

APPENDIX J  
ELECTROMAGNETIC INTERFERENCE

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July 24, 2024

**Ms. Bethany DuChene**  
**Innovation, Science and Economic Development Canada**  
 Email: ic.spectrumnsd-spectredne.ic@canada.ca

Dear Ms. DuChene,

**Re: Rhodena Wind Project**  
**Creignish, Nova Scotia**

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by ABO Energy (our client) to support the proposed Rhodena Wind Project (the “Project”) within Inverness County, Nova Scotia (NS).

On behalf of our client, Strum is conducting an electromagnetic interference (EMI) study on the placement of six wind turbines located near the community of Creignish in Inverness County, Nova Scotia. 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 6 turbines
- Tip height of each turbine is 199.5 m
- Hub height of each turbine is 118 m
- 3-blade rotor; turbine blade sweep diameter is 163 m (blade length is 81.5 m)

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

**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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3	622125.910	5069842.039	45.771340	-61.429257	234	118	81.5	433.5
4	622678.812	5069775.179	45.770641	-61.422165	252	118	81.5	451.5

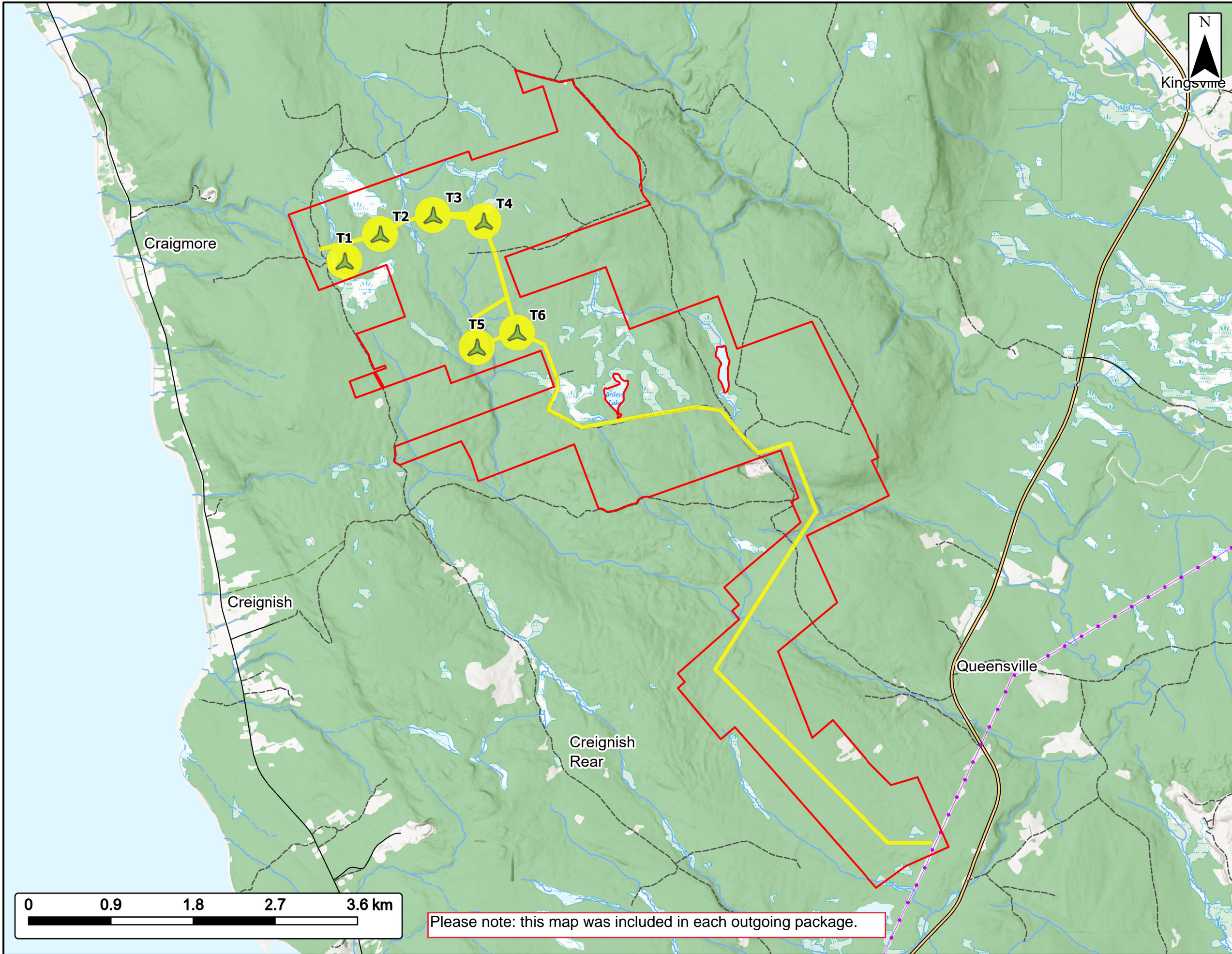
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6	623043.311	5068557.339	45.759619	-61.417789	217	118	81.5	416.5

Thank you for your time and consideration of this Project. Upon review, should you have any questions, or 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,



Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)



**Rhodena Wind Project**  
Site Overview

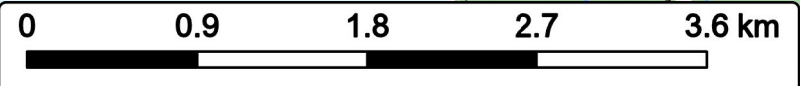


Study Area	
Assessment Area	
Proposed Turbine Location	
<b>Utilities (line)</b>	
Existing Transmission Lines	
<b>Transportation</b>	
Trans-Canada Highway	
Road	
Unpaved Road	
<b>Water Features</b>	
Mapped Stream	
Mapped Indefinite Stream	
Mapped Lakes and Rivers	
Mapped Wet Areas	



Coordinate System: NAD83 UTM Zone 20N Sources: ESRI Basemaps, GeoNOVA, SNSIS, NSNRR, ACCDC, IBA Canada, CNWI, HERE, Garmin, USGS

Date:	Jul 2024	Project #:	24-9952
Scale:	1:40,000	Drawing #:	<b>1</b>
Drawn By:	K. Wallace		
Checked By:	H. Mosher		



Please note: this map was included in each outgoing package.



Heather Mosher &lt;hmosher@strum.com&gt;

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## EMI Notification - Rhodena Wind Project

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**Gingell, Keegan (ISED/ISDE)** <keegan.gingell@ised-isde.gc.ca>  
To: "hmosher@strum.com" <hmosher@strum.com>

Fri, Jul 26, 2024 at 2:06 PM

Good afternoon,

This message is to confirm that ISED has received the information package for the Rhodena Wind Farm Project proposal.

Our comments on the proposal are as follows:

- One turbine is within the consultation zone for a microwave (greater than 890 MHz) link from a point-to-point radiocommunication system.
- Further consultation is required with Nova Scotia Power.
- Please ensure all agencies listed in Table 1 are consulted with, as several are operating within the consultation area of the proposed wind farm.

Please note:

Current Radiofrequency data can be found here:

[Spectrum Management System Data \(canada.ca\)](#)

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

Keegan Gingell, CD

Spectrum Management Officer, Spectrum Management Operations Branch

Innovation, Science and Economic Development Canada / Government of Canada

[Keegan.Gingell@ised-isde.gc.ca](mailto:Keegan.Gingell@ised-isde.gc.ca) / Tel: 902-456-6918 / TTY: 1-866-694-8389

Agent de la Gestion du Spectre, Direction générale des opérations de la gestion du spectre

Innovation, Sciences et Développement économique Canada / Gouvernement du Canada

[Keegan.Gingell@ised-isde.gc.ca](mailto:Keegan.Gingell@ised-isde.gc.ca) / Tél: 902-456-6918 / ATS: 1-866-694-8389

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**From:** Heather Mosher <[hmosher@strum.com](mailto:hmosher@strum.com)>

**Sent:** Wednesday, July 24, 2024 8:53 PM

**To:** [ic.spectrumnsd-spectredne.ic@canada.ca](mailto:ic.spectrumnsd-spectredne.ic@canada.ca)

**Cc:** Melanie Smith <[msmith@strum.com](mailto:msmith@strum.com)>

**Subject:** EMI Notification - Rhodena Wind Project

Good Morning,

Please find attached a notification letter for the proposed Rhodena Wind Project location near the community of Creignish within Inverness County, Nova Scotia. A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Thank you,

Heather Mosher

--

**Heather Mosher** (she/her), MSc.

*Senior Environmental Scientist, Associate*

*Environmental Assessments and Approvals*

[Redacted signature]

[Quoted text hidden]



NOVA SCOTIA

T: 902.835.5560 (24/7)

NEWFOUNDLAND  
& LABRADOR

T: 709.738.8478 (24/7)

NEW BRUNSWICK

T: 1.855.770.5560 (24/7)

July 24, 2024

**Military Air Defence and Air Traffic Control Radars  
Department of National Defence (DND)**

Email: +WindTurbines@forces.gc.ca

To whom it may concern,

**Re: Rhodena Wind Project  
Creignish, Nova Scotia**

---

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On behalf of our client, Strum is conducting an electromagnetic interference (EMI) study on the placement of six wind turbines located near the community of Creignish in Inverness County, Nova Scotia. 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 6 turbines
- Tip height of each turbine is 199.5 m
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A map showing the proposed locations of the turbines is attached (Drawing 1) and a summary of the proposed turbine details, including coordinates and elevations, is provided in Table 1, below.

**Table 1: Proposed Turbine Locations & Specifications**

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Thank you,



Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)



July 24, 2024

**Military Radiocommunication Users  
Department of National Defence (DND)**

Email: +WindTurbines@forces.gc.ca

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**Re: Rhodena Wind Project  
Creignish, Nova Scotia**

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Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)



National Défense  
Defence nationale

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

Date of Electronic Signature

Heather Mosher  
Strum Consulting  
Suite 210-211 Horseshoe Lake Drive,  
Halifax, Nova Scotia B3S 1B4

### LETTER OF NON-OBJECTION FOR STRUM CONSULTING

Dear Ms. Mosher

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# 24-2766 the Rhodena wind project near Creignish, 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 Strum Consulting.

DND/CAF 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# 24-2766 the Rhodena wind project near Creignish, NS. upon the DND/CAF radars, equipment and its provision of Air Traffic Services.

Canada 

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.J. McKillop*  
Lieutenant-Colonel  
Senior Staff Officer Aerospace  
Capabilities and Readiness

July 24, 2024

**Mr. Phil Tanguay**  
**Royal Canadian Mounted Police (RCMP)**  
 Email: Windfarm\_Coordinator@rcmp-grc.gc.ca

Dear Mr. Tanguay,

**Re: Rhodena Wind Project  
 Creignish, Nova Scotia**

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Thank you,



Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)

**Protected A**

Heather Mosher  
Strum

**GV 1620-7-3**

August 01, 2024

**SUBJECT: EMI Notification - Rhodena Wind Project**

**Ref. # 2024-08-01\_0130**

Greetings,

Reference is made to your email request dated July 25, 2024, on your plans for the wind energy project called "Rhodena" 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](mailto: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](mailto:windfarm_coordinator@rcmp-grc.gc.ca) / Tél: 343-552-1290

July 24, 2024

**Mr. Martin Grégoire**

**Canadian Coast Guard- Vessel Traffic Systems Radars**

Email: windfarm.coordinator@dfo-mpo.gc.ca, Martin.Gregoire@dfo-mpo.gc.ca

Dear Mr. Grégoire,

**Re: Rhodena Wind Project  
Creignish, Nova Scotia**

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Thank you,



Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)



Heather Mosher <hmosher@strum.com>

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## EMI Notification - Rhodena Wind Project

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**Grégoire, Martin (DFO/MPO)** <Martin.Gregoire@dfo-mpo.gc.ca>  
To: Heather Mosher <hmosher@strum.com>  
Cc: Melanie Smith <msmith@strum.com>

Thu, Jul 25, 2024 at 11:36 AM

Hello,

My interference assessment is still the same as the one that I sent to Nortek Resource Solutions on October 20, 2022:

The proposed wind farm (Rhodena) is located 28 km away from the Eddy Point radar site.

Even though it is located within the 60 km consultation zone, it is located beyond the area covered by the radar. Therefore no interference issues are anticipated.

