Expansion Environmental Assessment, NB (2014) – Environmental Scientist: Completed desktop studies, background research and analysis of environmental impacts on marine environmental components including fish habitat, benthic habitat, navigation and marine mammals.

Maritime Link Transmission Line Wetland and Rare Plant Assessment, NL and NS (2013 - 2014) – Environmental Scientist: Conducted field surveys to assess rare plants and wetlands along the footprint of the transmission and grounding lines for the purpose of construction planning and permitting. This involved the identification and functional assessment of wetlands and areas of rare plants along a combined total of 500 km of transmission and grounding line corridor as well as all associated site facilities.

Marine Training Mitigation Measures (2014) – Environmental Scientist: Participated in a desktop analysis to identify environmental impacts of naval at-sea training exercises throughout North America and Europe. This involved the identification of environmental components and potential adverse impacts, and the development of appropriate mitigating measures.

Chebucto Terence Bay Wind Farm Project Environmental Assessment, NS (2014) – Environmental Scientist: Completed desktop studies, background research and analysis of environmental and socio-economic impacts for a 7.2 MW wind farm.

Aboiteau Replacement Fisheries Application, NS (2014) – Field Biologist: Conducted fish sampling and fish habitat assessments and compiled a fisheries application to assess the impact of replacing an existing aboiteau on the local fish population.

Sediment Erosion Control Program, NB (2014) – Environmental Scientist: Conducted statistical analysis to determine the effectiveness of erosion control measures around watercourses at an active military base.

Fish Monitoring Program, NL (2013) – Environmental Scientist: Fish sampling, watercourse assessments and water quality analysis as part of an ongoing fish and fish habitat monitoring program at a highly contaminated military site. Fish tissue was analyzed for contaminant concentration and the resulting trends were analyzed.

AREAS OF SPECIALIZATION

- Field Program Design and Logistics Coordination
- Environmental Assessment
- Wetland Delineation and Functional Assessment
- Watercourse and Wetland Alteration Permitting
- Marine near-shore and Water Quality Monitoring
- Avian Studies
- Regulatory and Public Consultation

RELEVANT EXPERIENCE

Mr. Doane joined the Strum team in 2020 as an Environmental Intern, while working towards his Master of Resource and Environmental Management degree at Dalhousie. While studying at Dalhousie, Angus specialized in natural resource management in Nova Scotia, especially in the coastal zone. Angus obtained his Bachelor of Science degree in 2019 from Mount Allison University, where he specialized in Environmental Chemistry and Microbiology. He completed his honours thesis in organic and inorganic synthesis of maltol-derived thiopyridinone ligands for various environmental and anti-bacterial applications. To complement the lab-based skills associated with research, Angus has experience in field-based collection and preparation of environmental samples from his academic studies.

Mr. Doane is active in conducting environmental assessments, wetland functional assessments, delineations, and compensation projects, completing radar, avian, wetland, watercourse, flora, lichen, and wildlife surveys, and other ecological studies. He has planned and coordinated multi-team fieldwork across large projects in remote locations throughout Nova Scotia. Away from the field, he is knowledgeable with Provincial and Federal approvals and permitting processes and works closely with senior staff to prepare reports and regulatory submissions, as well as prepare materials for, and participate in, public and regulator consultation components for Environmental Assessments. He complements freshwater and marine survey work with deckhand and operator experience in near-shore marine survey projects. Mr. Doane also serves on the Joint Occupational Health and Safety committee as an environmental science team representative. Also, Angus is experienced in working with multi-disciplinary teams through the Dalhousie Faculty of Management, in the Management Without Borders and Tri-Course class-structures, beyond his time with Strum.

Mr. Doane held a previous position with Environment and Climate Change Canada (ECCC) as a water quality technician. He conducted water sampling in many bays, harbours, and estuaries around Nova Scotia from Pubnico to Cape North, dealing with all matters of leading a field crew on a day-to-day basis. This included trailering, launch and recover practices, regular boat, motor, trailer and vehicle maintenance, as well as training and aiding new staff in acclimating to the work. Processing of samples was also completed on a daily basis using the modified A1 method in a level 3 CALA certified microbiology lab.

EDUCATION

- Master of Resource and Environmental Management (MREM) - Dalhousie University, Halifax, NS (2021)
- Bachelor of Science (Honours in Chemistry) - Mount Allison University, Sackville, NB (2019)

TRAINING

- Wetland Ecosystem Service Protocol – Atlantic Canada (WESP-AC) – Maritime College of Forest Technology (2021)
- Wetland Delineation Training – Maritime College of Forest Technology (2020)
- Small Vessel Operator Proficiency “SVOP” and Marine Emergency Duties “MED A3” - Survival Systems Training Limited (2017)
- Wilderness First Aid - St. John’s Ambulance (2022)
- Backpack Electrofishing – Canadian Rivers Institute (2021)
- VHF Radio Restricted Operators Certificate – Industry Canada (2017)

REPRESENTATIVE PROJECTS AND ROLES

Various Wind Farm Project Environmental Assessments, NS – Environmental Scientist/Field Coordinator:

- **Goose Harbour Lake Wind Farm Project, NS, (2021 – Present)**
- **Mersey River Wind Farm Project, NS, (2021 – Present)**
- **Weavers Mountain Wind Farm Project, NS, (2021 – Present)**
- **Ellershouse Wind Farm Project, NS, (2021 – Present)**
- **Apitamkiejit Windfarm, NS, (2021 – 2022)**
- **Blueberry Acres Windfarm, NS, (2021 – 2022)**
- **Panuke Lake Wind Farm, NS, (2021 – 2022)**
- **Melvin Lake Wind Farm Project, NS (2021 – Present)**
- **Sandy Point Wind Farm Project, NS (2021 – 2022)**
- **Higgins Mountain Wind Farm Project, NS, (2020 – Present)**

Coordinated and completed all aspects of field surveys for Environmental Assessments, including wetland, watercourse, fish & fish habitat, avian, avian radar, bat, wildlife, flora, and lichen surveys. Prepared, reviewed, and organized field data using several methods of collection. Prepared materials for and participated in public consultation meetings, as well as aiding in the preparation of materials for public outreach. Led regulatory meetings to brief provincial and federal agencies on project activities. Prepared EA related documents, including methodologies, effects assessments, and desktop reviews.

Avian Radar Studies for Wind Development, NL, 2022 – Present - Environmental Scientist – Aided in the design and construction of avian radar monitoring systems for 4-season deployment in harsh coastal and inland environments in Newfoundland, including siting and remote monitoring.

Ruth Falls Hydroelectric Monitoring, NS, 2021-Present - Project Coordinator/Environmental Scientist:

Completed Swallow nesting/monitoring surveys during the fall 2021 migration period. Designed, coordinated, and conducted a wetland and wetland fish & fish habitat monitoring program considering wetland fish habitat functions.

Melford Atlantic Gateway Terminal Project, NS, 2020-Present – Environmental Scientist: Completed comprehensive research as partial fulfillment of the wetland compensation requirement for the Melford Terminal's wetland alteration. This has included a comprehensive search of potential sites across Antigonish and Guysborough counties based on the precedence of other wetland compensation projects, as well as aiding in the design and implementation of the engineered wetlands to be created. Supported regulatory consultation for watercourse alteration applications and impacts to fish and fish habitat, especially salmonid species.

L8001 and L8005 Transmission Line Project, NS, 2020-2022 – Environmental Scientist/Field Coordinator:

Planned, coordinated and completed Wetland and watercourse assessments, wildlife surveys, and rare plant and lichen surveys, along the linear corridor spanning 100 km from the NS/NB border to Onslow, NS. These surveys involved preparing desktop and safety tools for field staff, as well as preparing reports respective to each of the surveys.

Boat Harbor Remediation Project, NS, 2021, Environmental Scientist – Monitored water quality through seasonal tide cycles, before aiding in the research and installation of mitigations to improve water quality and reduce fish mortalities at the Boat Harbor remediation site.

GWRR Watercourse Alteration Approval and Fish Surveys, NS, 2021 – Environmental Scientist: Conducted electrofishing / fish salvage for an emergency watercourse alteration along a section of railway. This involved the capture, identification, documentation, and release of fish from the impacted section of the watercourse. Conducted further watercourse assessments to aid in the alteration approval process.

Canadian Shellfish Sanitation Plan – Shellfish Water Classification Program, NS, 2017-2019 – Water Quality Technician: Completed three summers of fecal coliform testing of coastal waters around the province of Nova Scotia to aid in the classification of areas for shellfish harvesting. This involved extensive travel, sample collection, processing and overall upkeep of field equipment across a fleet of boats, vehicles, and associated gear. Lab and sample processing work included QA and QC procedures, sample reading, media production, waste management, and sample inoculation.

AREAS OF SPECIALIZATION

- Environmental Reporting and Permitting
- Wetland and Watercourse Assessment
- Wildlife Surveying and Assessment
- Remediation and Reclamation
- Environmental Emergency Response
- Dangerous Goods Assessment

RELEVANT EXPERIENCE

Miss Eichinger first joined the Strum team in 2020 as an Environmental Intern, while working towards her Masters of Resource and Environmental Management degree at Dalhousie. While studying at Dalhousie, Lyndsay specialized in remediation, environmental assessment, and natural resource management in Nova Scotia. Lyndsay also obtained her Bachelor of Science degree in 2019 from the University of British Columbia where she specialized in Earth and Environmental Science with a minor in Economics.

During her graduate studies, Lyndsay conducted a desktop study on the Boat Harbor Remediation Project, producing a technical review paper evaluating the cost-effectiveness of the different remedial components and technologies considered by the project. This paper has since been published in the journal Remediation titled: Review of remedial options for the Boat Harbour remediation project in Nova Scotia, Canada.

Lyndsay is active in conducting environmental assessments, wetland delineations, watercourse assessments, bat surveys, and other ecological studies. She has conducted significant fieldwork across large projects in remote locations. She is knowledgeable with provincial and federal regulations, working closely with senior staff preparing reports and regulatory submissions. Lyndsay is experienced working with multi-disciplinary teams through the Dalhousie Faculty of Management, in the Management Without Borders and Tri-Course class-structures, beyond her time with Strum.