Regards / Salutations,

**Martin Grégoire**

Canadian Coast Guard

Garde côtière canadienne

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**From:** Heather Mosher <hmosher@strum.com>

**Sent:** Thursday, 25 July, 2024 7:00 AM

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

**Cc:** Melanie Smith <msmith@strum.com>

**Subject:** EMI Notification - Rhodena Wind Project

You don't often get email from [hmosher@strum.com](mailto:hmosher@strum.com). [Learn why this is important](#)

Good Morning,

Please find attached a notification letter for the proposed Rhodena Wind Project location near the community of Creignish within Inverness County, Nova Scotia. A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Thank you,

Heather Mosher

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**Heather Mosher (she/her), MSc.**

*Senior Environmental Scientist, Associate*

*Environmental Assessments and Approvals*

[Quoted text hidden]

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& LABRADOR

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NEW BRUNSWICK

T: 1.855.770.5560 (24/7)

July 24, 2024

**Mr. Alvin Au Duong**  
**Meteorological Service of Canada**  
**Environment and Climate Change Canada (ECCC)**  
Email: weatherradars@ec.gc.ca

Dear Mr. Alvin Au Duong,

**Re: Rhodena Wind Project**  
**Creignish, Nova Scotia**

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[hmosher@strum.com](mailto:hmosher@strum.com)



July 30, 2024

**Heather Mosher**  
**Strum Consulting on behalf of ABO Energy (client)**

**Subject:** Rhodena Wind Project – New Preliminary Analysis of Impacts on ECCC Radars

Dear Heather,

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 July 25, 2024, for the proposed Rhodena Windfarm Project (located 96 km away from ECCC's Marion Bridge Radar – Marion Bridge, 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.

If your plans are modified in any manner (e.g. number of turbines, height, or placement) this analysis would no longer be valid and an updated analysis must be conducted. Please contact us at: [radarsmeteo-weatheradars@ec.gc.ca](mailto:radarsmeteo-weatheradars@ec.gc.ca). In addition, please notify us if you decide not to proceed with this project so that we may formally close the file.

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

Sincerely,

**Shannon Kaya**

Directrice, Transformation, innovation et ingénierie  
Service Météorologique du Canada, Environnement et Changement Climatique Canada  
Director, Transformation, Innovation and Engineering  
Meteorological Service of Canada, Environment and Climate Change Canada



July 24, 2024

**NavCAN**

Email: landuse@navcanada.ca

To whom it may concern,

**Re: Rhodena Wind Project  
Creignish, Nova Scotia**

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by ABO Energy (our client) to support the proposed Rhodena Wind Project (the “Project”) within Inverness County, Nova Scotia (NS).

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3	622125.910	5069842.039	45.771340	-61.429257	234	118	81.5	433.5
4	622678.812	5069775.179	45.770641	-61.422165	252	118	81.5	451.5
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6	623043.311	5068557.339	45.759619	-61.417789	217	118	81.5	416.5

Thank you for your time and consideration of this Project. Upon review, should you have any questions, or 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,



Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)







Serving a world in motion  
 Au service d'un  
 monde en mouvement  
 navcanada.ca

October 7, 2024

Your file  
 Rhodena Wind Project  
 Our file  
 24-2766

Heather Mosher  
 Strum Consulting  
 210-211 Horseshoe Lake, Dr.  
 Halifax, NS  
 B3S 0B9

**RE: Natural Resources: Wind Turbine(s) - Creignish, NS  
 (See attached document(s))**

H. Mosher,

NAV CANADA has evaluated the captioned proposal and has no objections to your proposal but has noted the following impacts. Our assessment does not constitute an approval and/or permit from other agencies.

**- ROUTE:**  
**T783 (Airway) (Between waypoints NOTOP-SILRO) – Minimum Obstacle Clearance Altitude (MOCA) to be raised from 2400ft to 2500ft.**

**- AERODROME:**

**CYPD - PORT HAWKESBURY AIRPORT**

**NOTE: CYPD is shared site with EDO (External Design Organization).**

**RNAV (GNSS) Z RWY 11: Wind farm would become new 10 NM man-made obstacle.**

**RNAV (GNSS) Z RWY 29: Wind farm would become new 10 NM man-made obstacle.**

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, we ask that you 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](mailto: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.

If you have any questions, contact the Land Use Department by email at [landuse@navcanada.ca](mailto: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  
 msmith@strum.com

July 24, 2024

**Cape Breton Regional Police**

865 Grand Lake Road  
Sydney, NS B1P 6W2

To whom it may concern,

**Re: Rhodena Wind Project  
Creignish, Nova Scotia**

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Thank you,



Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)

July 24, 2024

**Royal Canadian Mounted Police (RCMP) – Port Hawkesbury**

8 Paint St.

Port Hawkesbury, NS B9A 3JA

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Creignish, Nova Scotia**

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Thank you,



Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)

July 24, 2024

**Port Hawkesbury Volunteer Fire Department**

Email: phvfd@eastlink.ca

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July 24, 2024

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Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)

---

**Fwd: Read Notification: Message has been read**

1 message

---

**Heather Mosher** <hmosher@strum.com>  
To: Sandra Mateos <smateos@strum.com>

Tue, Aug 6, 2024 at 10:37 PM

----- Forwarded message -----

From: **JOHN BUFFET** <phvfd@eastlink.ca>  
Date: Thu, Jul 25, 2024 at 11:03 AM  
Subject: Read Notification: Message has been read  
To: <hmosher@strum.com>

This is a message receipt notification. The message sent on Thu Jul 25 2024 08:00:39 GMT-0300 (Atlantic Daylight Time) to [phvfd@eastlink.ca](mailto:phvfd@eastlink.ca) with subject "EMI Notification - Rhodena Wind Project" has been displayed on the recipient's computer.

--

**Heather Mosher (she/her), MSc.**

*Senior Environmental Scientist, Associate*

*Environmental Assessments and Approvals*



T: 902.835.5560 (24/7)  
C: 902.817.2730  
F: 902.835.5574


[LinkedIn](#) • [Twitter](#) • [Instagram](#)  
[www.strum.com](http://www.strum.com)

Head Office:  
Suite 210 - 211 Horseshoe Lake Drive  
Halifax, NS, B3S 1B4

**CONFIDENTIALITY NOTICE**

This e-mail, and any files sent with it, is confidential and for the use of the intended recipient only. If you have received this e-mail in error, please telephone 902.835.5560 or e-mail the sender, and delete the original. Thank you.

---

 **noname**  
5K

July 24, 2024

**Mr. Sunny Saini**

**Bell Aliant**

Email: sunny.saini@bell.ca

Dear Mr. Saini,

**Re: Rhodena Wind Project  
Creignish, Nova Scotia**

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by ABO Energy (our client) to support the proposed Rhodena Wind Project (the “Project”) within Inverness County, Nova Scotia (NS).

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Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)



Heather Mosher <hmosher@strum.com>

---

## EMI Notification - Rhodena Wind Project

---

**Saini, Sunny** <sunny.saini@bell.ca>

Fri, Oct 4, 2024 at 11:45 AM

To: Heather Mosher <hmosher@strum.com>

Cc: "Donkor, Enyonam" <enyonam.donkor@bell.ca>, "Caldwell, Daniel" <daniel.caldwell@bell.ca>

Hi Heather,

This proposed Rhodena wind farm development is not a concern for Bell Mobility or Bell Mobility Radio site connectivity.

Thanks,



Sunny Saini

Project Manager | RAN Solutions

Bell Mobility Inc. | M: (647) 394-4812

---

**From:** Heather Mosher <hmosher@strum.com>

**Sent:** Tuesday, October 1, 2024 4:02 PM

**To:** Saini, Sunny <sunny.saini@bell.ca>

[Quoted text hidden]

[Quoted text hidden]

July 24, 2024

**Andrew MacVicar**

**Eastlink**

Email: CEO@corp.eastlink.ca, Andrew.MacVicar@corp.eastlink.ca

Dear Mr. MacVicar,

**Re: Rhodena Wind Project  
Creignish, Nova Scotia**

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Thank you,



Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)





Heather Mosher <hmosher@strum.com>

---

## EMI Notification - Rhodena Wind Project

---

For the office of Jeff Gillham, Chief Executive Officer <CEO@corp.eastlink.ca>  
To: Heather Mosher <hmosher@strum.com>

Thu, Jul 25, 2024 at 8:05 AM

Hi Heather,

Thanks, I have shared with our engineering team and they'll reach out with any questions or concerns.

Andrew

---

**From:** Heather Mosher <hmosher@strum.com>  
**Sent:** Thursday, July 25, 2024 8:00 AM  
**To:** For the office of Jeff Gillham, Chief Executive Officer <CEO@corp.eastlink.ca>; Andrew MacVicar <Andrew.MacVicar@corp.eastlink.ca>  
**Cc:** Melanie Smith <msmith@strum.com>  
**Subject:** EMI Notification - Rhodena Wind Project

Good Morning,

Please find attached a notification letter for the proposed Rhodena Wind Project location near the community of Creignish within Inverness County, Nova Scotia. A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Thank you,

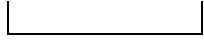
Heather Mosher

--

**Heather Mosher** (she/her), MSc.

*Senior Environmental Scientist, Associate*

*Environmental Assessments and Approvals*



[Quoted text hidden]



NOVA SCOTIA

T: 902.835.5560 (24/7)

NEWFOUNDLAND  
& LABRADOR

T: 709.738.8478 (24/7)

NEW BRUNSWICK

T: 1.855.770.5560 (24/7)

July 24, 2024

**Rogers Communications Canada Inc**

33 Bloor Street East, 10th Floor

Toronto, ON M4W 1G9

To whom it may concern,

**Re: Rhodena Wind Project  
Creignish, Nova Scotia**

---

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by ABO Energy (our client) to support the proposed Rhodena Wind Project (the “Project”) within Inverness County, Nova Scotia (NS).

On behalf of our client, Strum is conducting an electromagnetic interference (EMI) study on the placement of six wind turbines located near the community of Creignish in Inverness County, Nova Scotia. 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 6 turbines
- Tip height of each turbine is 199.5 m
- Hub height of each turbine is 118 m
- 3-blade rotor; turbine blade sweep diameter is 163 m (blade length is 81.5 m)

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

**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	621160.911	5069340.739	45.767000	-61.441789	228	118	81.5	427.5
2	621547.710	5069634.039	45.769571	-61.436743	236	118	81.5	435.5
3	622125.910	5069842.039	45.771340	-61.429257	234	118	81.5	433.5
4	622678.812	5069775.179	45.770641	-61.422165	252	118	81.5	451.5



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)
5	622604.711	5068398.939	45.758272	-61.423467	202	118	81.5	401.5
6	623043.311	5068557.339	45.759619	-61.417789	217	118	81.5	416.5

Thank you for your time and consideration of this Project. Upon review, should you have any questions, or 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,



Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)

July 24, 2024

**Seaside Communications**

Email: support@seaside.ns.ca

To whom it may concern,

**Re: Rhodena Wind Project  
Creignish, Nova Scotia**

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by ABO Energy (our client) to support the proposed Rhodena Wind Project (the “Project”) within Inverness County, Nova Scotia (NS).

On behalf of our client, Strum is conducting an electromagnetic interference (EMI) study on the placement of six wind turbines located near the community of Creignish in Inverness County, Nova Scotia. 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 6 turbines
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- Hub height of each turbine is 118 m
- 3-blade rotor; turbine blade sweep diameter is 163 m (blade length is 81.5 m)

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

**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	621160.911	5069340.739	45.767000	-61.441789	228	118	81.5	427.5
2	621547.710	5069634.039	45.769571	-61.436743	236	118	81.5	435.5
3	622125.910	5069842.039	45.771340	-61.429257	234	118	81.5	433.5
4	622678.812	5069775.179	45.770641	-61.422165	252	118	81.5	451.5
5	622604.711	5068398.939	45.758272	-61.423467	202	118	81.5	401.5

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)
6	623043.311	5068557.339	45.759619	-61.417789	217	118	81.5	416.5

Thank you for your time and consideration of this Project. Upon review, should you have any questions, or 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,



Heather Mosher, MSc.  
Senior Environmental Scientist  
Environmental Assessment & Approvals  
[hmosher@strum.com](mailto:hmosher@strum.com)



Heather Mosher <hmosher@strum.com>

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## We got your email!

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support@seaside.ns.ca <support@seaside.ns.ca>  
To: Heather Mosher <hmosher@strum.com>

Thu, Jul 25, 2024 at 11:18 PM

Heather Mosher writes:

Good Morning,

Please find attached a notification letter for the proposed Rhodena Wind Project location near the community of Creignish within Inverness County, Nova Scotia. A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Thank you,  
Heather Mosher

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\*Heather Mosher \*(she/her), MSc.

\*Senior Environmental Scientist, Associate\*

\*Environmental Assessments and Approvals\*

T: 902.835.5560 (24/7)  
C: 902.817.2730  
F: 902.835.5574

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\*[www.strum.com](http://www.strum.com) <<http://www.strum.com/>>\*

\*Head Office\*:  
Suite 210 - 211 Horseshoe Lake Drive  
Halifax, NS, B3S 1B4

\*CONFIDENTIALITY NOTICE\*

10/18/24, 3:24 PM

Strum Consulting Mail - We got your email!

This e-mail, and any files sent with it, is confidential and for the use of the intended recipient only. If you have received this e-mail in error, please telephone 902.835.5560 or e-mail the sender, and delete the original. Thank you.

Dear Customer,

Thank you for contacting us with your concerns. We'll get back to you within 24 hours.

If you require immediate assistance, please contact us at 902-539-6250, choose option 1, then select from the various options presented and remain on hold for our support team to assist you. We are available Weekdays 8:00am – 10:00pm and Weekends 8:00am – 10:00pm

Thank you,

The Customer Care Team Seaside Communications 902-539-6250

1318 Grandlake Rd, Sydney, NS B1E 1L2

[www.seaside.ns.ca](http://www.seaside.ns.ca) [support@seaside.ns.ca](mailto:support@seaside.ns.ca)



APPENDIX K  
SHADOW FLICKER

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## SHADOW - Main Result

Calculation: 2024-04-03\_ROA\_6xN163-7.0-HH118m\_worst-case\_Im

### Assumptions for shadow calculations

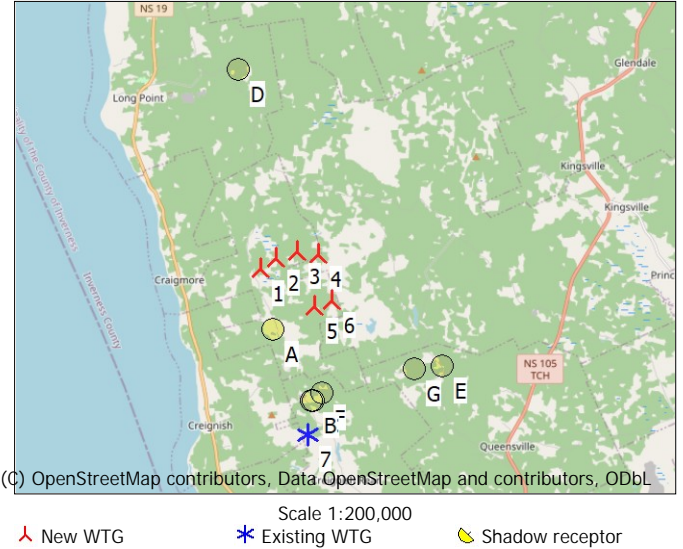
Maximum distance for influence  
Calculate only when more than 20 % of sun is covered by the blade  
Please look in WTG table

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

The calculated times are "worst case" given by the following assumptions:  
The sun is shining all the day, from sunrise to sunset  
The rotor plane is always perpendicular to the line from the WTG to the sun  
The WTG is always operating

Line-of-sight calculation has been deactivated. This means that sheltering from obstacles, areas or hills are not taken into account.

All coordinates are in  
UTM (north)-NAD83 (US+CA) Zone: 20



### WTGs

No.	Easting	Northing	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.	Type-generator				Calculation distance [m]	RPM [RPM]
1	621,161	5,069,342	230.0	NORDEX N163-6.X 7000 163.0 !O! ...	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	1,788	11.3
2	621,548	5,069,635	239.9	NORDEX N163-6.X 7000 163.0 !O! ...	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	1,788	11.3
3	622,126	5,069,843	242.6	NORDEX N163-6.X 7000 163.0 !O! ...	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	1,788	11.3
4	622,679	5,069,776	258.0	NORDEX N163-6.X 7000 163.0 !O! ...	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	1,788	11.3
5	622,605	5,068,400	210.0	NORDEX N163-6.X 7000 163.0 !O! ...	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	1,788	11.3
6	623,043	5,068,558	220.0	NORDEX N163-6.X 7000 163.0 !O! ...	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	1,788	11.3
7	622,482	5,064,995	240.9	ENERCON E-82 2000 82.0 !O! hub: ...	Yes	ENERCON	E-82-2,000	2,000	82.0	78.3	1,552	19.5

### Shadow receptor-Input

No.	Easting	Northing	Z	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode
A	621,528	5,067,757	217.4	1.0	1.0	1.5	90.0	"Green house mode"
B	622,564	5,065,899	215.6	1.0	1.0	1.5	90.0	"Green house mode"
C	622,622	5,065,925	220.0	1.0	1.0	1.5	90.0	"Green house mode"
D	620,476	5,074,590	105.1	1.0	1.0	1.5	90.0	"Green house mode"
E	626,031	5,066,878	139.1	1.0	1.0	1.5	90.0	"Green house mode"
F	622,865	5,066,100	216.0	1.0	1.0	1.5	90.0	"Green house mode"
G	625,288	5,066,801	163.9	1.0	1.0	1.5	90.0	"Green house mode"

### Calculation Results

#### Shadow receptor

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	24:03	74	0:26
B	0:00	0	0:00
C	0:00	0	0:00
D	0:00	0	0:00
E	0:00	0	0:00
F	0:00	0	0:00
G	0:00	0	0:00

## SHADOW - Main Result

Calculation: 2024-04-03\_ROA\_6xN163-7.0-HH118m\_worst-case\_lm

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

No.	Name	Worst case [h/year]
1	NORDEX N163-6.X 7000 163.0 !O! hub: 118.0 m (TOT: 199.5 m) (4376)	0:00
2	NORDEX N163-6.X 7000 163.0 !O! hub: 118.0 m (TOT: 199.5 m) (4377)	0:00
3	NORDEX N163-6.X 7000 163.0 !O! hub: 118.0 m (TOT: 199.5 m) (4378)	0:00
4	NORDEX N163-6.X 7000 163.0 !O! hub: 118.0 m (TOT: 199.5 m) (4379)	0:00
5	NORDEX N163-6.X 7000 163.0 !O! hub: 118.0 m (TOT: 199.5 m) (4380)	19:08
6	NORDEX N163-6.X 7000 163.0 !O! hub: 118.0 m (TOT: 199.5 m) (4381)	19:39
7	ENERCON E-82 2000 82.0 !O! hub: 78.3 m (TOT: 119.3 m) (151)	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.

## SHADOW - Calendar

Calculation: 2024-04-03\_ROA\_6xN163-7.0-HH118m\_worst-case\_lm Shadow receptor: A - Shadow Receptor: 1.0 × 1.0 Azimuth: 3.2° Slope: 90.0° (7)  
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:47 16:32	07:29 17:11	06:46 17:52	06:48 19:34	05:55 20:13	05:20 20:48	05:44 (6) 21:00	05:48 20:36	06:26 19:46	07:04 18:48	06:45 16:54	07:26 16:24
2	07:47 16:33	07:28 17:13	06:45 17:53	06:46 19:35	05:54 20:14	05:20 20:49	05:44 (6) 21:00	05:46 (5) 20:35	06:28 19:44	07:05 18:46	06:47 16:53	07:27 16:24
3	07:47 16:34	07:27 17:14	06:43 17:55	06:44 19:36	05:52 20:15	05:19 20:50	05:43 (6) 21:00	05:46 (5) 20:33	06:29 19:42	07:06 18:44	06:48 16:51	07:28 16:23
4	07:47 16:35	07:25 17:16	06:41 17:56	06:42 19:38	05:51 20:17	05:19 20:51	05:43 (5) 20:59	05:47 (5) 20:32	06:30 19:40	07:07 18:42	06:49 16:50	07:29 16:23
5	07:47 16:36	07:24 17:17	06:39 17:58	06:40 19:39	05:49 20:18	05:18 20:51	05:43 (5) 20:59	05:48 (5) 20:31	06:31 19:38	07:09 18:40	06:51 16:48	07:31 16:23
6	07:47 16:37	07:23 17:19	06:37 17:59	06:38 19:40	05:48 20:19	05:18 20:52	05:42 (5) 20:58	05:48 (5) 20:29	06:32 19:36	07:10 18:38	06:52 16:47	07:32 16:22
7	07:47 16:38	07:21 17:20	06:35 18:00	06:37 19:42	05:46 20:20	05:18 20:53	05:42 (5) 20:58	05:49 (5) 20:28	06:34 19:34	07:11 18:37	06:54 16:46	07:33 16:22
8	07:47 16:39	07:20 17:22	07:34 19:02	06:35 19:43	05:45 20:22	05:17 20:54	05:42 (5) 20:58	05:50 (5) 20:26	06:35 19:33	07:13 18:35	06:55 16:44	07:34 16:22
9	07:46 16:40	07:19 17:23	07:32 19:03	06:33 19:44	05:43 20:23	05:17 20:54	05:41 (5) 20:57	05:50 (5) 20:25	06:36 19:31	07:14 18:33	06:57 16:43	07:35 16:22
10	07:46 16:41	07:17 17:25	07:30 19:04	06:31 19:45	05:42 20:24	05:17 20:55	05:41 (5) 20:57	05:51 (6) 20:23	06:37 19:29	07:15 18:15	06:58 16:42	07:36 16:22
11	07:46 16:43	07:16 17:26	07:28 19:06	06:29 19:47	05:41 20:25	05:16 20:55	05:41 (5) 20:56	05:52 (6) 20:22	06:39 19:27	07:16 18:29	06:59 16:41	07:37 16:22
12	07:45 16:44	07:14 17:28	07:26 19:07	06:27 19:48	05:40 20:27	05:16 20:56	05:41 (5) 20:55	05:53 (6) 20:20	06:40 19:25	07:18 18:27	07:01 16:39	07:37 16:22
13	07:45 16:45	07:13 17:29	07:24 19:09	06:26 19:49	05:38 20:28	05:16 20:57	05:41 (5) 20:55	05:54 (6) 20:19	06:41 19:23	07:19 18:25	07:02 16:38	07:38 16:22
14	07:44 16:46	07:11 17:30	07:22 19:10	06:24 19:51	05:37 20:29	05:16 20:57	05:41 (5) 20:54	05:54 (6) 20:17	06:42 19:21	07:20 18:24	07:04 16:37	07:39 16:22
15	07:44 16:48	07:10 17:32	07:20 19:11	06:22 19:52	05:36 20:30	05:16 20:58	05:41 (5) 20:53	05:55 (6) 20:16	06:44 19:19	07:22 18:22	07:05 16:36	07:40 16:22
16	07:43 16:49	07:08 17:33	07:19 19:13	06:20 19:53	05:35 20:31	05:16 20:58	05:41 (5) 20:53	05:56 (6) 20:14	06:07 19:17	07:23 18:20	07:06 16:35	07:41 16:22
17	07:43 16:50	07:07 17:35	07:17 19:14	06:18 19:55	05:34 20:32	05:16 20:58	05:41 (5) 20:52	05:57 (6) 20:12	06:08 19:15	07:24 18:18	07:08 16:34	07:41 16:23
18	07:42 16:52	07:05 17:36	07:15 19:15	06:17 19:56	05:32 20:34	05:16 20:59	05:41 (5) 20:51	05:58 (6) 20:11	06:09 19:13	07:26 18:17	07:09 16:33	07:42 16:23
19	07:41 16:53	07:03 17:38	07:13 19:17	06:15 19:57	05:31 20:35	05:16 20:59	05:41 (5) 20:50	05:59 (6) 20:09	06:10 19:11	07:27 18:15	07:11 16:32	07:43 16:23
20	07:41 16:54	07:02 17:39	07:11 19:18	06:13 19:58	05:30 20:36	05:16 20:59	05:41 (5) 20:49	06:00 (6) 20:07	06:11 19:09	07:29 18:13	07:12 16:31	07:43 16:24
21	07:40 16:56	07:00 17:41	07:09 19:19	06:11 20:00	05:29 20:37	05:16 21:00	05:41 (5) 20:48	06:01 (6) 20:06	06:13 19:07	07:30 18:11	07:13 16:30	07:44 16:24
22	07:39 16:57	06:58 17:42	07:07 19:21	06:10 20:01	05:28 20:38	05:16 21:00	05:42 (5) 20:47	06:02 (6) 20:04	06:14 19:05	07:31 18:10	07:15 16:30	07:44 16:25
23	07:38 16:58	06:57 17:43	07:05 19:22	06:08 20:02	05:27 20:39	05:17 21:00	05:42 (5) 20:46	06:03 (6) 20:02	06:15 19:03	07:33 18:08	07:16 16:29	07:45 16:25
24	07:37 17:00	06:55 17:45	07:03 19:23	06:06 20:04	05:26 20:40	05:17 21:00	05:42 (5) 20:45	06:04 (6) 20:00	06:16 19:01	07:34 18:06	07:17 16:28	07:45 16:26
25	07:36 17:01	06:53 17:46	07:01 19:24	06:05 20:05	05:26 20:41	05:17 21:00	05:42 (5) 20:44	06:05 (6) 19:59	06:18 19:00	07:35 18:05	07:19 16:27	07:46 16:26
26	07:35 17:03	06:52 17:48	06:59 19:26	06:03 20:06	05:25 20:42	05:18 21:00	05:43 (5) 20:43	06:06 (6) 19:57	06:19 18:58	07:37 18:03	07:20 16:27	07:46 16:27
27	07:34 17:04	06:50 17:49	06:57 19:27	06:01 20:08	05:24 20:43	05:18 21:00	05:43 (5) 20:42	06:07 (6) 19:55	06:58 18:56	07:38 18:02	07:21 16:26	07:46 16:28
28	07:33 17:05	06:48 17:51	06:56 19:28	06:00 20:09	05:23 20:44	05:18 21:00	05:44 (5) 20:41	06:08 (6) 19:53	07:00 18:54	07:40 18:00	07:22 16:25	07:47 16:28
29	07:32 17:07		06:54 19:30	05:58 20:10	05:22 20:45	05:19 21:00	05:44 (5) 20:40	06:23 19:51	07:01 18:52	07:41 17:58	07:24 16:25	07:47 16:29
30	07:31 17:08		06:52 19:31	05:57 20:11	05:22 20:46	05:19 21:00	05:45 (5) 20:39	06:24 19:49	07:02 18:50	07:42 17:57	07:25 16:24	07:47 16:30
31	07:30 17:10		06:50 19:32	05:57 20:11	05:21 20:47	05:19 21:00	05:45 (5) 20:37	06:25 19:48	07:04 17:55	07:44 17:55		07:47 16:31
Potential sun hours	283	290	369	406	462	470	475	437	377	340	286	271
Total, worst case					218	741	484					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