Lyndsay held a previous position with RAM Environmental Response as a HAZMAT Responder based in the BC interior. Her role was fast-paced and multidisciplinary, working in tandem with senior management on emergency response planning and remediation teams on site. Lyndsay has responded to an array of emergency situations involving dangerous goods, such as train derailments and fuel spills, all requiring coordination between clients, contractors, first responders, and government parties. She has a strong background in safety protocols, erosion control implementation, response tactics, and emergency remediation measures for a variety of contaminants. Lyndsay is well practiced in remote travel along with ATV, snowmobile, and 4x4 use.

REPRESENTATIVE PROJECTS AND ROLES

Environmental Assessment Registration and Environmental Protection Plan, NL, 2022 – Junior Environmental Professional: Completed reporting requirements for the submission of an EA Registration Document and associated Environmental Protection Plan for a transmission line decommissioning project located in Newfoundland and Labrador.

Ellershouse Wind Farm Environmental Risk Assessment, NS, 2022 – Junior Environmental Professional: Conducted a desktop study to characterize environmental risk, mitigation, and management measures for a wind farm located in Ellershouse, NS. This report was then used to inform constraints analysis and Project design features.

Windsor Forks Wetland Compensation Project, NS, 2021-2022 – Junior Environmental Professional: Completed reporting requirements for the final year of wetland monitoring and assessment for a constructed wetland.

EDUCATION

- Masters of Resource and Environmental Management (MREM) - Dalhousie University, Halifax, NS (2021)
- Bachelor of Science - University of British Columbia (2019)

TRAINING

- ATV Certification (2022)
- RPAS Pilot Certification (2022)
- BICO – Search and Rescue Program (2022)
- Electrofishing Certification (2021)
- Standard First Aid and WHMIS (2021)
- Stream Gauging Training from UBC (2019).
- Environmental Impact Assessment Certificate received from the Centre for Environmental Assessment Research at UBC (2019).
- Derailment Response - CP Railway (2018)
- Railway Safety Training (2018)
Transportation of Dangerous Goods (2018)

Weavers Mountain Wind Farm Moose Tracking Surveys, NS, 2022 – Junior Environmental Professional:

Participated in field assessments for winter wildlife, with a focus on mainland moose and other species at risk. This involved walking predetermined transects through various habitats to identify and document evidence of wildlife such as tracks, scat, and browsing.

GWRR Watercourse Alteration Approval and Fish Surveys, NS, 2021 – Junior Environmental Professional:

Conducted electrofishing / fish salvage for an emergency watercourse alteration along a section of railway. This involved the capture, identification, documentation, and release of fish from the impacted section of the watercourse.

Mahone Bay Well Installation and Monitoring, NS, 2021 – Junior Environmental Professional: Groundwater well installs were completed at a construction site in Mahone Bay, NS along with vegetation transects to characterize the sites environmental features.

Pirate Harbour Wind Farm Project, NS) 2021-Present – Junior Environmental Professional: Participated in field assessments and Environmental Assessment report writing for a wind farm located in NS. Field surveys were conducted for wildlife, birds, wetlands, and watercourses. Environmental Assessment related documents such as field survey assessments, consultation, and background research were also completed.

Mersey Wind Farm Project, NS, 2021 – Junior Environmental Professional: Participated in field assessments and Environmental Assessment report writing for a wind farm located in NS. Field surveys were conducted for wildlife, birds, wetlands, and watercourses. Environmental Assessment related documents such as field survey assessments, consultation, and background research were also completed.

Melford Atlantic Gateway Project, NS, 2020-Present – Junior Environmental Professional: Completed various reporting and background research requirements such as consultation documents, engagement record keeping, and the development of a wetland compensation plan.

Higgins Mountain Wind Farm Project, NS, 2020-Present – Environmental Technician: Conducted watercourse, wetland, fish/fish habitat, wildlife and avian assessments all contributing to the environmental assessment for the establishment of a windfarm. Involved in Environmental Assessment development, planning, and finalization.

L8001 and L8005 Transmission Line, NS, 2020 – Environmental Technician: Participated in wetland and watercourse assessments, Wildlife surveys, and rare plant and lichen surveys, along the linear corridor spanning 100kms from the NS/NB border to Onslow, NS.

Shellfish Harvesting and the Persistent Threat of Sewage Pollution, NS, 2020 – MREM Tri-course project: Working in a multi-disciplinary team to assess the threat of sewage pollution on the shellfish industry of Nova Scotia, including the biophysical, socio-political, law and policy aspects of the greater issue of pollution in the near shore environment. This involved research into government programs, policies and regulations, as well as different stakeholders in the industry.

AREAS OF SPECIALIZATION

- Wetland and Watercourse Assessment
- Wetland Delineation & Functional Assessment
- Wildlife Surveying and Assessment
- Environmental Reporting and Permitting
- Baseline Study Data Collection & Interpretation

RELEVANT EXPERIENCE

Mr. Kavanagh joined Strum in 2022, having just completed a master's degree in Resource and Environmental Management at Dalhousie University. While studying at Dalhousie University, Mr. Kavanagh specialized in freshwater resource management, wetland alteration/compensation, and stormwater management. He also obtained his diploma of engineering in 2016 and Bachelor of Science degree in 2018, from Saint Mary's University. While there, he completed an honours thesis focused on enhancing the effectiveness of wind power source assessment, responding to the need of having a measure of the relationship of wind speed and its consistency.

Throughout his academic career, Mr. Kavanagh has had the opportunity to partake in a number of research initiatives, including collecting and processing water chemistry data, the remediation of trampled pollinator habitat, an assessment of the carbon sequestration capabilities of species mixes within the boreal forest, and an evaluation of the acid rock drainage potential within the watersheds of Nova Scotia. Further, for the final project of his graduate studies, Darcy assessed the climate resiliency of wetland compensation projects within the province of Nova Scotia, providing a series of research-backed recommendations to continue working towards the provincial goal of no net loss of wetland structure and function, while also ensuring a net gain of climate resiliency.

Mr. Kavanagh has proven critical thinking and problem-solving skills through collaboration with multiple real-world organizations. This includes a partnership with the Atlantic First Nations Water Authority to analyze the biophysical, socio-political, and law & policy related dimensions associated with the self-determination of water resources in First Nations communities, as well as aiding the District of Argyle in their efforts to mitigate their localized mosquito problem through a series of research tactics including a literature review, policy review, jurisdictional scan, and feasibility analysis. For the internship portion of his graduate degree, Mr. Kavanagh worked with a consulting company where he was involved with various tasks including soil, sediment, and surface water sampling, wetland delineation, electrofishing, watercourse assessment, and air quality monitoring.

Mr. Kavanagh is active in conducting numerous field surveys to fulfill baseline studies, environmental permits, and conditions of approval, as well as any relative complementary desktop research. Further, Mr. Kavanagh is well practiced in working in remote areas, along with ATV, snowmobile, and 4x4 use.

REPRESENTATIVE PROJECTS AND ROLES

Various Wind Farm Project Environmental Assessments, NS – Environmental Scientist:

- **Goose Harbour Lake Wind Farm Project, NS, (2022 – Present)**
- **Mersey River Wind Farm Project, NS, (2022 – Present)**
- **Weavers Mountain Wind Farm Project, NS, (2022 – Present)**
- **Higgins Mountain Wind Farm Project, NS, (2022 – Present)**
- **Ellershouse Wind Farm Project, NS, (2022 – Present)**

EDUCATION

- Master of Resource and Environmental Management (MREM) - Dalhousie University, Halifax, NS (2022)
- Bachelor of Science (Honours in Environmental Science) - Saint Mary's University, Halifax, NS (2018)
- Diploma of Engineering - Saint Mary's University, Halifax, NS (2016)

TRAINING

- Wetland Ecosystem Services Protocol - Atlantic Canada (WESP-AC) Training – Maritime College of Forest Technology (2022)
- Wetland Delineation Training – Maritime College of Forest Technology (2022)
- Backpack Electrofishing – Canadian Rivers Institute (2022)
- Wilderness First Aid – Saint John Ambulance (2022)

Responsible for conducting field assessments and Environmental Assessment report writing for multiple prospective wind farm locations in NS. Field surveys were conducted for terrestrial flora & fauna, herpetofauna, avifauna, fish & fish habitat, wetlands, and watercourses. Other methods of data collection included snowshoe expeditions, ATV driving, and trail camera, acoustic monitor, and ultrasonic monitor deployment. Environmental Assessment documentation included field data compilation and interpretation to inform effects assessments, mitigation measures, and monitoring strategies.

Ruth Falls Wetland Monitoring, NS (2022 – Present) – Environmental Scientist: Responsible for conducting field assessments and report writing for a wetland and wetland fish & fish habitat monitoring program to be completed 2022 – 2027 to facilitate the dewatering of the reservoir necessary for capital upgrades. Field assessments included wetland delineation & functional assessment, monitor well installation, vegetation plot monitoring, and in-situ water chemistry sampling.

Nesting Bird Searches, NS (2022 – Present) – Environmental Scientist: Surveyed prospective project areas for the presence of nesting birds. Collected field data related to any observed species and reported on the findings. Flagged buffer areas for any identified species.

Wetland Delineation and Permitting, NS (2021 – Present) – Environmental Scientist: Completed wetland delineation, functional assessments, and permitting submissions at numerous sites around Nova Scotia. Projects include pre-construction and post-construction monitoring, compensation planning, contingency planning, and erosion and sedimentation control planning.

L8001 and L8005 Transmission Line, NS (2022) – Environmental Scientist: Participated in wetland and watercourse assessments, wildlife surveys, and rare plant and lichen surveys along the linear corridor spanning 100 km from the NS/NB border to Onslow, NS.

Goldboro Liquefied Natural Gas (LNG) Project, NS (2021) – Environmental Scientist: Undertook soil and water sampling, stream flow monitoring, and avian surveys to satisfy conditions for environmental permits and approvals for the construction of an LNG facility. Soil samples were taken along the perimeter of the study area in order to delineate the presence of contaminants associated with historic gold mining. Water samples were analyzed in a lab for parameters including total & dissolved metals, dissolved organic carbon, and total suspended solids. Surveys included MBBA-style early morning passerine surveys, nighttime nocturnal surveys following the *Nova Scotia Nocturnal Owl Survey* sampling methodology, as well as circumnavigating multiple waterbodies and conducting waterfowl nest surveys. Other tasks included the periodic maintenance and data extraction of both acoustic avian monitors and ultrasonic bat monitors.