Calculation: 2024-04-03\_ROA\_6xN163-7.0-HH118m\_worst-case\_lm Shadow receptor: B - Shadow Receptor: 1.0 × 1.0 Azimuth: 3.2° Slope: 90.0° (8)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:47 16:32	07:29 17:11	06:46 17:52	06:48 19:34	05:55 20:13	05:20 20:48	05:20 21:00	05:48 20:36	06:26 19:46	07:03 18:48	06:45 16:54	07:26 16:24
2	07:47 16:33	07:28 17:13	06:44 17:53	06:46 19:35	05:53 20:14	05:20 20:49	05:20 21:00	05:50 20:35	06:27 19:44	07:05 18:46	06:47 16:53	07:27 16:24
3	07:47 16:34	07:26 17:14	06:43 17:55	06:44 19:36	05:52 20:15	05:19 20:50	05:21 20:59	05:51 20:33	06:29 19:42	07:06 18:44	06:48 16:51	07:28 16:23
4	07:47 16:35	07:25 17:16	06:41 17:56	06:42 19:38	05:51 20:16	05:19 20:50	05:22 20:59	05:52 20:32	06:30 19:40	07:07 18:42	06:49 16:50	07:29 16:23
5	07:47 16:36	07:24 17:17	06:39 17:58	06:40 19:39	05:49 20:18	05:18 20:51	05:22 20:59	05:53 20:31	06:31 19:38	07:09 18:40	06:51 16:48	07:30 16:23
6	07:47 16:37	07:23 17:19	06:37 17:59	06:38 19:40	05:48 20:19	05:18 20:52	05:23 20:58	05:54 20:29	06:32 19:36	07:10 18:38	06:52 16:47	07:31 16:22
7	07:47 16:38	07:21 17:20	06:35 18:00	06:37 19:41	05:46 20:20	05:18 20:53	05:24 20:58	05:56 20:28	06:34 19:34	07:11 18:37	06:54 16:46	07:33 16:22
8	07:47 16:39	07:20 17:22	06:34 19:02	06:35 19:43	05:45 20:21	05:17 20:53	05:24 20:57	05:57 20:26	06:35 19:32	07:12 18:35	06:55 16:44	07:34 16:22
9	07:46 16:40	07:19 17:23	06:32 19:03	06:33 19:44	05:43 20:23	05:17 20:54	05:25 20:57	05:58 20:25	06:36 19:31	07:14 18:33	06:56 16:43	07:35 16:22
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31	07:30 17:10		06:50 19:32		05:21 20:47		05:47 20:37	06:25 19:48		07:44 17:55		07:47 16:31
Potential sun hours	283	290	369	406	462	469	475	437	377	340	286	271
Total, worst case												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

Calculation: 2024-04-03\_ROA\_6xN163-7.0-HH118m\_worst-case\_lm Shadow receptor: C - Shadow Receptor: 1.0 × 1.0 Azimuth: 3.2° Slope: 90.0° (9)  
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:  
The sun is shining all the day, from sunrise to sunset  
The rotor plane is always perpendicular to the line from the WTG to the sun  
The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:47 16:32	07:29 17:11	06:46 17:52	06:48 19:34	05:55 20:13	05:20 20:48	05:20 21:00	05:48 20:36	06:26 19:46	07:03 18:48	06:45 16:54	07:26 16:24
2	07:47 16:33	07:28 17:13	06:44 17:53	06:46 19:35	05:53 20:14	05:20 20:49	05:20 21:00	05:50 20:35	06:27 19:44	07:05 18:46	06:47 16:53	07:27 16:24
3	07:47 16:34	07:26 17:14	06:43 17:55	06:44 19:36	05:52 20:15	05:19 20:50	05:21 20:59	05:51 20:33	06:29 19:42	07:06 18:44	06:48 16:51	07:28 16:23
4	07:47 16:35	07:25 17:16	06:41 17:56	06:42 19:38	05:51 20:16	05:19 20:50	05:22 20:59	05:52 20:32	06:30 19:40	07:07 18:42	06:49 16:50	07:29 16:23
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31	07:30 17:10		06:50 19:32		05:21 20:47		05:47 20:37	06:25 19:48		07:44 17:55		07:47 16:31
Potential sun hours	283	290	369	406	462	469	475	437	377	340	286	271
Total, worst case												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

Calculation: 2024-04-03\_ROA\_6xN163-7.0-HH118m\_worst-case\_lm Shadow receptor: D - Shadow Receptor: 1.0 x 1.0 Azimuth: 3.2° Slope: 90.0° (10)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:48 16:32	07:29 17:11	06:46 17:52	06:48 19:34	05:55 20:13	05:20 20:48	05:20 21:00	05:48 20:36	06:26 19:46	07:04 18:48	06:45 16:54	07:26 16:24
2	07:48 16:33	07:28 17:13	06:45 17:53	06:46 19:35	05:53 20:14	05:20 20:49	05:20 21:00	05:49 20:35	06:27 19:44	07:05 18:46	06:47 16:52	07:27 16:23
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31	07:30 17:10		06:50 19:32		05:21 20:47		05:47 20:38	06:25 19:48		07:44 17:55		07:48 16:31
Potential sun hours Total, worst case	283	290	369	406	463	470	475	438	377	340	286	271

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

Calculation: 2024-04-03\_ROA\_6xN163-7.0-HH118m\_worst-case\_lm Shadow receptor: E - Shadow Receptor: 1.0 x 1.0 Azimuth: 3.2° Slope: 90.0° (11)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:47 16:32	07:29 17:11	06:46 17:52	06:48 19:33	05:55 20:12	05:20 20:48	05:20 21:00	05:48 20:36	06:26 19:46	07:03 18:48	06:45 16:54	07:26 16:24
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Potential sun hours	283	290	369	406	462	470	475	437	377	340	286	271
Total, worst case												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

Calculation: 2024-04-03\_ROA\_6xN163-7.0-HH118m\_worst-case\_lm Shadow receptor: F - Shadow Receptor: 1.0 x 1.0 Azimuth: 3.2° Slope: 90.0° (12)

### Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
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Potential sun hours	283	290	369	406	462	469	475	437	377	340	286	271
Total, worst case												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## SHADOW - Calendar

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### Assumptions for shadow calculations

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23	07:38 16:58	06:57 17:43	07:05 19:22	06:08 20:02	05:27 20:39	05:17 21:00	05:38 20:46	06:15 20:02	06:53 19:03	07:32 18:08	07:16 16:29	07:45 16:25
24	07:37 17:00	06:55 17:45	07:03 19:23	06:06 20:03	05:26 20:40	05:17 21:00	05:39 20:45	06:16 20:00	06:55 19:01	07:34 18:06	07:17 16:28	07:45 16:26
25	07:36 17:01	06:53 17:46	07:01 19:24	06:04 20:05	05:25 20:41	05:17 21:00	05:40 20:44	06:17 19:58	06:56 18:59	07:35 18:05	07:18 16:27	07:46 16:26
26	07:35 17:02	06:51 17:48	06:59 19:26	06:03 20:06	05:25 20:42	05:17 21:00	05:41 20:43	06:19 19:57	06:57 18:57	07:37 18:03	07:20 16:26	07:46 16:27
27	07:34 17:04	06:50 17:49	06:57 19:27	06:01 20:07	05:24 20:43	05:18 21:00	05:43 20:42	06:20 19:55	06:58 18:55	07:38 18:01	07:21 16:26	07:46 16:28
28	07:33 17:05	06:48 17:50	06:55 19:28	06:00 20:09	05:23 20:44	05:18 21:00	05:44 20:41	06:21 19:53	07:00 18:54	07:39 18:00	07:22 16:25	07:46 16:28
29	07:32 17:07		06:53 19:30	05:58 20:10	05:22 20:45	05:19 21:00	05:45 20:40	06:22 19:51	07:01 18:52	07:41 17:58	07:23 16:25	07:47 16:29
30	07:31 17:08		06:52 19:31	05:56 20:11	05:22 20:46	05:19 21:00	05:46 20:38	06:24 19:49	07:02 18:50	07:42 17:57	07:25 16:24	07:47 16:30
31	07:30 17:10		06:50 19:32		05:21 20:47		05:47 20:37	06:25 19:47		07:44 17:55		07:47 16:31
Potential sun hours	283	290	369	406	462	470	475	437	377	340	286	271
Total, worst case												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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## APPENDIX L SOUND

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## 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 S.1).

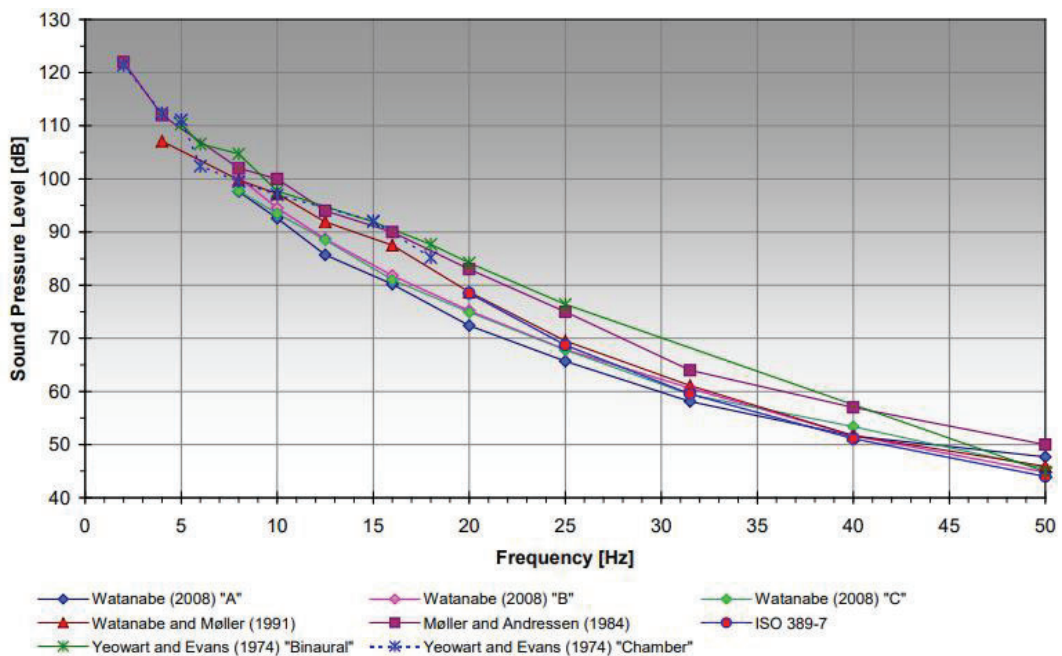


Figure S.1. Threshold of Hearing Data from Various Papers (Source: HGC, 2010)

**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 S.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 S.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
<b>Natural Sources</b>	
Adjacent to Beach – 25 m from high water	75
Cliff Face – 250 m from coastline	69
Inland Forest – 8 km from coastline	57
<b>Anthropogenic Sources</b>	
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.