Highway 102 Aerotech Connector Road Project, NS (2021) – Environmental Scientist: Responsible for conducting field surveys and aiding in the reporting for birds and bats to inform science-based decision making within the project laydown area. Surveys included acoustic monitoring, point-count surveys, and nighttime nocturnal surveys. Other tasks included the periodic maintenance and data extraction of ultrasonic bat monitors, as well as aiding in the development of a wildlife crossing plan to mitigate wildlife-vehicle collisions.

Goldenville Historic Mine Remediation Project, NS (2021) – Environmental Scientist: Flow monitoring was conducted at eight locations within and around the Goldenville Gold Mine site in tandem with a surface water sampling program. A total of eight transducers were submerged (one per sample site), along with an additional datalogger nearby to measure air pressure. A discharge transect was also completed for each sample site using a handheld flow meter. Surface water samples were analyzed in a lab for parameters including total & dissolved metals, dissolved organic carbon, and total suspended solids. This program was conducted as part of an ecological risk assessment for the remediation of the contaminated tailings area.

Touquoy Gold Mine DustTrak Air Monitoring Program, NS (2021) – Environmental Scientist: Responsible for conducting direct-read real time sampling in response to periodic elevated dust levels at the Touquoy Gold Mine Site, in order to better understand the reasons for the elevated dust levels. TSI DustTrak instruments were used to strategically perform monitoring upwind and downwind of known areas of concern. During the monitoring, record was taken of any mining activities occurring, localized weather conditions, and any other potential dust sources in the area. This program was useful for providing a relative comparison of on-site dust levels, offering a good indication of whether compliance with the IA could be achieved.

AREAS OF SPECIALIZATION

- Wetland and Watercourse Assessment
- Wildlife Surveying and Assessment
- Ecological Forestry and Agriculture
- Benthic Invertebrate Analysis

RELEVANT EXPERIENCE

Ms. Schultz joined the Strum team in 2022 as an Environmental Scientist upon completing her coursework for her Masters of Resource and Environmental Management degree at Dalhousie. While studying at Dalhousie, Ms. Schultz specialized in a number of different areas of natural resource management in Nova Scotia, such as forestry, agriculture, and wetlands. She obtained her Bachelor of Science degree in 2019 from the University of Manitoba in the department of biological sciences where she specialized in ecology and environmental sciences. Her honours thesis focused on the ecological application of double-stranded RNA-based pesticides to control flea beetles in canola cropping systems in Manitoba. This project incorporated both field-based sample collection and lab-based sample preparation using techniques in molecular biology.

During her graduate studies, Ms. Schultz worked on a number of large projects, collaborating with multidisciplinary teams to contribute to local issues. As her final MREM Research Project, she produced GIS and statistics-based recommendations for Nova Scotia Natural Resources and Renewables regarding identification of old-growth forest locations in the province. Through the Dalhousie Faculty of Management's 'Management Without Borders' course, Ms. Schultz helped develop recommendations for pest control in the Municipality of the District of Argyle. She also developed an understory vegetation sampling protocol to be used in the Acadia Research Forest by the Canadian Forestry Service.

Ms. Schultz's most recent work experience includes contributing to a research project on bat activity hosted by a global non-profit organization by conducting statistical analysis on acoustic data. Ms. Schultz held a previous position with Nova Scotia Department of Lands and Forestry as a summer intern while completing her graduate studies. This role required remote field work to carry out the provincial old-growth scoring protocol, and desktop GIS-based work to plan and navigate to study locations. Prior to this internship, Ms. Schultz held a position with Agriculture and Agri-Foods Canada as a Junior Policy Analyst. In this role, she focused on the development of the Clean Fuel Standard, which included significant correspondence with agricultural stakeholders and a major deliverable of a jurisdictional scan of clean fuel regulations across the world.

Ms. Schultz is active in conducting ecological studies to contribute to a variety of environmental assessments. She has conducted significant fieldwork across large projects in remote locations, in both Nova Scotia and Manitoba. She is knowledgeable with provincial and federal regulations, working closely with senior staff preparing reports and regulatory submissions.

REPRESENTATIVE PROJECTS AND ROLES

Environmental Effects Monitoring Program, Halifax International Airport Authority, NS, 2022-Present – Environmental Scientist: Conducting preliminary research, planning, field work, data composition, and reporting for benthic macroinvertebrate monitoring plan following CABIN protocol.

EDUCATION

- Masters of Resource and Environmental Management (MREM) - Dalhousie University, Halifax, NS (2022)
- Bachelor of Science (Hons.) - University of Manitoba, Winnipeg, MB (2019)

TRAINING

- Wetland Ecosystem Services Protocol for Atlantic Canada Training – Maritime College of Forest Technology (2022)
- Wetland Delineation Training – Maritime College of Forest Technology (2022)
- Backpack Electrofishing – Canadian Rivers Institute (2022)
- Pilot Certificate for Small Remotely Piloted Aircraft System (RPAS), Visual line-of-sight (VLOS) – Transport Canada (2022)
- Wilderness First Aid and CPR "C" – St. John's Ambulance (2022)

Environmental Assessment, Higgins Mountain Wind Farm, NS, 2022-Present – Environmental Scientist:

Reporting on terrestrial habitat and flora at the Project site in support of an in-progress Environmental Assessment.

Environmental Assessment, Weavers Mountain Wind Farm, NS, 2022-Present – Environmental Scientist:

Collecting winter and spring wildlife data and wetland and watercourse data, and reporting on various field programs for an Environmental Screening Report and in-progress Environment Assessment.

Environmental Assessment, Mersey River Wind Farm, NS, 2022-Present – Environmental Scientist:

Collecting winter and spring wildlife data and wetland and watercourse data, and reporting on various field programs for an in-progress Environment Assessment.

Environmental Assessment, Goose Harbour Lake Wind Farm, NS, 2022-Present – Environmental Scientist:

Collecting winter and spring wildlife data and wetland and watercourse data, and reporting on various field programs for an in-progress Environment Assessment.

Environmental Assessment, Melvin Lake, NS, 2022-Present – Environmental Scientist:

Collecting winter and spring wildlife data.

Environmental Study, Apitamkiejit Wind Farm, NS, 2022 – Environmental Scientist:

Reporting on winter wildlife tracking and winter avian surveys for an Environmental Screening Report.

Environmental Assessment, Blueberry Acres Wind Farm, NS, 2022 – Environmental Scientist:

Reporting on winter wildlife tracking and fall and winter avian surveys for an Environmental Screening Report.

Environmental Assessment, Red Spruce Wind Farm, NS, 2022 – Environmental Scientist:

Reporting on fall migration avian surveys for an Environmental Screening Report.

Environmental Study, L8005 Transmission Line, NS, 2022 – Environmental Scientist:

Collecting winter wildlife data, reviewing a summary report of winter field work, and preparing a proposal for an old-growth forest assessment within the transmission line right-of-way.

Environmental Assessment, Ross Bay Junction, NF, 2022 – Environmental Scientist:

Identifying previously collected benthic macroinvertebrate samples and preparing a report and data summary on the diversity and abundance of species present on the Project site.

PROFESSIONAL ASSOCIATIONS

- Association of Professional Engineers of Nova Scotia (Engineer-in-Training)

AREAS OF SPECIALIZATION

- Industrial Approvals
- Environmental Approvals
- Computer-Aided Design
- Hydrogeology
- Water Treatment
- Climate Change

RELEVANT EXPERIENCE

Frank Gascon is an Engineer-in-Training with a Bachelor's Degree in Environmental Engineering from Dalhousie University in Halifax, NS. Since his employment with Strum, he has been involved in project management, engineering design, environmental monitoring, groundwater assessments, hazard assessments, environmental assessments, project reporting, and regulatory compliance.

Frank has worked directly with the Mechanical Engineering group to design solid waste transfer stations, waste audits, long-term monitoring and regulatory permitting for large Solid Waste and Waste to Energy Facilities. Similarly, he has worked with the Industrial Approvals and Permitting group on various Industrial Approval applications across multiple industries; and is well-versed in the development of Environmental Management Plans. Additionally, he has gained valuable experience from Strum's Senior Hydrogeologist, concerning groundwater assessments for potable groundwater supply development, evaluation and treatment of water quality issues, and review of factors that contribute to the degradation of groundwater resources at residential sites.

Before working with Strum, Frank researched the management and disposal of municipal drinking water treatment plant waste residuals in the Northwest Territories.

REPRESENTATIVE PROJECTS AND ROLES

- **Dartmouth Municipal Compost Facility Environmental Monitoring Program, Dartmouth, NS, 2021 - Present – Intermediate Engineer:** Monitoring groundwater and surface water sampling, data compilation, data analysis, and regulatory reporting. Frank has prepared various approval amendment applications for submission to NSECC, direct correspondence with NSECC and streamlined the monitoring and reporting program.
- **Wind Turbine Environmental Assessments, Multiple Locations, NS, 2021 – Present – Intermediate Engineer:** Conducted watercourse, wetland, fish/fish habitat, wildlife and avian assessments required, and environmental assessment reporting. Developing greenhouse gas and climate change assessment criteria for quantifying effects or impacts from these and other Projects.
- **Groundwater Geothermal Heating and Cooling System Review and Permitting, Wolfville, NS, 2021 - Present – Intermediate Engineer:** Withdrawal flow monitoring, water level monitoring, equipment inspection, water quality sampling, data compilation, data analysis, and regulatory reporting.
- **Municipal Compost Facility Leachate Handling System, Dartmouth, NS, 2021 - Present – Intermediate Engineer:** Design, specification, and industrial approval amendment.

EDUCATION

- Bachelor of Engineering (Environmental), Dalhousie University, Halifax, NS (2020)
- Civil/Mining Technician, Collège Boréal, Sudbury, ON (2010)

TRAINING

- Standard First Aid & CPR
- Excavation and Trenching
- Confined Spaces

- **Level I and II Groundwater Assessments, Multiple Locations, NS, 2021 - Present – Intermediate Engineer:** Supervise well installation, pump testing (i.e., step and constant), sampling, analysis of aquifer characteristics, groundwater modelling, and regulatory reporting.
- **Groundwater Geothermal Cooling Systems, Wolfville, NS, 2021 - Present – Intermediate Engineer:** Withdrawal flow monitoring, water level monitoring, equipment inspection, water quality sampling, data compilation, data analysis, and regulatory reporting.
- **Production Field Centre Hazardous Materials Assessment, Sheet Harbour, NS, 2021 – Junior Engineer:** Hazardous Materials inventory, coordinate sampling, data analysis, and reporting.
- **Green House Gas Inventory Audit, Parrsboro, NS, 2021 – Junior Engineer:** Green House Gas auditing for Fisheries and Oceans Canada (DFO) application.
- **Air Quality Improvement Design, Labrador, NL, 2021 – Junior Engineer:** Design, specification, stack testing, data analysis, and construction of ventilation improvements.
- **Drinking and Wastewater Treatment Plant System Assessments, Baddeck, NS, 2021 – Junior Engineer:** Assess water and wastewater infrastructure, establish an asset inventory, and reporting.
- **Municipal Groundwater Withdrawal Compliance, Pictou, NS, 2021 – Junior Engineer:** Review pumping rates and withdrawal volumes, spatial interferences, sustainability concerns, data analysis, and regulatory compliance.
- **Registered Potable Groundwater Supply Assessment, Cape Breton, NS, 2021 – Junior Engineer:** Review design specifications, well logs, water quality, data compilation, data analysis, and regulatory compliance.

AREAS OF SPECIALIZATION

- Marine Hydrographic Surveys
- Bathymetric Surveys
- Single Beam Sonar Surveys
- Multibeam Sonar Surveys
- Marine Benthic and Water Sampling
- Underwater Video
- Geographic Information Systems (GIS)

COMPUTER EXPERIENCE

- Operating Systems: Windows, OSX, Linux
- Survey Software: HYPACK
- Seismic Software: SonarWiz, Coda
- GPS Software: Trimble Office, Waypoint GPS Processing, GravNav and GravNet
- GIS Software: ArcGIS, GRASS GIS
- CAD Software: AutoCAD Civil 3D
- Image Processing: Surfer, CARIS HIPS and SIPS
- Misc. Software: Grapher, Microsoft Office, Global Mapper, SonarPro

EQUIPMENT EXPERIENCE

- GPS Equipment: Assorted Trimble and equipment for autonomous, differential, static, and RTK surveying (Pro XR, 4600, 4800, 5700/5800), Leica RTK, differential static and total stations
- Surveying Equipment: Knudsen BP320 echosounder, SSS Klein 595 and 3000, Teledyne Reson T20P multibeam, Teledyne Reson 7125 multibeam, Odom MB1 and MB2, Integrated Marine Acoustic Profiling System, Magnetometer, and various GPR equipment.
- Misc. Equipment: RBR XR620 CTD Probe and Tide Gauge, Eckman and Van Veen Grab Samplers, Underwater Camera, CNAV 0183 NMEA GPS receivers

RELEVANT EXPERIENCE

Mr. Savelle is a Marine Surveyor and a GIS Specialist with Strum working in our Environmental Science Group. His area of speciality is in Marine Geomatics and conducting bathymetric and topographic surveys. He has extensive experience in surveying marine benthic surfaces and shorelines, obtaining overlapping hydrographic (multibeam, single beam and side scan sonar) data, data collection positioning and navigation, data processing and compilation, plotting and reporting of results. Matt also has experience collecting conventional total station data, RTK and static GPS data, and has been responsible for project set up, establishing GPS control points, and boat mobilization.

REPRESENTATIVE PROJECTS AND ROLES

EverWind Fuels Green Hydrogen Project, NS, 2022 - Present - Geomatics Specialist: Project work includes geospatial analysis, supporting external inquiries, and integrating environmental and socioeconomic factors into the assessments.

Wind Farm Projects, NS, 2022 - Present - Geomatics Specialist: Project work includes streamlining field data collection, developing in house habitat modelling, tracking applications, and performing geospatial data analysis.

Marine Survey for Offshore Oil & Gas Support Facilities, Sheet Harbour, NS, 2020 – Detailed marine surveys were conducted as part of the planning and permitting process for a marine facility used to support the offshore oil and

EDUCATION

- Centre of Geographic Sciences (COGS), Lawrencetown, Nova Scotia Advanced Diploma in Marine Geomatics (2010)
- Saint Mary's University, Halifax, Nova Scotia Bachelor of Science Degree (BSc) (2009), major in Biology and Minor in Geography

TRAINING

- Marine Basic First Aid
- St. John Ambulance, Level A CPR
- St. John Ambulance, Canadian East Coast Offshore Fitness Certificate
- Med A1 Offshore Survival Systems,
- WHMIS

gas industry. Bathymetric and multibeam sonar surveys were completed to provide a detailed bottom profile and water depths in areas of Sheet Harbour that will be used for large vessel movements. This information will be used to determine proper clearances for vessels and to determine if additional dredging is required. In addition to collecting this survey information, digital video was captured to document the types of marine habitat in the area to support applications for federal approvals.

Chedabucto Bay Marine Surveys for Aquaculture Facilities, NS, 2020 – As part of the detailed siting of marine aquaculture facilities, bathymetric and single beam sonar surveys were completed to provide a detailed bottom profile and water depths in multiple areas of St. Marys Bay. In addition to collecting this survey information, digital video was captured along predetermined transects to document marine habitats, and benthic sediment samples were collected with a Van Veen grab for analysis. Marine survey data was processed to generate detailed digital bottom profiles.

St. Marys Bay Marine Surveys for Aquaculture Facilities, NS, 2019-2020 – As part of the detailed siting of marine aquaculture facilities, bathymetric and single beam sonar surveys were completed to provide a detailed bottom profile and water depths in multiple areas of St. Marys Bay. In addition to collecting this survey information, digital video was captured along predetermined transects to document marine habitats, and benthic sediment samples were collected with a Van Veen grab for analysis. Marine survey data was processed to generate detailed digital bottom profiles.

AREAS OF SPECIALIZATION

- Remote Sensing
- Geographic Information Systems (GIS)
- LiDAR
- Photogrammetry
- Location, spatial, and data analytics
- Geoprocessing, Model Building, and automation
- Database management
- Geomorphology

COMPUTER EXPERIENCE

- Operating Systems: Windows, macOS
- GPS Software: Garmin BaseCamp, Trimble Geospatial
- GIS Software: ArcGIS Suite, QGIS, Global Mapper
- Remote Sensing Data Processing: Trimble Inpho, POSPac MMS, LAStools
- Other Software: CoreDRAW X7
- Scripting: Python 2 & 3, SQL

EDUCATION

- Master of Science in Applied Geomatics, Acadia University, Wolfville, NS (2021)
- Advanced Diploma in Geographic Information Systems (GIS), Centre of Geographic Sciences (COGS), Lawrencetown, NS (2020)
- Bachelor of Science, Major in Geology Saint Mary's University, Halifax, NS (2019)

TRAINING

- Standard First Aid (2022)
- WHMIS (2022)
- RPAS Pilot Certification (2021)
- Over 200 hours ESRI Academy Training (2019 – Present)

RELEVANT EXPERIENCE

Mr. Opra is a GIS Specialist with Strum working in our Environmental Science Group. Mr. Opra specializes in Geomatics analysis and automation. He has extensive experience in implementing workflows for data analysis and processing. This experience includes trajectory processing, processing single and dual channel LiDAR data, photogrammetry, and automation of geospatial data analysis with both vector and raster data. In addition, Mr. Opra is experienced in operating a RPAS for data collection.

During his graduate studies, Mr. Opra focused on the application of remote sensing technologies in exploration geology. He investigated LiDAR as an effective means to visualize topography and in further detail, geomorphological features such as folds and glacial structures. He explored the advantages of both RPAS and airplane-acquired LiDAR while reviewing various software for processing and analysis. Mr. Opra helped support the project's RPAS surveys in Trafalgar, Nova Scotia and processed the data to produce high resolution terrain models.

Prior to and following his research contribution, Mr. Opra worked in academia as an advisor, then in the industry as a Geospatial Data Analyst and as a Remote Sensing Analyst. In academia, he assisted with an Honours thesis in developing a geospatial model to automatically detect sinkholes based on LiDAR data. He also assisted in a Master's thesis by mapping legacy gold mine tailings, and developing a survey grid for sampling. As a geospatial data analyst, he helped create new data products using multispectral imagery for precision agriculture. Through working on various LiDAR and Photogrammetry projects based throughout the Caribbean, USA, and Canada, Mr. Opra was able to apply automation to photogrammetry procedures and LiDAR processing. His commitment to data quality assurance and control, allowed him to develop a deeper understanding of how data is affected by environmental and human factors. His experience in both geology and environmental science allows him to have a strategic approach for geospatial analysis in environmental consulting.

Due to the multidisciplinary nature of Geomatics, Mr. Opra developed the ability to anticipate, identify, and solve diverse geospatial problems. Mr. Opra continues to research advancements in technology to build on and develop efficient procedures for data analysis and collection.

REPRESENTATIVE PROJECTS AND ROLES

EverWind Fuels Green Hydrogen Project, NS, 2022 - Present - Geomatics Specialist: Spearheaded geospatial analysis, supported external inquiries, and integrated environmental and socioeconomic factors in the assessments.

Wind Farm Projects, NS, 2022 - Present - Geomatics Specialist: Streamlining field data collection, developed in house habitat modelling, tracking applications, and performing geospatial data analysis.

Sinkhole Delineation Automation, NS, 2021 - 2022 - Advisor: Assisted in the development of a model within ArcGIS Pro for automating detection and delineation of sinkholes in the Karst prone areas.

LiDAR and Orthoimagery Data Production, Caribbean, USA, and Canada, 2021 - 2022 - Remote Sensing Analyst: Trajectory processing, LiDAR processing, automation, and creation of data products from inception to delivery.

Epiphytic Lichens as Spatial Biomonitors of Airbourne Mercury and Arsenic, 2019 - Research Intern: Used GPS to map historical mining sites and designed survey grids for Lichen collection.

Multispectral Vineyard Imagery Data Production, California, USA, 2020 - Geospatial Data Analyst: Assisted with the development of new proprietary geospatial products for precision agriculture.

Provenance and Diagenesis of Sandstones in the Deep Wells Annapolis G-24, Balvenie B-79, Crimson F-81, Weymouth A-45, and Newburn H-23, Scotian Basin, offshore NS, 2017 - 2018 - Research Assistant: Creation of graphic models and diagrams using data captured by a scanning electron microscope (SEM) to further research efforts in understanding the geology of the Scotian Basin.

Petrography of Bedrock and Ice-rafted Granules, Flemish Cap, Offshore Newfoundland and Labrador, 2017-2018, Research Assistant: Determining petrographic information of the samples using a scanning electron microscope (SEM). Energy dispersive spectroscopy (EDS) was used to determine mineral composition and backscattered electron images (BSE) were used to identify textures. Graphic design software was used to aggregate the images captured from the SEM.