## DECIBEL - Main Result

Calculation: 2024-08-15\_6xN163-7.0-HH118m\_without-serrations\_lm

### Noise calculation model:

ISO 9613-2 General

### Wind speed (at 10 m height):

Highest noise value

### Ground attenuation:

General, terrain specific

Ground factor for porous ground: 0.5

Area object with hard ground: Area object (): REGIONS\_CA\_Rhodena aktuell

Area type with hard ground: water

Ground factor for hard ground: 0.0

Topographic screening, Reduction: 0.0 dB

### Meteorological coefficient, C0:

Selected option: Fixed value: 0.0 dB

### Type of demand in calculation:

2: WTG plus ambient noise is compared to ambient noise plus margin (FR 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

Model: 5.0 dB(A)

### Height above ground level, when no value in NSA object:

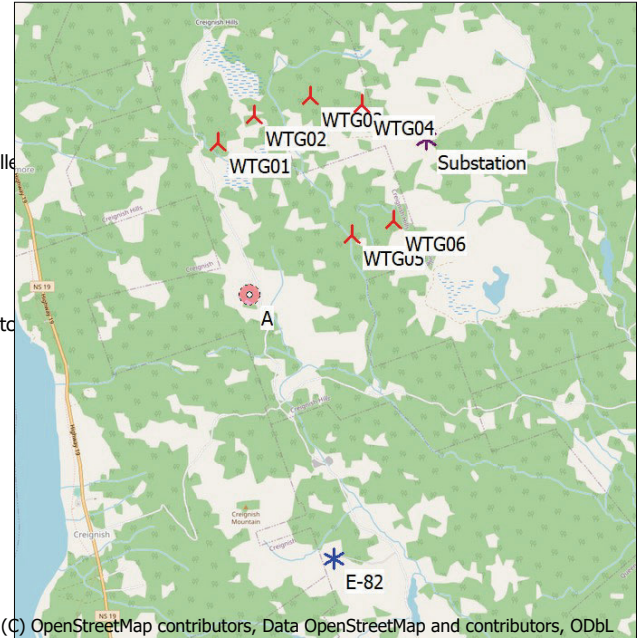
0.0 m; Allow override of model height with height from NSA object

### 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)



All coordinates are in  
UTM (north)-NAD83 (US+CA) Zone: 20

## WTGs

	Easting	Northing	Z	Row data/Description	WTG type			Noise data			Wind speed [m/s]	LwA,ref [dB(A)]		
					Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]			Creator	Name
E-82	622,482	5,064,995	240.9	ENERCON E-82 2000 82.0 !O! h... Yes	Yes	ENERCON	E-82-2,000	2,000	82.0	78.3	USER	PS_CA0009_ROA_TRZ_E-82_E2_Mode_0_2000kW_103.1dBA	7.2	103.1
Substation	623,367	5,069,429	252.9	Substation 42 1.0 !-! hub: 4.0 ... No	No	Substation	-42	42	1.0	4.0	USER	PS_CA_0009_ROA_Project-substation_98dBA	(95%)	98.0
WTG01	621,161	5,069,342	230.0	NORDEX N163-6-X 7000 163.0 !... Yes	Yes	NORDEX	N163-6-X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6-X_Mode00_7000kW_109.4dB	7.0	109.4
WTG02	621,548	5,069,635	239.9	NORDEX N163-6-X 7000 163.0 !... Yes	Yes	NORDEX	N163-6-X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6-X_Mode00_7000kW_109.4dB	7.0	109.4
WTG03	622,126	5,069,843	242.6	NORDEX N163-6-X 7000 163.0 !... Yes	Yes	NORDEX	N163-6-X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6-X_Mode00_7000kW_109.4dB	7.0	109.4
WTG04	622,679	5,069,776	258.0	NORDEX N163-6-X 7000 163.0 !... Yes	Yes	NORDEX	N163-6-X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6-X_Mode00_7000kW_109.4dB	7.0	109.4
WTG05	622,605	5,068,400	210.0	NORDEX N163-6-X 7000 163.0 !... Yes	Yes	NORDEX	N163-6-X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6-X_Mode00_7000kW_109.4dB	7.0	109.4
WTG06	623,043	5,068,558	220.0	NORDEX N163-6-X 7000 163.0 !... Yes	Yes	NORDEX	N163-6-X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6-X_Mode00_7000kW_109.4dB	7.0	109.4

## Calculation Results

### Sound level

#### Noise sensitive area

No.	Name	Easting	Northing	Z	Immission height [m]	Ambient noise [dB(A)]	Additional exposure [dB(A)]	Ambient+WTGs [dB(A)]	Sound level		Additional exposure [dB(A)]	Demands fulfilled ? Noise
									From WTGs [dB(A)]	Ambient+WTGs [dB(A)]		
A	R1	621,528	5,067,757	217.4	4.5	35.1	0.0	40.0	37.4	39.4	4.3	Yes

### Distances (m)

WTG	A
E-82	2922
Substation	2486
WTG01	1627
WTG02	1879
WTG03	2171
WTG04	2325
WTG05	1255
WTG06	1715

## DECIBEL - Detailed results

**Calculation:** 2024-08-15\_6xN163-7.0-HH118m\_without-serrations\_lm **Noise calculation model:** ISO 9613-2 General 10.0 m/s  
**Assumptions**

Calculated  $L(DW) = LWA_{ref} + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet - Cscreen$   
 (when calculated with ground attenuation, then  $Dc = D_{omega}$ )

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction
Cscreen:	Topographic screening

## Calculation Results

### Noise sensitive area: A R1

Highest noise value

#### WTG

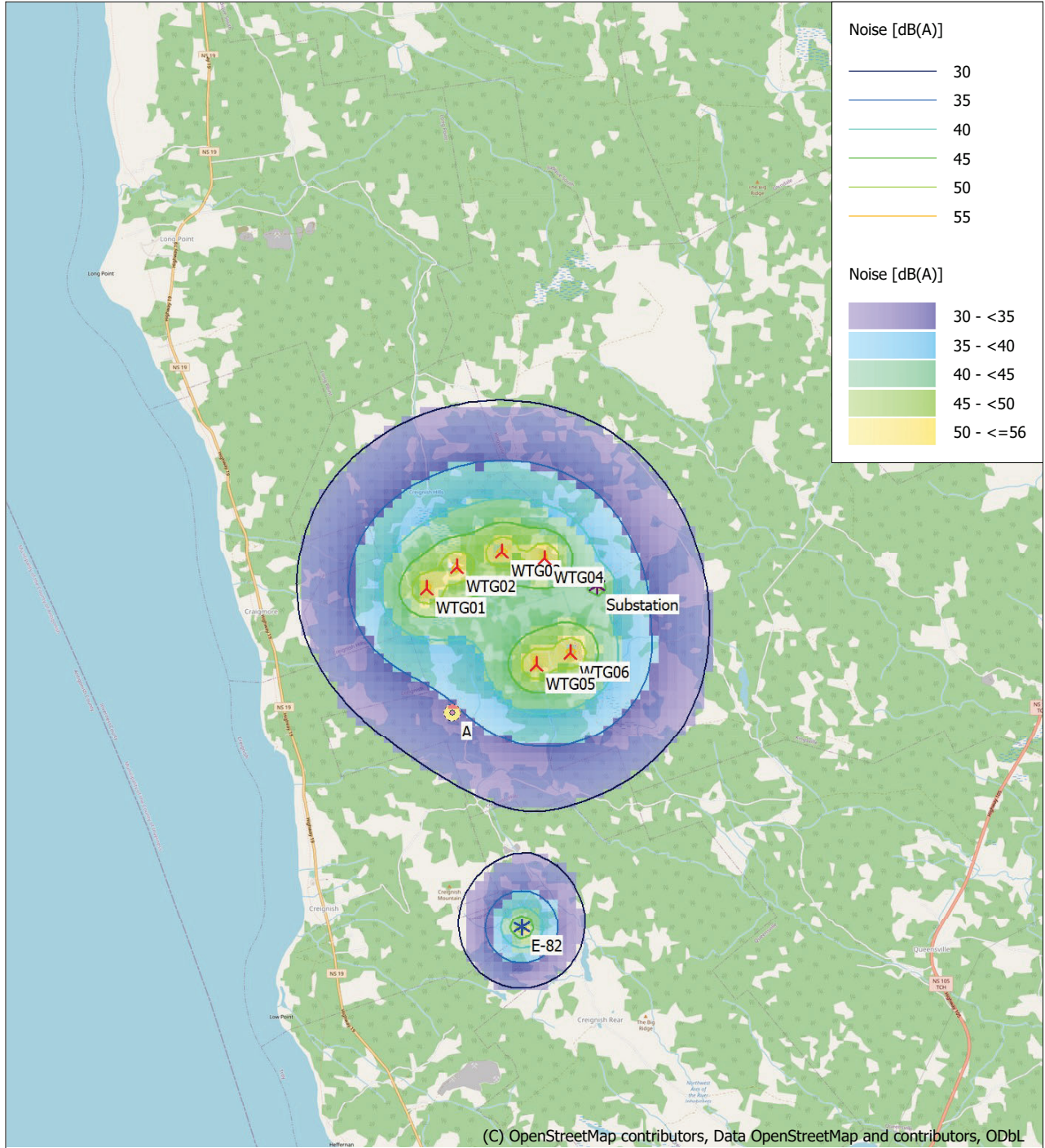
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LWA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
E-82	2,922	2,923	<b>18.40</b>	103.1	0.00	80.32	-	-	0.00	0.00	-
Substation	2,486	2,486	<b>15.89</b>	98.0	0.00	78.91	-	-	0.00	0.00	-
WTG01	1,627	1,632	<b>30.06</b>	109.4	0.00	75.25	-	-	0.00	0.00	-
WTG02	1,879	1,884	<b>28.33</b>	109.4	0.00	76.50	-	-	0.00	0.00	-
WTG03	2,171	2,175	<b>26.56</b>	109.4	0.00	77.75	-	-	0.00	0.00	-
WTG04	2,325	2,330	<b>25.70</b>	109.4	0.00	78.35	-	-	0.00	0.00	-
WTG05	1,255	1,259	<b>33.12</b>	109.4	0.00	73.00	-	-	0.00	0.00	-
WTG06	1,715	1,719	<b>29.44</b>	109.4	0.00	75.70	-	-	0.00	0.00	-
Sum			<b>37.45</b>								

- Data undefined due to calculation with octave data



## DECIBEL - Map Highest noise value

Calculation: 2024-08-15\_6xN163-7.0-HH118m\_without-serrations\_lm



Map: EMD OpenStreetMap , Print scale 1:75,000, Map center UTM (north)-NAD83 (US+CA) Zone: 20 East: 622,271 North: 5,069,406  
 \* New WTG      \* Existing WTG      ■ Noise sensitive area  
 Noise calculation model: ISO 9613-2 General. Wind speed: Highest noise value  
 Height above sea level from active line object

Project:

CA\_Rhodena

Licensed user:

**ABO Energy GmbH & Co. KGaA**

Unter den Eichen, 7  
DE-65195 Wiesbaden  
+49 611 26765 0

Lukas Mylonas / lukas.mylonas@aboenergy.com

Calculated:

21.10.2024 16:24/4.1.254

## DECIBEL - Main Result

**Calculation:** 2024-10-21\_6xN163-7.0-HH118m\_Low-Frequency\_without-serrations\_lm

### Noise calculation model:

Finland Low frequency

### Wind speed (at 10 m height):

Highest noise value at receptor

### Spectral distribution:

From 20.0 Hz to 200.0 Hz

### Meteorological coefficient, C0:

Selected option: Fixed value: 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

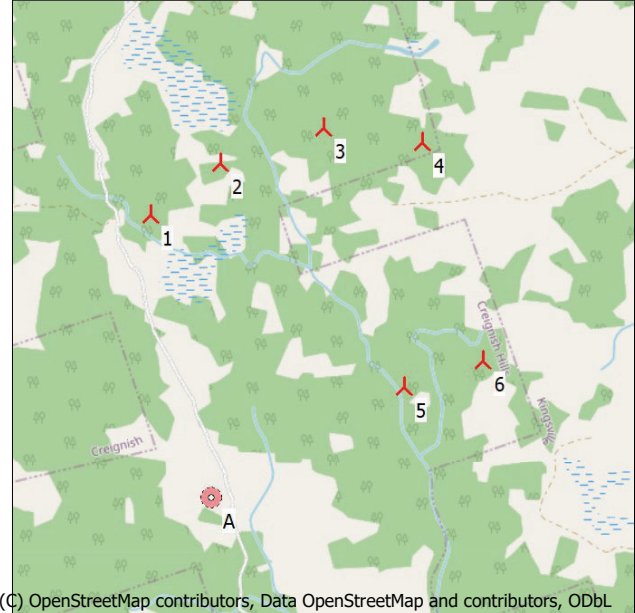
UTM (north)-NAD83 (US+CA) Zone: 20

All coordinates are in

UTM (north)-NAD83 (US+CA) 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				
1 621,161	5,069,342	230.0	NORDEX N163-6.X 7000 163....	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6.X_Mode00_7000kW_109.4dB	6.0	99.3	12.0	100.1
2 621,548	5,069,635	239.9	NORDEX N163-6.X 7000 163....	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6.X_Mode00_7000kW_109.4dB	6.0	99.3	12.0	100.1
3 622,126	5,069,843	242.6	NORDEX N163-6.X 7000 163....	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6.X_Mode00_7000kW_109.4dB	6.0	99.3	12.0	100.1
4 622,679	5,069,776	258.0	NORDEX N163-6.X 7000 163....	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6.X_Mode00_7000kW_109.4dB	6.0	99.3	12.0	100.1
5 622,605	5,068,400	210.0	NORDEX N163-6.X 7000 163....	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6.X_Mode00_7000kW_109.4dB	6.0	99.3	12.0	100.1
6 623,043	5,068,558	220.0	NORDEX N163-6.X 7000 163....	Yes	NORDEX	N163-6.X-7,000	7,000	163.0	118.0	USER	TRZ_N163-6.X_Mode00_7000kW_109.4dB	6.0	99.3	12.0	100.1