AREAS OF SPECIALIZATION

- Geographic Information Systems (GIS)
- Field Studies
- Avian Radar Analysis
- Wind Turbine Risk Assessment (Shadow Flicker, Noise Modelling & Visual Simulations)

RELEVANT EXPERIENCE

Mr. Johnson first joined Strum in 2021 as an Environmental Field Technician working in our Environmental Science Group. His area of speciality is in Geographic Information Systems and Remote Sensing. He has extensive experience in data collection in the field, installation of monitoring equipment such as groundwater wells, bird and bat monitoring systems, and working with avian radar datasets and wind turbine analysis software. He is responsible for producing concise and accurate mapping products and incorporating them into the environmental assessment.

More recently, Mr. Johnson has been responsible for the predictive modelling of multiple wind farm projects around the province. This includes the shadow flicker and noise assessment impact on receptors in nearby communities, and photo-simulations visualizing turbines in each study area.

REPRESENTATIVE PROJECTS AND ROLES

Higgins Mountain Wind Farm, NS, 2021-2022 – Junior Environmental Technician/GIS Technician: Environmental constraints were calculated and visualized using GIS software, producing mapping products to be used in the official environmental assessment. Avian radar systems were installed and used in various locations of the study area for the purpose of tracking bird activity. Detailed wind turbine risk assessment was conducted for the study area, including noise level and shadow flicker assessments, and photo-simulations visualizing turbines in each potential location.

Pirate Harbour Wind Farm Project, NS) 2021-Present – Junior Environmental Technician / GIS Technician: Responsible for the collection of field data, analysis, and production of accurate GIS mapping products to be used in the reporting process. Avian radar systems were installed and used in various locations of the study area for the purpose of tracking bird activity. Detailed wind turbine risk assessment was conducted for the study area, including noise level and shadow flicker assessments, and photo-simulations visualizing turbines in each potential location.

Ellershuse Wind Farm, NS, 2022-Present – Junior Environmental Technician/GIS Technician: Responsible for the collection of field data, analysis, and production of accurate GIS mapping products to be used in the reporting process. Detailed wind turbine risk assessment was conducted for the study area, including noise level and shadow flicker assessments, and photo-simulations visualizing turbines in each potential location.

Weavers Mountain Wind Farm, NS, 2022 – Present - Junior Environmental Technician / GIS Technician: Responsible for the collection of field data, analysis, and production of accurate GIS mapping products to be used in the reporting process. Detailed wind turbine risk assessment was conducted for the study area, including noise level and shadow flicker assessments, and photo-simulations visualizing turbines in each potential location.

Mersey Wind Farm, NS, 2021 – Present - Junior Environmental Technician / GIS Technician: Responsible for the collection of field data, analysis, and production of accurate GIS mapping products to be used in the reporting process. Avian radar systems were installed and used in various locations of the study area for the purpose of tracking bird activity. Detailed wind turbine risk assessment was conducted for the study area, including noise level and shadow flicker assessments, and photo-simulations visualizing turbines in each potential location.

EDUCATION

- Centre of Geographic Sciences (COGS), Lawrencetown, Nova Scotia Advanced Diploma in Geographic Information Systems (2020)
- Saint Mary's University, Halifax, Nova Scotia Bachelor of Science Degree (BSc) (2017), major in Geography

TRAINING

- Canadian Drone Pilot Certificate (Basic)
- WHMIS
- ATV Training Course

L8005 Transmission Line Moose Tracking Surveys, NS, 2022 – Junior Environmental Technician/GIS

Technician: Participated in field assessments for winter wildlife, with a focus on mainland moose and other species at risk. This involved walking predetermined transects through various habitats to identify and document evidence of wildlife such as tracks, scat, and browsing. Additionally, responsible for the post-processing of field data and production of accurate GIS mapping products to be used in the reporting process.

Various Wetland and Watercourse Delineation Projects, NS, 2021 – Present - Junior Environmental

Technician/GIS Technician: Responsible for the post-processing of field data and production of accurate GIS mapping products to be used in the reporting process.

AREAS OF SPECIALIZATION

- Stakeholder Management & Engagement
- Community Development
- Intercultural Communication
- Data Management and Analysis
- Digital Communications
- Qualitative Research
- Political Affairs

RELEVANT EXPERIENCE

Ms. Morrison joined the Strum team in 2022. She is an experienced facilitator and community organizer with an interdisciplinary academic background. She has lived and worked in six provinces and brings this regional perspective to her work. Her diverse professional experience has fostered strong interpersonal and teamwork skills; she excels in communication, collaboration, and research.

During graduate studies, Ms. Morrison focused on environmental health, environmental racism, and First Nation consultation. She worked as a Qualitative Research Intern with the *Atlantic Policy Congress of First Nation Chiefs Secretariat*. In this role, she participated in the Atlantic consultation session for *Indigenous Circle of Experts Pathway to Canada Target 1* (protecting 17% of terrestrial areas and inland waters by 2020). She also prepared a summary and index of all First Nations' submissions to the federal review of the *Canadian Environmental Assessment Act* and *National Energy Board*. These findings were compiled into a formal report to inform member decision-making.

Prior to joining Strum, Courtney worked various political roles in Alberta, Nova Scotia, and Newfoundland & Labrador. In Alberta, she worked in both government and opposition, and represented the Minister of Health at stakeholder consultation sessions for the *Mental Health Services Protection Act*. In Nova Scotia, she managed a federal campaign (South Shore–St. Margarets). In Newfoundland & Labrador, she worked as a regional organizer and supported Indigenous and Inuk candidates running in Fortune Bay - Cape La Hune, Happy Valley-Goose Bay, and Torngat Mountains. In these roles, Courtney has gained experience developing outreach strategies and managing stakeholder, public, and Indigenous relations.

REPRESENTATIVE PROJECTS AND ROLES

Elmsdale (ELCO) Biochar Plant, NS, 2022-Present – Community Engagement Coordinator: Supported client with presentation to town council.

Ellershouse III Wind Farm, NS, 2022-Present – Community Engagement Coordinator: Supporting client with Electromagnetic Interference and Engagement (Mi'kmaq, Government, Public, and Stakeholder) sections of the EA.

EverWind Fuels Green Hydrogen Project, NS, 2022-Present – Community Engagement Coordinator: Supporting client with Mi'kmaq, Government, Public, and Stakeholder Engagement, as well as these sections of the Class 1 Environmental Assessment (EA).

Goose Harbour Lake Wind Farm, NS, 2022-Present – Community Engagement Coordinator: Supporting client with Mi'kmaq, Government, Public, and Stakeholder Engagement, as well as these sections of the Class 1 Environmental Assessment (EA).

EDUCATION

- Continuing and Professional Education, Change Leadership, University of Alberta, Edmonton, AB (2020)
- Master of Resource and Environmental Management, Dalhousie University, Halifax, NS (2018)
- Bachelor of Arts (Sustainability and Sociology), Dalhousie University, Halifax, NS (2013)

TRAINING

- Standard First Aid, CPR, and AED (2022)
- WHMIS Certificate (2022)
- RBC Sustainability Leadership Certificate (2013)

Higgins Mountain Wind Farm, NS, 2022-Present – Community Engagement Coordinator: Supporting client with Engagement (Mi'kmaq, Government, Public and Stakeholder) sections of the EA.

Laconia Wind Farm, NS, 2022-Present – Community Engagement Coordinator: Supporting client with Mi'kmaq, Government, Public, and Stakeholder Engagement, as well as tracking public/stakeholder engagement efforts.

Mersey River Wind Farm, NS, 2022-Present – Community Engagement Coordinator: Supporting client with public open houses, including ad design for local newspaper, and tracking public engagement. Also supported with Electromagnetic Interference, Engagement (Mi'kmaq, Government, Public, and Stakeholder) and Socioeconomic sections of the EA.

Tusket Wind Farm, NS, 2022-Present – Community Engagement Coordinator: Supporting client with Mi'kmaq, Government, Public, and Stakeholder Engagement, as well as tracking public/stakeholder engagement efforts.

Weavers Mountain Wind Farm, NS, 2022-Present – Community Engagement Coordinator: Supporting client with Electromagnetic Interference, Engagement (Mi'kmaq, Government, Public, and Stakeholder) and Socioeconomic sections of the EA.

AREAS OF SPECIALIZATION

- Avifauna Surveys
- Wetland Delineation
- Plant Identification
- Rare Lichen Assessment

RELEVANT EXPERIENCE

Mr. Pepper has been an active member of the Nova Scotia birding community for the past 14 years, and has participated in such projects as the Maritime Breeding Bird Atlas, the Maritime Nocturnal Owl Survey and the Christmas Bird Count. Chris served as the Field Trip Coordinator for the Nova Scotia Bird Society from 2010-12 and currently sits on the Executive Committee as a Director. Other current roles include acting as the Provincial Coordinator for the Nova Scotia Spring Migration Count.

Mr. Pepper has completed over 4000 hours of avian assessment surveys in Nova Scotia, Newfoundland, and Alberta, working for various companies including Strum Consulting, McCallum Environmental, WSP Ltd, CBCL Ltd., Nature Conservancy of Canada, and Canadian Wildlife Service.

Chris completed multiple avifauna surveys on a series of offshore coastal islands. The study was completed to ascertain the use of the islands by shorebirds during the breeding season, and to identify relationships between habitat and species utilization for nesting and feeding. The importance of the habitat for bird migration periods was also evaluated.

Chris has also been heavily involved in the implementation of comprehensive avifauna surveys in support of multiple wind energy developments in Nova Scotia.

In 2014 Chris completed an extensive bird interaction study at the site of a coastal vehicular causeway crossing in eastern Nova Scotia. The study was conducted to gauge bird behavioural responses to, and interaction with, electrical power line infrastructure. Situated in a marine environment, the study consisted of marine and shorebird species identification, and relationship to migratory pathways, impacts to coastal colony nesting, and access to feeding areas.

In addition to Chris's Avian Assessment experience, he has completed over 3000 hours of Boreal Felt Lichen surveys for various organizations including Stantec, McCallum Environmental, Consulting, Mersey Tobeatic Research Institute, Northern Pulp, Port Hawkesbury Paper, Nature Conservancy of Canada, Nova Scotia Nature Trust, and others.

Chris is also an experienced Wetland Delineator, completing wetland surveys for various companies including McCallum Environmental, Strum Consulting and others.

REPRESENTATIVE PROJECTS AND ROLES

Nova Scotia Wind Farm Developments, NS, Ongoing – Expert Birder: Responsible for completing seasonal avifauna surveys as part of Environmental Assessments in support of multiple proposed wind power projects.

Offshore Island Bird Surveys, NS, Ongoing – Expert Birder: Responsible for completing avifauna surveys on a series of offshore islands along the Eastern Shore of Nova Scotia.

Canso Causeway Bird Study, NS, 2014 – Expert Birder: Completion of avian abundance and species composition surveys at a marine causeway, and evaluation of potential migration pattern disturbance as a result of power line infrastructure.

TRAINING

- Wetland Plant Adaption and Identification and Wetland Delineation (2012)
- First Aid (2015)

MEMBERSHIPS AND ROLES

- Provincial Coordinator for the Nova Scotia Bird Migration Count
- Director for the Nova Scotia Birds Society

Canada Warbler Study, NS, Ongoing – Expert Birder: Completion of surveys to evaluate the potential shift in presence/absence and behavioural changes of Canada Warbler, as a result of local wind farm development.

Abraham’s Lake Bird Surveys, NS, 2011 – Expert Birder: Responsible for completing avifauna surveys in support of the acquisition of a parcel of land on behalf of the Nature Conservancy of Canada.

Education: Master of Arts – History, Saint Mary’s University, 2011
Bachelor of Arts – History and Social Anthropology, Dalhousie University, 1998

Permits: Nova Scotia Heritage Research Permits held since 2008
Newfoundland and Labrador Historic Resources Impact Assessment Permits held since 2011
Parks Canada Agency - Research and Collection Permits held since 2017

Affiliations: Saint Mary’s University, Adjunct Professor, Department of Anthropology (2014-Present)
Acadia University, Part-time Professor, Department of History and Classics (2017)

Archaeological Land Trust of Nova Scotia (Director: 2006-Present; Secretary/Treasurer: 2011-2017)
Association of Professional Archaeologists of New Brunswick (2013-Present; Secretary: 2018-2021)
Canadian Archaeology Association (Vice President: 2020-Present)
Gorsebrook Research Institute, Saint Mary’s University (External Director: 2020-Present)
Nova Scotia Archaeology Society (Director: 2004-2008; 2015-2016; President: 2005-2007; 2016-2018)
Royal Nova Scotia Historical Society (Director: 2010-2013; Vice President: 2013-2017; President: 2017-2020)

EMPLOYMENT HISTORY

Saint Mary’s University, Halifax, Nova Scotia

2020 Adjunct Professor, Department of Anthropology

Parks Canada, Indigenous Affairs & Cultural Heritage Directorate, Halifax, Nova Scotia

2019-2020 Collections Specialist (SI-2) – responsible for the creation of an archaeological inventory/database of all Indigenous material cultural from Nova Scotia National Historic Sites/Parks held in the Parks Canada collection, report writing, and photography.

2018 Collections Specialist (SI-2) – responsible for the creation of an archaeological inventory/database of all Indigenous material cultural from Prince Edward Island National Historic Sites/Parks held in the Parks Canada collection, report writing, and photography.

Acadia University, Wolfville, Nova Scotia

2017 Part-time Professor, Department of History and Classics

Boreas Heritage Consulting Inc., Halifax, Nova Scotia

2013-Present Principal and Senior Archaeologist/Historian providing archaeological, historical and heritage consulting services to public and private sector clients.

Parks Canada, Indigenous Affairs & Cultural Heritage Directorate, Halifax, Nova Scotia

2017 Archaeological Assistant (GT-1) – responsible for the creation of an archaeological inventory/database of all Indigenous material cultural from New Brunswick National Historic Sites/Parks held in the Parks Canada collection, report writing, photography, and conservation.

Stantec Consulting, Churchill River, Newfoundland & Labrador

2015-2017 Senior Archaeologist/Field Team Lead for Stage 3 Mitigation of Muskrat Falls Hydroelectric Project, Labrador, involved in all aspects of archaeological assessment and mitigation, including: research, implementation of field and lab work, artifact analysis, and report writing. This project required working in remote areas of Labrador, directing large field crews, and working closely with Innu and other Indigenous peoples.

Cultural Resource Management Group Limited, Halifax, Nova Scotia

2006-2013 Staff Archaeologist and Historian involved in all aspects of archaeological assessment and mitigation, including project management, research, implementation of field and lab work, and report writing.

Parks Canada, Halifax, Nova Scotia

2004 Archaeological Site and Laboratory Assistant, Beaubassin & Fort Lawrence National Historic Sites.

Private Consultant

2003-2006 Provided archaeological and historical research services to private sector consulting firms in Nova Scotia.

Jacques Whitford Environment Limited, Dartmouth, Nova Scotia

1993 Field Technician and Archaeological Assistant involved in various aspects of environmental assessment.

Parks Canada, Halifax, Nova Scotia

1992 Field Archaeologist and Laboratory Assistant, Fort Anne National Historic Site.

REPRESENTATIVE PROFESSIONAL EXPERIENCE

- 2021 Project Manager for Gaspereau Lake Reservoir Archaeological Mitigation, for Nova Scotia Power Inc.
Principal Investigator for Archaeological Impact Assessment of Acadia Wharf Extension, for Develop Nova Scotia
Principal Investigator for Archaeological Impact Assessment of Blandford to Tancook Ferry Terminals, for NS Department of Transportation
Principal Investigator for Archaeological Impact Assessment of Peggy's Cove Revitalization, for Develop Nova Scotia
- 2020 Project Manager for Archaeological Impact Assessment of installation of electric charging stations at Ardgowan National Historic Site, Prince Edward Island, for Parks Canada
Project Manager for Archaeological Impact Assessment of George's Island National Historic Site, for Parks Canada
Project Manager for Geophysical Survey of Shubenacadie Residential School, for Confederacy of Mainland Mi'kmaq
Principal Investigator for Archaeological Assessment of Deep Panuke Jackup Gas Production Field Centre (PFC) Platform, for RJMI Ltd.
- 2019 Project Manager and Lead Researcher for Chignecto Isthmus Indigenous Knowledge Study (Archaeology), for Mi'gmawe'l Tplu'taqnn Incorporated
- 2018 Project Manager for Archaeological Impact Assessment of PEI National Park – Morrison Cottage Infrastructure Removal, for Parks Canada
Principal Investigator for Geophysical Investigation of the Garrison Graveyard at Fort Anne National Historic Site, for Parks Canada
Project Manager/Senior Archaeologist for Geophysical Investigation of Chapel Island at Potlotek First Nation;

for Potlotek First Nation

Project Manager/Senior Archaeologist for Archaeological Impact Assessment of Kejimikujik Multi Use Trail in Kejimikujik National Park/National Historic Site, for Parks Canada

Project Manager for Hydro Asset Study, for Nova Scotia Power Incorporated

Project Manager/Senior Archaeologist for Archaeological Resource Impact Assessment PID 15308448, in Cape Breton Regional Municipality, for Eskasoni First Nation

Project Manager/Senior Archaeologist for Archaeological Impact Assessment of Halifax Citadel National Historic Site in Halifax Regional Municipality, for Parks Canada

Archaeological Assistant for 2018 Archaeological Survey & Geophysical Investigation of Sable Island National Park Reserve, for Parks Canada

2017 Project Manager for Archaeological Impact Assessment of PEI National Park Project FII 1427, for Parks Canada

Principal Investigator for Geophysical Investigation of Elsdale Anomaly at Halifax Citadel National Historic Site, in Halifax Regional Municipality, for Parks Canada

Principal Investigator for Archaeological Salvage Operation at Canso Islands National Historic Site in Canso, in Guysborough County, for Parks Canada

Project Manager/Historian/Archaeologist for Archaeological Impact Assessment of Halifax Citadel National Historic Site in Halifax Regional Municipality, for Parks Canada

Archaeological Assistant for 2017 Archaeological Survey of Sable Island National Park Reserve, for Parks Canada

Project Manager/Senior Archaeologist for Archaeological Resource Impact Assessment of Ellershouse Windfarm, in Hants County, for Strum Consulting

Project Manager for Archaeological Impact Assessment of Kouchibouguac Force Main Realignment, in Kouchibouguac National Park, New Brunswick, for Parks Canada

Principal Investigator for Archaeological Resource Impact Assessment of Big Moon Tidal Demonstration Site, in Cape Split, Kings County, for Strum Consulting

2016 Field Team Lead for Stage 3 Mitigation of Muskrat Falls Hydroelectric Project, Labrador, for Stantec

Senior Archaeologist/Historian for Archaeological Overview Assessment of Halifax Citadel National Historic Site in Halifax Regional Municipality, for Parks Canada

Project Manager/Senior Archaeologist for Archaeological Screening and Reconnaissance of Cow Bay Road-Grand Lake Road in Cape Breton Regional Municipality, for Nova Scotia Department of Natural Resources

2015 Field Team Lead for Stage 3 Mitigation of Muskrat Falls Hydroelectric Project, Labrador, for Stantec

Principal Investigator for Archaeological Monitoring of geotechnical drilling at Upper Lake Falls, Mersey River Hydro System in the Region of Queens Municipality, for Nova Scotia Power Incorporated

Project Manager/Historian for Archaeological Monitoring of site preparation for Horizontal Directional Drilling Pad location at Cape Ray, Newfoundland and Labrador, for NSP Maritime Link Inc. / Emera Newfoundland and Labrador

Project Manager/Historian for Archaeological Screening and Reconnaissance of the Mersey Hydro System Redevelopment in the Region of Queens Municipality, for Nova Scotia Power Incorporated

Project Manager/Historian for Archaeological Screening and Reconnaissance of Eon Wind – Ketch Harbour Wind Farm in Halifax Regional Municipality, for Strum Environmental

Project Manager for Archaeological Monitoring of tree clearing for Maritime Link - Onslow to Springhill Transmission Line near Debert, for Nova Scotia Power Incorporated

2014 Principal Investigator for Archaeological Shovel Testing of Maritime Link – Onslow to Springhill Transmission Line – Debert Area in Colchester County, for Nova Scotia Power Incorporated

Project Manager for Archaeological Screening, Reconnaissance and Shovel testing of Haddock Harbour in Richmond County, for Glenn Group