## Calculation Results

### Sound level

#### Noise sensitive area

No.	Name	Easting	Northing	Z	Immission height	Frequency	Noise	WTG noise	Demands fulfilled ?
				[m]	[m]	[Hz]	[dB]	[dB]	
A	R1 - low frequency	621,528	5,067,755	217.3	4.0	125.0	36.0	31.5	Yes

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

### Distances (m)

WTG	A
1	1628
2	1880
3	2172
4	2326
5	1255
6	1715

## DECIBEL - Detailed results

**Calculation:** 2024-10-21\_6xN163-7.0-HH118m\_Low-Frequency\_without-serrations\_lm **Noise calculation model:** Finland Low frequency Assumptions

Cmet: Meteorological correction

### Calculation Results

#### Noise sensitive area: A R1 - low frequency

Highest noise value at receptor: 7.0 m/s

#### WTG

No.	Distance [m]	Sound distance [m]	Frequency [Hz]	Calculated [dB]	LwA,ref [dB(A)]	Aatm [dB]	Agr [dB]	Lsigma [dB]
1	1,628	1,633	20	<b>45.34</b>	70.5	0.00	5.60	6.00
1			25	<b>42.71</b>	73.9	0.03	5.40	6.00
1			32	<b>38.49</b>	76.2	0.05	5.20	7.00
1			40	<b>35.46</b>	78.2	0.08	5.00	7.00
1			50	<b>31.73</b>	80.2	0.11	4.70	8.00
1			63	<b>29.26</b>	83.2	0.18	4.30	9.00
1			80	<b>26.88</b>	86.2	0.26	3.70	10.00
1			100	<b>24.63</b>	89.2	0.41	3.00	11.00
1			125	<b>24.22</b>	94.2	0.62	1.80	12.00
1			160	<b>18.41</b>	94.2	0.93	0.00	13.00
1	200	<b>15.50</b>	95.2	1.34	0.00	14.00		
2	1,880	1,885	20	<b>44.10</b>	70.5	0.00	5.60	6.00
2			25	<b>41.46</b>	73.9	0.04	5.40	6.00
2			32	<b>37.24</b>	76.2	0.06	5.20	7.00
2			40	<b>34.20</b>	78.2	0.09	5.00	7.00
2			50	<b>30.46</b>	80.2	0.13	4.70	8.00
2			63	<b>27.99</b>	83.2	0.21	4.30	9.00
2			80	<b>25.59</b>	86.2	0.30	3.70	10.00
2			100	<b>23.32</b>	89.2	0.47	3.00	11.00
2			125	<b>22.88</b>	94.2	0.72	1.80	12.00
2			160	<b>17.02</b>	94.2	1.07	0.00	13.00
2	200	<b>14.05</b>	95.2	1.55	0.00	14.00		
3	2,172	2,176	20	<b>42.85</b>	70.5	0.00	5.60	6.00
3			25	<b>40.20</b>	73.9	0.04	5.40	6.00
3			32	<b>35.98</b>	76.2	0.07	5.20	7.00
3			40	<b>32.94</b>	78.2	0.11	5.00	7.00
3			50	<b>29.19</b>	80.2	0.15	4.70	8.00
3			63	<b>26.71</b>	83.2	0.24	4.30	9.00
3			80	<b>24.30</b>	86.2	0.35	3.70	10.00
3			100	<b>22.00</b>	89.2	0.54	3.00	11.00
3			125	<b>21.52</b>	94.2	0.83	1.80	12.00
3			160	<b>15.61</b>	94.2	1.24	0.00	13.00
3	200	<b>12.56</b>	95.2	1.78	0.00	14.00		
4	2,326	2,331	20	<b>42.25</b>	70.5	0.00	5.60	6.00
4			25	<b>39.60</b>	73.9	0.05	5.40	6.00
4			32	<b>35.38</b>	76.2	0.07	5.20	7.00
4			40	<b>32.33</b>	78.2	0.12	5.00	7.00
4			50	<b>28.59</b>	80.2	0.16	4.70	8.00
4			63	<b>26.09</b>	83.2	0.26	4.30	9.00
4			80	<b>23.68</b>	86.2	0.37	3.70	10.00
4			100	<b>21.37</b>	89.2	0.58	3.00	11.00
4			125	<b>20.86</b>	94.2	0.89	1.80	12.00
4			160	<b>14.92</b>	94.2	1.33	0.00	13.00
4	200	<b>11.84</b>	95.2	1.91	0.00	14.00		
5	1,255	1,260	20	<b>47.60</b>	70.5	0.00	5.60	6.00
5			25	<b>44.97</b>	73.9	0.03	5.40	6.00
5			32	<b>40.76</b>	76.2	0.04	5.20	7.00
5			40	<b>37.73</b>	78.2	0.06	5.00	7.00
5			50	<b>34.01</b>	80.2	0.09	4.70	8.00
5			63	<b>31.56</b>	83.2	0.14	4.30	9.00
5			80	<b>29.19</b>	86.2	0.20	3.70	10.00
5	100	<b>26.98</b>	89.2	0.31	3.00	11.00		

To be continued on next page...

Project:

CA\_Rhodena

Licensed user:

ABO Energy GmbH & Co. KGaA

Unter den Eichen, 7

DE-65195 Wiesbaden

+49 611 26765 0

Lukas Mylonas / lukas.mylonas@aboenergy.com

Calculated:

21.10.2024 16:24/4.1.254

## DECIBEL - Detailed results

Calculation: 2024-10-21\_6xN163-7.0-HH118m\_Low-Frequency\_without-serrations\_lm Noise calculation model: Finland Low frequency

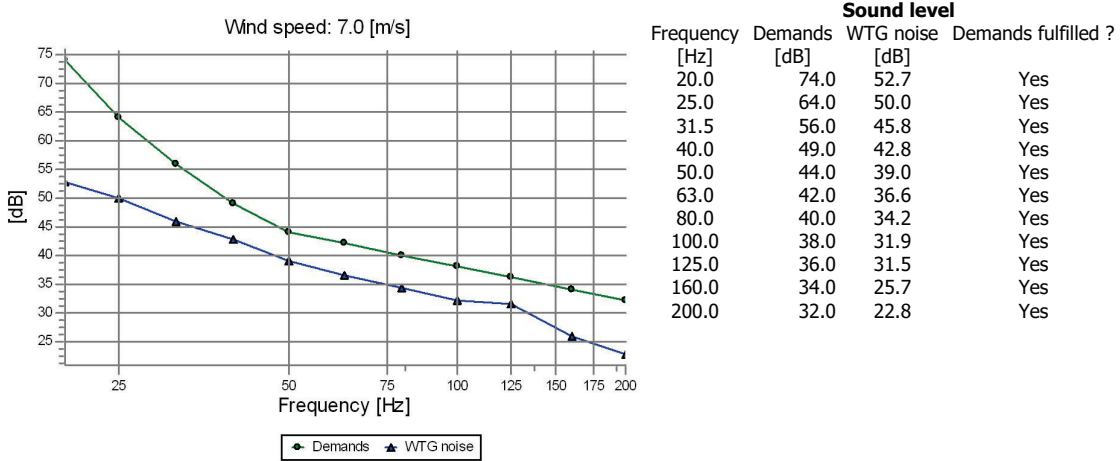
...continued from previous page

### WTG

No.	Distance [m]	Sound distance [m]	Frequency [Hz]	Calculated [dB]	LwA,ref [dB(A)]	Aatm [dB]	Agr [dB]	Lsigma [dB]
5			125	<b>26.62</b>	94.2	0.48	1.80	12.00
5			160	<b>20.88</b>	94.2	0.72	0.00	13.00
5			200	<b>18.06</b>	95.2	1.03	0.00	14.00
6	1,715	1,719						
6			20	<b>44.89</b>	70.5	0.00	5.60	6.00
6			25	<b>42.26</b>	73.9	0.03	5.40	6.00
6			32	<b>38.04</b>	76.2	0.05	5.20	7.00
6			40	<b>35.01</b>	78.2	0.09	5.00	7.00
6			50	<b>31.27</b>	80.2	0.12	4.70	8.00
6			63	<b>28.80</b>	83.2	0.19	4.30	9.00
6			80	<b>26.42</b>	86.2	0.28	3.70	10.00
6			100	<b>24.16</b>	89.2	0.43	3.00	11.00
6			125	<b>23.74</b>	94.2	0.65	1.80	12.00
6			160	<b>17.91</b>	94.2	0.98	0.00	13.00
6			200	<b>14.98</b>	95.2	1.41	0.00	14.00
Sum								
Sum			20	<b>52.65</b>				
Sum			25	<b>50.02</b>				
Sum			32	<b>45.80</b>				
Sum			40	<b>42.77</b>				
Sum			50	<b>39.04</b>				
Sum			63	<b>36.57</b>				
Sum			80	<b>34.18</b>				
Sum			100	<b>31.93</b>				
Sum			125	<b>31.52</b>				
Sum			160	<b>25.70</b>				
Sum			200	<b>22.78</b>				

## DECIBEL - Detailed results, graphic

Calculation: 2024-10-21\_6xN163-7.0-HH118m\_Low-Frequency\_without-serrations\_lm **Noise calculation model:** Finland Low frequency  
**A R1 - low frequency**



Project:

CA\_Rhodena

Licensed user:

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Calculated:

21.10.2024 16:24/4.1.254

## DECIBEL - Assumptions for noise calculation

Calculation: 2024-10-21\_6xN163-7.0-HH118m\_Low-Frequency\_without-serrations\_lm

### Noise calculation model:

Finland Low frequency

### Wind speed (at 10 m height):

Highest noise value at receptor

### Spectral distribution:

From 20.0 Hz to 200.0 Hz

### Meteorological coefficient, C0:

Selected option: Fixed value: 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)

### Low frequency calculation

dLsigma

20.0 Hz	25.0 Hz	31.5 Hz	40.0 Hz	50.0 Hz	63.0 Hz	80.0 Hz	100.0 Hz	125.0 Hz	160.0 Hz	200.0 Hz
[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
6.0	6.0	7.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0

All coordinates are in

UTM (north)-NAD83 (US+CA) Zone: 20

WTG: NORDEX N163-6.X 7000 163.0 !O!