Project Manager for Archaeological Screening, Reconnaissance and Shovel Testing of Lower Lake Falls Reservoir in Queen’s County, for Nova Scotia Power Incorporated

Project Manager for Archaeological Screening and Reconnaissance of Van Dyke Blueberry (PID 70036504) in Queens County

Project Manager for Archaeological Shovel Testing of Town Point (PID 01302165) in Antigonish County

Project Manager for Archaeological Screening and Reconnaissance of Eon Wind Farms in Queen’s County and Halifax Regional Municipality, for Strum Consulting

Project Manager for Archaeological Screening and Reconnaissance of Maritime Link - Onslow to Springhill Transmission Line, for Nova Scotia Power Incorporated

Project Manager for Archaeological Screening and Reconnaissance of Northumberland Rock Quarry Expansion in Antigonish County, for Alva Construction

Principal Investigator for Archaeological Screening and Reconnaissance of Hardwood Lands Community Wind Project in Hants County, for Strum Environmental

Principal Investigator for Archaeological Monitoring of Upper Broad River Bridge Replacement in Queens County, for Nova Scotia Department of Internal Services

Project Manager for Archaeological Monitoring of Sandy Lake drawdown in Halifax Regional Municipality, for Nova Scotia Power Incorporated

Principal Investigator for Archaeological Testing of Castor’s River, Newfoundland

Project Manager for Archaeological Screening and Reconnaissance of Chedabucto Aggregates Quarry Expansion in Guysborough County, for Strum Environmental

Project Manager for Archaeological Screening, Reconnaissance and Testing of Mink Lake Dam Refurbishment in Yarmouth County, for Nova Scotia Power Incorporated

Project Manager for Archaeological Screening, Reconnaissance and Testing of PID 25223686 in Cumberland County

Project Manager for Archaeological Screening, Reconnaissance and Testing of PID 50001007 in Inverness County

Principal Investigator for Archaeological Screening and Reconnaissance of Crowdis Bridge Replacement in Inverness County, for Nova Scotia Department of Transportation and Infrastructure Renewal

2013 Principal Researcher/Historian for Historical Research Report on the “Formation of the Jewish Legion at Fort Edward during WWI”, for Parks Canada

Project Manager for Archaeological Screening and Reconnaissance of proposed Dufferin Mine Expansion in Halifax Regional Municipality, for Ressources Applaches

Project Manager for Archaeological Testing of proposed Neives Dam Replacement in Annapolis County, for Nova Scotia Power Incorporated

Project Manager for Stage 2 Archaeological Assessment of proposed subdivision in Happy Valley-Goose Bay, Labrador, for Goose Bay Capital Corp. Inc.

Principal Investigator for Archaeological Testing of the Thibodeau Village/Shawbrook Farm site in Hants County;

2012 Principal Investigator for Archaeological Testing of the Shawbrook Farm site in Hants County

Principal Investigator for Archaeological Testing of the Donahue Dam Refurbishment project in Guysborough County, for Nova Scotia Power Incorporated

Principal Investigator for Archaeological Testing of the Cooks Brook Pit Expansion project in Halifax Regional Municipality, for Gallant Aggregates Limited

Principal Investigator for the Archaeological Testing of Highway 103 Connector Road in Halifax Regional Municipality, for Nova Scotia Department of Transportation and Infrastructure Renewal

2011 Principal Investigator for Archaeological Screening, Reconnaissance and Strategic Testing of the Cape Ray, Newfoundland component of the *Maritime Link* project, for Emera Newfoundland and Labrador

Field Supervisor for Archaeological Survey of Lawlors Island Quarantine Facility in Halifax, Nova Scotia

Principal Investigator for Archaeological Screening and Reconnaissance of the Cape Breton Grounding Site components of the *Maritime Link* project, for Emera Newfoundland and Labrador

Field Supervisor and Principal Researcher for Archaeological Screening and Reconnaissance of the Newfoundland component of the *Maritime Link* project, for Emera Newfoundland and Labrador

Field Supervisor and Principal Researcher for Archaeological Screening and Reconnaissance of the Cape Breton component of the *Maritime Link* project, for Emera Newfoundland and Labrador

Principal Investigator for Archaeological Monitoring of the Provincial Law Courts Parking Lot Replacement in Halifax Regional Municipality, for Department of Transportation and Infrastructure Renewal

Principal Investigator for Comparative Evaluation of archaeological potential assessment of the Greater Sydney Area Wastewater Collection Project in Cape Breton Regional Municipality, for Cape Breton Regional Municipality

Principal Investigator for Archaeological Screening, Reconnaissance and Testing of the proposed Ingramport Cellular Tower Site in Halifax Regional Municipality, for GENIVAR

Principal Investigator for Archaeological Reconnaissance of the Falls Lake Refurbishment in Hants County, for Nova Scotia Power Incorporated

Principal Investigator for Archaeological Screening and Reconnaissance of McNab's Bridge, Hay Cove Bridge, Soldiers Bridge, Sutherlands Culvert and Thorn Culvert, in Richmond County, for Nova Scotia Department of Transportation and Infrastructure Renewal

Principal Investigator for Archaeological Screening and Reconnaissance of the Aberdeen Transmission Line and Substation Expansion in Inverness County, for Nova Scotia Power Incorporated

Principal Investigator for Archaeological Monitoring of the Shoreline Stabilization Project at Malagawatch, Inverness County, for Dillon Consulting Limited and the Assembly of Nova Scotia Mi'kmaq Chiefs

Principal Investigator for Archaeological Assessment of the Northeast Nova Scotia Correctional Facility in Pictou County, for Nova Scotia Department of Transportation and Infrastructure Renewal

Principal Investigator for Archaeological Screening and Reconnaissance of the Raynardton and Alders Bridge

Replacement projects in Yarmouth County, for Nova Scotia Department of Transportation and Infrastructure Renewal

Principal Investigator for Archaeological Screening and Reconnaissance of the Antigonish Wind Project in Antigonish County, for Nova Scotia Power Incorporated

- 2010 Principal Investigator for Archaeological Screening and Reconnaissance of the Donahue Dam Refurbishment project in Guysborough County, for Nova Scotia Power Incorporated
- Principal Investigator for Archaeological Screening and Reconnaissance of the Baddeck Landfill Expansion project in Victoria County, for the Municipality of the County of Victoria
- Principal Investigator for Archaeological Screening and Reconnaissance of the Ten Mile Lake Dam project in Halifax Regional Municipality, for Nova Scotia Power Incorporated
- Principal Investigator for Archaeological Screening and Reconnaissance of the Marshall Falls Dam project in Halifax Regional Municipality, for Nova Scotia Power Incorporated
- Principal Investigator for the Archaeological Monitoring of soil sampling at the Halifax Armoury in Halifax, for Defence Construction Canada
- Principal Investigator for the Archaeological Assessment of proposed Highway 103 Connector Road alignments in Halifax Regional Municipality, for Nova Scotia Department of Transportation and Infrastructure Renewal
- Principal Investigator for the Archaeological Screening and Reconnaissance of the Stillwater Later Bridge Replacement project, for Halifax Regional Municipality
- Principal Investigator for Archaeological Screening and Reconnaissance of the Lower Cove Wind Project in Cumberland County, for Nova Scotia Power Incorporated
- Principal Investigator for Archaeological Screening and Reconnaissance of the Loganville Wind Project in Colchester County, for Nova Scotia Power Incorporated
- Principal Investigator for Archaeological Screening and Reconnaissance of the Nuttby I & II Wind Projects in Colchester County, for Nova Scotia Power Incorporated
- 2009 Principal Researcher for Archaeological Assessment of proposed Highway 113 alignment in Halifax Regional Municipality, for Nova Scotia Department of Transportation and Infrastructure Renewal
- Field Archaeologist and Principal Researcher for Archaeological Assessment of the Ferrona Bridge Replacement Project in Pictou County, for Nova Scotia Department of Transportation and Infrastructure Renewal
- Principal Researcher for Archaeological Assessment of the Hawthorne Farm Site within a proposed mine expansion area in Gays River, Nova Scotia, for Acadian Mining
- Principal Investigator for the Archaeological Monitoring of subterranean electrical duct installation at CFB Stadacona in Halifax, for Department of National Defence
- Field Director for Stage 2 and Stage 3 Archaeological Assessments of Talbot Wind Farm, in Chatham-Kent, Ontario, for Renewable Energy Systems - *Reports on file with Ontario Ministry of Tourism, Culture and Sport*
- 2008 Principal Investigator for Archaeological Screening and Reconnaissance of the Fifteen Mile Stream Development in Halifax Regional Municipality, for Nova Scotia Power Incorporated
- Principal Researcher for Archaeological Assessment of Highway 101 Twinning in Kings County, for Nova Scotia Department of Transportation and Infrastructure Renewal
- Field Supervisor and Principal Researcher for Archaeological Screening, Reconnaissance and Testing of Great Barren Dam Safety Remedial Works in Yarmouth County, for Nova Scotia Power Incorporated

Field Archaeologist and Principal Researcher for Archaeological Screening and Reconnaissance of the Ardoise Development Property in Hants County, for Environmental Design and Management Limited

Field Archaeologist and Principal Researcher for Archaeological Screening and Reconnaissance of the Sandy Lake Development Property in Halifax Regional Municipality, for Armco Capital Incorporated

Field Supervisor and Principal Researcher for Archaeological Screening and Reconnaissance of the Beaver Dam, Getty, Northeast Expansion, Smithfield, and Cape Breton Barite development properties, all proposed mine expansion areas in Nova Scotia, for Acadian Mining Corporation

Field Archaeologist and Principal Researcher for Archaeological Screening and Reconnaissance of proposed harbour improvements at Margaree Harbour, Inverness County, for Public Works and Government Services Canada

Principal Researcher for Assessment of the Touquoy Gold Project – Moose River Heritage Preservation in Halifax Regional Municipality, for Atlantic Gold

2007 Field Supervisor and Principal Researcher for Archaeological Investigations of the Dartmouth Turbine Chamber, part of the Shubenacadie Canal System and Starr Manufacturing complex in Dartmouth, for Halifax Regional Municipality & the Shubenacadie Canal Commission

Field Director and Principal Researcher for the Monitoring and Mitigation of features identified during construction of Founders Corner Condominiums in Halifax Regional Municipality, for Nova New England Group

Field Archaeologist for the Archaeological Mitigation of the Sinkhole Site, a Precontact habitation site within a proposed mine expansion area in Colchester County, for ScoZinc Limited