Noise: TRZ\_N163-6.X\_Mode00\_7000kW\_109.4dB

Source Source/Date Creator Edited

Man./CHI 13.10.2023 USER 11.03.2024 13:16

F008\_277\_A17\_EN Rev.09 (2023-10-13)

Status	Hub height	Wind speed	LwA,ref	20.0 Hz	25.0 Hz	31.5 Hz	40.0 Hz	50.0 Hz	63.0 Hz	80.0 Hz	100.0 Hz	125.0 Hz	160.0 Hz	200.0 Hz
	[m]	[m/s]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
From Windcat	118.0	6.0	99.3	69.7	73.1	75.4	77.4	79.4	82.4	85.4	88.4	93.4	93.4	94.4
From Windcat	118.0	7.0	100.1	70.5	73.9	76.2	78.2	80.2	83.2	86.2	89.2	94.2	94.2	95.2
From Windcat	118.0	8.0	100.1	70.5	73.9	76.2	78.2	80.2	83.2	86.2	89.2	94.2	94.2	95.2
From Windcat	118.0	9.0	100.1	70.5	73.9	76.2	78.2	80.2	83.2	86.2	89.2	94.2	94.2	95.2
From Windcat	118.0	10.0	100.1	70.5	73.9	76.2	78.2	80.2	83.2	86.2	89.2	94.2	94.2	95.2
From Windcat	118.0	11.0	100.1	70.5	73.9	76.2	78.2	80.2	83.2	86.2	89.2	94.2	94.2	95.2
From Windcat	118.0	12.0	100.1	70.5	73.9	76.2	78.2	80.2	83.2	86.2	89.2	94.2	94.2	95.2

### Noise sensitive area: A R1 - low frequency

Predefined calculation standard: Residential health guide 2003, indoor - night

Immission height(a.g.l.): 4.5 m

Uncertainty margin: Use default value from calculation model

### No temporal binning

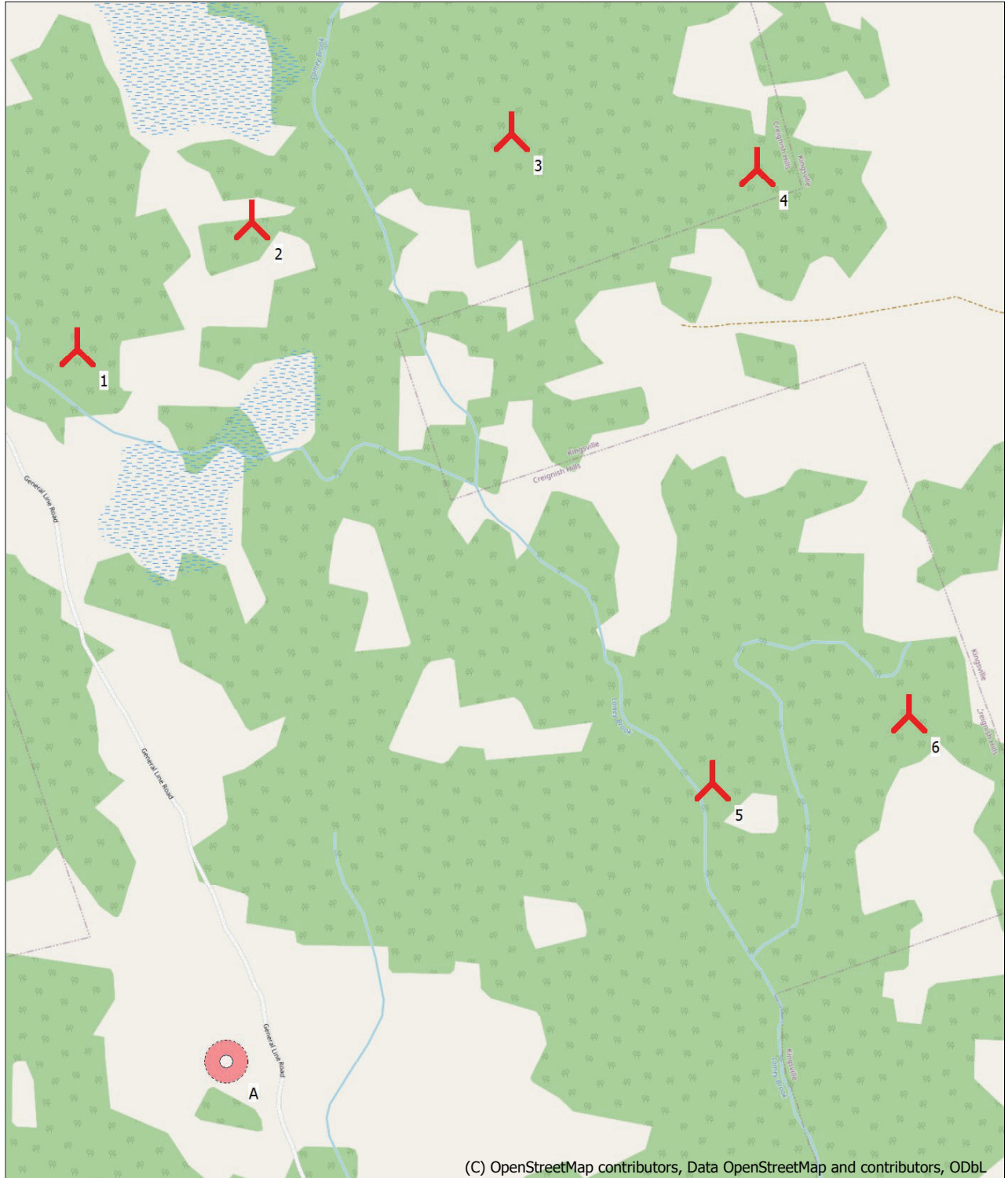
### Noise demand:

20.0 Hz	25.0 Hz	31.5 Hz	40.0 Hz	50.0 Hz	63.0 Hz	80.0 Hz	100.0 Hz	125.0 Hz	160.0 Hz	200.0 Hz
74.0 dB	64.0 dB	56.0 dB	49.0 dB	44.0 dB	42.0 dB	40.0 dB	38.0 dB	36.0 dB	34.0 dB	32.0 dB

### No distance demand

## DECIBEL - Map

Calculation: 2024-10-21\_6xN163-7.0-HH118m\_Low-Frequency\_without-serrations\_lm



Map: EMD OpenStreetMap , Print scale 1:12,500, Map center UTM (north)-NAD83 (US+CA) Zone: 20 East: 622,102 North: 5,068,799  
New WTG Noise sensitive area

APPENDIX M  
PROJECT TEAM CURRICULUM VITAE

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## 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.

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

## 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 CEEA 2012 (November 2012)
- Water Management & Wetland Restoration Training Course, University of Guelph (2010)

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-Present – Senior Reviewer:** Providing senior review and management on several 100 MW+ wind farms in Nova Scotia.

**Post-Approval Work, EverWind Point Tupper Green Hydrogen/Ammonia Project Phase 1, NS, 2023 – Senior Reviewer:** On-going post-approval work (following approval of the EA Registration Document) including the development of environmental management and monitoring plans. These plans are developed to avoid/mitigate potential impacts to nearby environmental and residential receptors throughout the lifespan of the Project.

**Environmental Assessment EverWind Point Tupper Green Hydrogen/Ammonia Project - Phase 1, NS, 2022 – Senior Reviewer:** Completed senior review of field studies and key reporting requirements for the submission of an EA Registration Document for a green ammonia/hydrogen facility located in Cape Breton, NS. This was the first green ammonia/hydrogen facility to be approved in both Nova Scotia and Canada.

### 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.

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## 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

**Wind Power Environmental Assessments, 2022-Present – Project Manager:** Providing project management on several 100 MW+ wind farms in Nova Scotia.

**Environmental Assessment EverWind Point Tupper Green Hydrogen/Ammonia Project - Phase 1, NS, 2022 – Environmental Scientist:** Completed key reporting requirements for the submission of an EA Registration Document for a green ammonia/hydrogen facility located in Cape Breton, NS. This was the first green ammonia/hydrogen facility to be approved in both Nova Scotia and Canada.

**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.

## 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)

**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.

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

- Wetland and Watercourse Assessment
- Wildlife Surveying and Assessment
- Ecological Forestry and Agriculture
- Benthic Invertebrate Analysis
- Environmental Data Collection, Interpretation, and Reporting

## 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 has previously contributed to a research project on bat activity hosted by a global non-profit organization by conducting statistical analysis on acoustic data. Ms. Schultz also 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

**Wind Power Environmental Assessments, 2022-Present – Environmental Scientist/Field Coordinator:** Providing coordination and field work on several 100 MW+ wind farms in Nova Scotia. Coordinated and completed all aspects of field surveys for environmental assessments, including wetland, watercourse, fish & fish habitat, avian, avian radar,

## EDUCATION

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

## TRAINING

- Nova Scotia Watercourse Alteration for Installers (2023)
- 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)

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.

**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.

**Environmental Assessment EverWind Point Tupper Green Hydrogen/Ammonia Project - Phase 1, NS, 2022 – Environmental Scientist:** Completed field studies and key reporting requirements for the submission of an EA Registration Document for a green ammonia/hydrogen facility located in Cape Breton, NS. This was the first green ammonia/hydrogen facility to be approved in both Nova Scotia and Canada.

**Environmental Study, Wind Farm, NS, 2022 – Environmental Scientist:** Reporting on winter wildlife tracking and winter avian surveys for several Environmental Screening Reports.

**Environmental Study, 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.

**Contaminated Site Assessment, Ross Bay Junction, NL, 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.



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## AREAS OF SPECIALIZATION

- Forest management and characterization
- Environmental and carbon modelling
- Stakeholder engagement
- Hydrologic assessment and modelling

## RELEVANT EXPERIENCE

Dr. Foster is an environmental scientist with a special interest in forests, their management, and how people relate to them. More broadly, he is interested in natural resource management and how resources can be utilized sustainably. He has experience in a variety of fieldwork and teaches field work planning, methods, and reporting to undergraduate students at Saint Mary's University.

Dr. Foster completed his PhD in 2024, researching the relationship between forest management and water treatability for potable water supplies. Specifically, his research examined how timber harvesting can be used to reduce watershed dissolved organic carbon (DOC) production to reduce the chemical and financial cost of water treatment in the face of continual and concerning increases in DOC. This study resulted in academic publications on its findings, and forest management recommendations to the region's water utility.

Before this research, David worked for two years as a research associate at Dalhousie University, studying various urban forest and non-urban forest matters. In addition to a contracted characterization of Halifax Regional Municipality's (HRM), urban forest, during this time, he also served as research associate for Prof. William Lahey during the Nova Scotia Independent Review of Forest Practices. He contributed research services, assisted with logistics, and provided writing input, including a report on the history of forest practices review. During this process, he had the opportunity to hear a diverse range of perspectives from stakeholders with contrasting perspectives on natural resource usage, helping to develop an understanding of what is at stake in the management of the natural environment.

## REPRESENTATIVE PROJECTS AND ROLES

### **Wind Power and Infrastructure Environmental Assessments, NS (2024-Ongoing) – Environmental Scientist:**

Supporting writing and editing several sections of a variety of environmental assessment for proposed wind farms and associated infrastructure. Contributions in several biophysical and socioeconomic sections, demonstrating a breadth in competencies related to communicating the findings of environmental assessment.

**Crown Land Forest Stakeholder Engagement, NS (2023-Present) – Chair/Facilitator:** Work with the NS Natural Resources and Renewables as Chair of the Nova Scotia Western Region Crown Land Stakeholder Interaction Committee (WRSIC). This committee is comprised of diverse stakeholders that come together to learn about and contribute to the management of public forests in Nova Scotia. Stakeholders include representatives from industry (mills and silvicultural contractors), Indigenous groups with a specific environmental mandate, NGOs including recreationalist and research groups, elected members of local government, private forest landowners, and more. The group meets at least twice a year to receive updates and provide input on public forest management policy and practice, and to review harvest proposals.

## EDUCATION

- Doctor of Philosophy, Interdisciplinary PhD Program, Dalhousie University, Halifax, NS (2024). Thesis: Mitigating forested water supply carbon loading through timber harvesting.
- Master of Resource and Environmental Management, Dalhousie University, Halifax, NS (2016). Report: Location matters: the importance of tree placement to urban forest values.
- Bachelor of Science, Combined Honours in Biology and Sustainability, Dalhousie University, Halifax, NS (2014). Thesis: Strategic environmental assessment of changes in Bill C-45 to the Navigable Waters Protection Act and potential effects of environmental protection in Canada.

## TRAINING

- St. John's Ambulance First Aid & CPR/AED Level C (2024)
- Environmental Impact Assessment certificate (2014)

**Pockwock Watershed Carbon Loading Study, NS (2018-2024) – PhD Candidate/Lead Researcher:** Completed extensive study of the Pockwock watershed, source of water for more than 1/5<sup>th</sup> of Nova Scotians. Led three summers of fieldwork with research assistants to characterize forest composition, determine hydrologic carbon export, and model watershed hydrology. Wrote custom forest management model and novel implementation of Natural Resources Canada's Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) for use in a programming environment (R). Research was conducted in partnership through a pan-Canadian research network (the forWater network) including other researchers, forest regulators, the regional water utility, forest managers, forestry contractors, ENGOs, and more. He coordinated with diverse stakeholders to ensure that forest management within the watershed during the study period met research objectives and was properly implemented and characterized and met the research goals of the network.

**Community Greening Program, NS (2013-2017) – Coordinator:** Developed and implemented a program of urban green space appreciation, education, and improvement. Creating a program of the Sierra Club Canada Foundation Atlantic Canada Chapter focused on urban green spaces, worked with a diverse range of stakeholders to plan, fund, and carry out urban greening initiatives in HRM, including numerous tree plantings. This required working with local government to obtain permission and support for initiatives, members of the public to gain support and to solicit for participation in local events, and business and organizations to find and otherwise support initiatives. These efforts led to planting over 2,700 trees in HRM and establishing the municipality's first publicly hosted community urban orchard.