Principal Researcher and Field Archaeologist for Archaeological Reconnaissance and Testing of proposed Highway 104 corridor and interchange areas between Port Hawkesbury and Port Hastings, Cape Breton, for Department of Transportation and Infrastructure Renewal

Principal Researcher for Archaeological Assessment of Lot 209, Palaeo Subdivision in Debert, Colchester County, for Department of Transportation and Public Works

2006 Field Archaeologist during search for the Portobello Turbine Chamber, part of the Shubenacadie Canal System in Waverly, for Halifax Regional Municipality & the Shubenacadie Canal Commission

Field Archaeologist for Archaeological Screening, Reconnaissance and Testing of proposed Miller's Creek gypsum quarry expansion in Hants County, for Fundy Gypsum Company

Field Archaeologist for the Archaeological Reconnaissance of Wrights Lake and Coon Pond in Halifax Regional Municipality, for Nova Scotia Power Incorporated

Field Archaeologist for the Archaeological Assessment of construction related activities at McGowan Headpond Main Dam on the Medway River in Queens County, for Nova Scotia Power Incorporated

2005 Field Archaeologist for Archaeological Testing of proposed Lingan Wind Turbine #2 site in Cape Breton County, with CRM Group

Field Archaeologist and Archaeological Monitor of proposed Port Hawkesbury/Port Hastings Sewage Treatment Plant site in Inverness County, with CRM Group

Archaeological Monitor during construction of Balmoral Pump Station and connecting pipe system at Point Pleasant Park in Halifax Regional Municipality, with CRM Group

Field Archaeologist for partial excavation and documentation of a 19th century shipwreck (BdCv-51) in Woodside, Nova Scotia, with CRM Group

Archival Research for "Crafting an Identity: Occupational Therapy in Nova Scotia, 1950-1972", in Halifax, Nova Scotia, for Saint Mary's University and Associated Medical Services Inc.

- 2004 Archaeological Site and Laboratory Assistant for Archaeological Testing of Beaubassin and Fort Lawrence National Historic Sites in Cumberland County, for Parks Canada
- Field Archaeologist and Artifact Processor for Archaeological Mitigation of the Maritime Museum Combined Sewage Overflow Chamber in Halifax Regional Municipality, with CRM Group
- 2003 Field Archaeologist for Archaeological Assessment of Highway 101 structure construction areas in Yarmouth County, with CRM Group
- Field Archaeologist for Archaeological Assessment of a proposed quarry expansion area in Colchester County, with CRM Group
- 1993 Field Technician and Archaeological Assistant for Jacques Whitford Environment Limited, Dartmouth, Nova Scotia
- 1992 Field Archaeologist and Laboratory Assistant for Archaeological Excavation of Charlesfort site at Fort Anne National Historic Site in Annapolis County, for Parks Canada

PUBLICATIONS AND PRESENTATIONS

- Beanlands, Sara 2018 "The Training of the Jewish Legion in Windsor, Nova Scotia, During the First World War," *Journal of the Royal Nova Scotia Historical Society*, Vol. XXI (2018).
- Beanlands, Sara 2012 "The Reverend Professor Andrew Brown: An Academic Reassessment," *The University of Edinburgh Journal*, Vol. XLV, No.4 (2012).
- Erickson, Paul & Jonathan Fowler, eds. 2010 "Neighbours in Time," in *Underground Nova Scotia: Stories of Archaeology*. Halifax: Nimbus Publishing.
- Reid, John G et. al. 2009 "Is There a Canadian Atlantic World?" *International Journal of Maritime History*, Vol. XXI, No. 1 (2009).
- MacIntyre, April & Sara Beanlands 2008 "History of Sale: The Treasure Trove Act in Nova Scotia," In *Preprints of the 15th Triennial Meeting, New Delhi, 22-26 September 2008*.
- Beanlands, Sara 2006 "The Rev. Dr. Andrew Brown: Nova Scotia's Elusive Historian," *Journal of the Royal Nova Scotia Historical Society*, Vol. IX (2006).
- 2019 "Merging UAV Data with Subsurface Ground Penetrating Radar for Archaeological Investigations", Nova Scotia Community College AGRG-COGS *Sensors High and Low: Measuring the Reality of Our World Conference*, Middleton, Nova Scotia
- "Archaeology and Species at Risk Research in Kespukwitk", with Jeff Purdy, *Kespukwitk Two-Eyed Seeing Gathering*, Bear River First Nation, Nova Scotia
- "What Lies Beneath: An Acadian Ancestry Project", Kings Theatre, Annapolis Royal, Nova Scotia
- 2018 "Sandy Banks (FgCg-01): The Archaeology of a Hudson's Bay Company Fur Trade Post in Central Labrador", with Fred Schwarz et al., *Council for Northeastern Archaeology Conference*, Halifax, Nova Scotia
- "A Typological analysis of the Stone Pipes of the Isthmus of Chignecto, Eastern Canada", with Eric Tremblay et al., *Council for Northeastern Archaeology Conference*, Halifax, Nova Scotia
- "The Elsdale Anomaly: Geophysics and the Search for Fort Luttrell", *Council for Northeastern Archaeology Conference*, Halifax, Nova Scotia
- "The Training of the Jewish Legion at Fort Edward", *Royal United Services Institute of Nova Scotia*, Royal Artillery Park, Halifax, Nova Scotia
- "The Jewish Legion in Windsor", *Atlantic Mayors Congress*, Windsor, Nova Scotia

- “Voices of the Landscape”, *Landscape of Cultures Festival*, Grand Pré National Historic Site, Nova Scotia
- 2017 “Landscape in Memory: What Time is it in Fort Lawrence?”, *Nova Scotia Archaeology Society*, Halifax, Nova Scotia
- “The Training of the Jewish Legion at Fort Edward during the First World War”, *Royal Nova Scotia Historical Society*, Halifax, Nova Scotia
- 2016 “Unearthing our History”, *West Hants Historical Society Heritage Banquet*, Windsor, Nova Scotia
- “Thibodeau Village: Community Engagement, Archaeology, and the Discovery of an Acadian Past in a Nova Scotia Planter Landscape”, *Genealogical Association of Nova Scotia*, Dartmouth, Nova Scotia
- “John Reid’s Influence on Historical Archaeology in Nova Scotia”, *Practicing History in the 21st Century Symposium*, Saint Mary’s University, Halifax, Nova Scotia
- 2015 “An Early African-Nova Scotian Burial Ground in Hammonds Plains”, *Black Canadian Studies Conference*, Dalhousie University, Halifax, Nova Scotia
- “Preserving the Memory of Historical Public Space in Halifax Regional Municipality”, *Public Space, History and Memory Symposium*, Saint Mary’s University, Halifax, Nova Scotia
- “Thibodeau Village: Community Engagement, Archaeology, and the Discovery of an Acadian Past in a Nova Scotia Planter Landscape”, *Evenings at Government House Lecture Series*, for the Lieutenant Governor of Nova Scotia, Government House, Halifax, Nova Scotia
- 2013 “Re-layering the Cultural Landscape”, *Nova Scotia Heritage Conference*, Liverpool, Nova Scotia
- “Unravelling the 3D Cultural Landscape within a Tablet Interface”, *European Archaeology Association*, Pilsen, Czech Republic
- 2012 “Rev. Dr. Andrew Brown and the Removal of the French Inhabitants of Nova Scotia”, *Monument-Lefebvre National Historic Site*, Memramcook, New Brunswick
- 2011 “The Brown Manuscripts: An 18th Century Approach to Understanding Acadia”, *Histoire de l’Acadie: New Approaches*, Saint Mary’s University, Halifax, Nova Scotia
- “Bayonets, Bottles and Beads: An Overview of Archaeological Sites in the Chignecto”, *Tantramar Heritage Trust*, Sackville, New Brunswick
- 2010 “Finding Acadia in Planter Oral Tradition”, *Colchester Historical Society*, Truro, Nova Scotia
- “An Introduction to Industrial Archaeology”, *Industrial Heritage Nova Scotia*, Halifax, Nova Scotia
- “The Brown Manuscript: An 18th Century Account of the Acadian Deportation”, *Causerie: Grand-Pré*, Place des Arts Père Anselm Chaisson, Cheticamp, Nova Scotia
- “Removal of the French Inhabitants of Nova Scotia by Lieut. Governor Lawrence & His Majesty’s Council in October 1755”, *Tantramar Heritage Trust*, Sackville, New Brunswick
- 2009 “The Brown Manuscript and the Scottish Enlightenment”, *Atlantic Canada Studies Conference*, University of Prince Edward Island, Charlottetown, Prince Edward Island
- 2008 “New Perspectives on the Idea of a ‘Canadian’ Atlantic World”, *International Workshop on Material Culture Dimensions of the Asia-Atlantic Comparison and on the ‘Canadian’ Atlantic World*, Halifax, Nova Scotia
- 2006 “Thibodeau Village”, *Confederation of Association of Acadian Families*, Lafayette, Louisiana
- “Thibodeau Village”, *Acadian Memorial*, St. Martinville, Louisiana
- “If the Land Could Speak”, *Grand-Pré National Historic Site*, Wolfville, Nova Scotia

- “Andrew Brown and the Acadians”, *Société Historique Acadienne*, Université de Moncton, Moncton, New Brunswick
- 2005 “An Enlightened Mind in Nova Scotia: The University of Edinburgh’s Andrew Brown - Nova Scotia’s First Historian”, *University of Edinburgh*, Centre of Canadian Studies, Edinburgh, Scotland
- “The Rev. Dr. Andrew Brown: Nova Scotia’s Elusive Historian”, *Royal Nova Scotia Historical Society*, Halifax, Nova Scotia

SCHOLARSHIPS AND AWARDS

- 2017 Volunteer Service Award (Municipality of the District of West Hants & the Town of Windsor)
- 2013 Nova Scotia Museum Research Grant (Cultural History)
- 2006/2007 Mary Jackson-Hinch and Joseph Hinch Research Award (St. Mary’s University)
- 2006 Honorary Citizenship to the City of Lafayette, Louisiana for contributions to Acadian Society
- 2005/2006 St. Mary’s University Graduate Award Scholarship
- St. Mary’s University Faculty of Graduate Studies and Research Fellowship
- 2005 Associated Medical Services Hannah Studentship
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TRAINING AND CERTIFICATES

Certified Emergency First Aid CPR Level A.
Wilderness First Aid
WHMIS