## PROFESSIONAL ASSOCIATIONS

- Eco Canada (Environmental Professional in-training)

## AREAS OF SPECIALIZATION

- Wetland and Watercourse Assessment and Delineations
- Wildlife Surveys
- Surface and Groundwater
- Climate Change and GHG Assessments
- Industrial Approvals
- Environmental Approvals

## RELEVANT EXPERIENCE

Mr. Scott joined the Strum team in 2022 and is working as a Junior Environmental Scientist with the Environmental Assessment and Approvals Group. Mr. Scott is experienced in many components of Environmental Assessments, including field surveys, delineations, avian radar analysis, wildlife acoustic analysis, and GHG quantification. In an industrial setting, Mr. Scott has experience managing projects and ensuring regulatory compliance and successful approvals. Mr. Scott is experienced in groundwater monitoring, groundwater development, sampling, and conducting aquifer testing and interpreting results.

Mr. Scott has completed fieldwork and report writing to support wetland permitting, Environmental Management Plans and Environmental Assessments for numerous projects across Nova Scotia. Additionally, Mr. Scott has been involved in fieldwork, report writing, and analysis concerning projects throughout the province relating to Level I/II Groundwater Assessments for Subdivisions, groundwater withdrawal approvals, and groundwater monitoring plan programs.

## REPRESENTATIVE PROJECTS AND ROLES

**Municipal Groundwater Supply Assessment, NS, 2023 – Junior Environmental Scientist:** Worked with a team of groundwater experts to analyze well logs, available pump tests and well chemistry data to inform municipal planning around groundwater supply development. This assessment involved determining the depth and stratification of sediments, yields and water quality to understand the yield and safety of a potential groundwater supply.

**Groundwater Monitoring Program, Canso, NS, 2023 – Junior Environmental Scientist:** Ongoing groundwater monitoring work (following approval of the groundwater monitoring plan), including developing groundwater wells, groundwater sampling, aquifer testing and analysis. The purpose of the monitoring plan is to avoid/mitigate potential impacts to nearby environmental receptors throughout the lifespan of the Project.

**Greenhouse Gas Inventories, NS, 2023 – Present – Junior Environmental Scientist:** Experienced in conducting direct and indirect GHG emission inventories to quantify large-scale industrial impacts and identify areas for mitigation.

**Post-Approval Work, Point Tupper Green Hydrogen/Ammonia Project, NS – Phase 1, NS, 2023 – Junior Environmental Scientist:** Development of the groundwater monitoring plan for the hydrogen/ammonia industrial facility as required following the EA approval. Completed fieldwork to support surface water monitoring.

**Wetland Carbon Sequestration, NS, 2023 – Present – Junior Environmental Scientist:** Designing methods and procedures for fieldwork and subsequent analysis to quantify carbon stored in wetland soils.

## EDUCATION

- Bachelor of Science (Environmental Science), Saint Mary's University, Halifax, NS (2022)

## TRAINING

- Wetland Delineation and Classification Training (2023) – Fern Hill Institution of Plant Classification
- Wetland Ecosystem Services Protocol Atlantic Canada (WESP-AC) Training (2023) – Maritime College of Forestry Technology
- Backpack Electrofishing Training (2023) – Maritime College of Forestry Technology
- Standard First Aid Level C CPR & AED (2022) – St John's Ambulance
- ATV Training Course (2022) – Canadian Safety Council
- Pilot Certificate – Small Remotely Piloted Aircraft System (RPAS), Visual line-of-sight (VLOS) (2022) – Transports Canada

**Wetland Delineation and Permitting, NS, 2023 – Present – Junior Environmental Scientist:** Completed wetland delineations, functional assessments, and permitting applications for pre-construction wetland alterations.

**Groundwater Geothermal Heating and Cooling Systems Review and Permitting, NS, 2023 – Present – Junior Environmental Scientist:** Withdrawal flow monitoring, water level monitoring, equipment inspection, water quality sampling, data compilation, data analysis, and regulatory reporting.

**Nesting Bird Searches, NS, 2023 – Junior Environmental Scientist:** Surveyed areas pre-construction for the presence of nesting bird activity. Collected field data related to observations and flagged off buffer areas surrounding nesting bird species.

**Wind Power Environmental Assessments, NS, 2022 – Present – Junior Environmental Scientist:** Conducted watercourse, wetland, fish/fish habitat, wildlife and avian assessments, and environmental assessment reporting. Quantified greenhouse gas and climate change impacts of the projects on the environment.

**Level I/II Groundwater Assessments, NS, 2022—Present—Junior Environmental Scientist:** Completed desktop assessments to determine the viability of sustainable groundwater withdrawals. Conducted drilling and pump test supervision. Sampled water to compare with drinking water guidelines and analyzed aquifer test data to determine adequate safe yields for groundwater users.

**Radar and Avian Acoustic Assessments NS, 2022 – Present – Junior Environmental Scientist:** Built and ran remote radar and acoustic monitor assemblies to record the passage of avian migrant species. The radar and acoustic data were processed and analyzed to determine the patterns of avian migration. The acoustics were analyzed with machine-learning software and manually verified for accuracy.

**Various Management and Leadership Roles, NS, 2018- 2022 – Self-Employed:** Competed internationally for Canada in Sprint Kayaking. This required creating sponsorship proposals, developing relationships with sponsors and stakeholders, and managing travel and shipping logistics. Part of this role required public speaking engagements, client receptions, and providing mentorship.

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## PROFESSIONAL ASSOCIATIONS

- Association of Professional Engineers of Nova Scotia

## AREAS OF SPECIALIZATION

- Industrial Approvals
- Environmental Approvals
- Hydrology/Hydrogeology
- Water Treatment
- Climate Change and GHG Assessments
- Dangerous Goods Assessments

## RELEVANT EXPERIENCE

Mr. Gascon joined the Strum team in 2021 and leads a team with the Environmental Assessment and Approvals Group. Mr. Gascon is experienced in project management, engineering design, environmental monitoring, groundwater assessments, hazard assessments, environmental assessments, project reporting, and regulatory compliance.

Mr. Gascon has worked in various roles, from field technician to project manager, on numerous projects throughout Atlantic Canada, including various Industrial Approval applications, renewals, and amendments, dangerous goods permitting, and environmental monitoring. Additionally, he has valuable experience developing potable groundwater supplies, evaluating and treating water quality issues, and reviewing factors contributing to groundwater resource degradation at residential sites. His responsibilities lie in managing and coordinating these projects, completing various field programs, collecting, compiling, and analyzing data, developing mitigative measures/plans, and preparing reports and related regulatory paperwork.

More recently, Mr. Gascon has been developing and implementing Environmental Management Plans for a variety of small- and large-scale projects, including environmental monitoring and compliance components for groundwater, surface water, air quality, soil quality, erosion and sedimentation controls, vegetation/wildlife management, hazardous and non-hazardous waste management, spill response, remediation, and decommissioning works.

Mr. Gascon previously worked as a Research Assistant with the Centre for Water Resources Studies. His role involved researching the management and disposal options for municipal drinking water treatment plant waste residuals in the Northwest Territories.

Prior to completing his bachelor's degree, Mr. Gascon was a Mechanical Designer, developing and designing 3D renderings for heavy-duty industrial enclosures. Tasks included designing structures with computer-aided design software, formatting designs compatible with the water jet cutter, configuring assembly plans, and inspecting units for fabrication and assembly deficiencies.

## REPRESENTATIVE PROJECTS AND ROLES

**Post-Approval Work, EverWind Point Tupper Green Hydrogen/Ammonia Project Phase 1, NS, 2023-Present – Environmental Engineer:** On-going post-approval work (following approval of the EA Registration Document), including the development of environmental management and monitoring plans. These plans are developed to avoid/mitigate potential impacts to nearby environmental and residential receptors throughout the project lifespan.

**Greenhouse Gas Assessments, NS and NL, 2022-Present – Environmental Engineer –** Complete a greenhouse gas inventory for various projects across the Atlantic provinces. Quantifying the GHG generation/sinking potential of a project is becoming a requirement for regulatory, financial, and incentivized institutions. Understanding the GHG contributions from projects increases the requirements to offset and adapt to meet federal and provincial net-zero goals.

## EDUCATION

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

## TRAINING

- Wilderness First Aid (2022)
- Standard First Aid & CPR (2021)
- WHMIS (2021)
- Confined Spaces (2021)
- Excavation and Trenching (2020)
- Pleasure Craft Operator License (2002)

**Waste Transfer Station Permitting, NS, 2022-Present – Intermediate Engineer:** Complete regulatory outreach for the permitting of new waste transfer stations. The permitting process requires detailed engineering plans and specifications, contingency planning, air quality, noise, surface water, and groundwater management and monitoring.

**Pyrolysis and Biochar Facilities, NS, 2021-Present – Intermediate Engineer:** Complete field studies and key reporting requirements for Environmental Assessment and Industrial Approvals. The permitting process requires detailed engineering plans and specifications, contingency planning, air quality and dispersion modelling, and surface water and groundwater management and monitoring.

**Compost Facility Environmental Monitoring Program, NS, 2021-Present – Intermediate Engineer:** Monitoring groundwater and surface water sampling, data compilation, data analysis, and regulatory reporting. Mr. Gascon has prepared various approval amendment applications for submission to NSECC, direct correspondence with NSECC, and streamlined the monitoring and reporting program.

**Wind Power Environmental Assessments, NS, 2021-Present – Intermediate Engineer:** Conducted watercourse, wetland, fish/fish habitat, wildlife and avian assessments required, and environmental assessment reporting. Developed greenhouse gas and climate change assessment criteria for quantifying the effects or impacts of the Projects on the environment and climate change on the Projects.

**Groundwater Geothermal Heating and Cooling System Review and Permitting, 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, NS, 2021-Present – Intermediate Engineer:** Design, specification, and industrial approval amendment.

**Level I and II Groundwater Assessments, 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, NS, 2021-Present – Intermediate Engineer:** Withdrawal flow monitoring, water level monitoring, equipment inspection, water quality sampling, data compilation, data analysis, and regulatory reporting.

**Environmental Assessment, EverWind Point Tupper Green Hydrogen/Ammonia Project, NS – Phase 1, NS, 2022 – Environmental Engineer:** Completed field studies and key reporting requirements for the submission of an EA Registration Document for a green ammonia/hydrogen facility. This was the first green ammonia/hydrogen facility to be approved in both Nova Scotia and Canada.

**Production Field Centre Hazardous Materials Assessment, NS, 2021 – Junior Engineer:** Hazardous Materials inventory, coordinate sampling, data analysis, and reporting.

**Greenhouse Gas Inventory Audit, NS, 2021 – Junior Engineer:** Greenhouse 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, NS, 2021 – Junior Engineer:** Assess water and wastewater infrastructure, establish an asset inventory, and reporting.

**Municipal Groundwater Withdrawal Compliance, NS, 2021 – Junior Engineer:** Review pumping rates and withdrawal volumes, spatial interferences, sustainability concerns, data analysis, and regulatory compliance.

**Registered Potable Groundwater Supply Assessment, NS, 2021 – Junior Engineer:** Review design specifications, well logs, water quality, data compilation, data analysis, and regulatory compliance.

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## AREAS OF SPECIALIZATION

- Wetland and Watercourse Assessment and Delineations
- Wetland Compensation and Restoration
- Fish and Fish Habitat Assessment
- Wildlife Surveys
- Environmental Approvals
- Environmental Monitoring

## RELEVANT EXPERIENCE

Mr. Bonner has acquired a wide range of regulatory and professional field experience working on projects across Nova Scotia, with a focus on wetland and aquatic assessments. He is responsible for completing biophysical assessments, including wetland and watercourse delineation, characterization, and functional assessment, flora and fauna surveys, wetland monitoring, species at risk evaluations, construction monitoring, fish collection, and fish rescues. Mr. Bonner also has experience in implementing field programs, wetland restoration projects, and regulatory permitting.

## EDUCATION

- Master of Environmental Management, University of New Brunswick, NB (2023)
- Bachelor of Science (Biology and Conversation Biology), Memorial University of Newfoundland, NL (2020)

## TRAINING

- Intermediate Workplace First Aid Level C CPR & AED (2023)
- Natural Resources Training Group (NRTG) Electrofishing Crew Supervisor (2023)
- Pleasure Craft Operator License (2023)
- Wetland Ecosystem Services Protocol (WESP-AC) Training (2022)
- Wetland Delineation Training (2022)

## REPRESENTATIVE PROJECTS AND ROLES

**Completed >100 wetland assessments over the past two years to support various projects across Nova Scotia, including those in the wind, mining, and residential development sectors.**

**Supported fisheries offsetting scoping and design over the past two years to support various mining projects across Nova Scotia.**

**Wetland Restoration, Upper Musquodoboit Wetland Restoration Project, NS (2024):** Worked as part of an experienced wetland restoration team by completing regulatory permitting, coordinating various phases of restoration construction, and leading biophysical field programs. Conducted construction monitoring, fish rescues, wood turtle surveys, nest sweeps, and collected groundwater data.

**Environmental Monitoring, Higgins Mountain Wind Farm Project, NS (2024):** Worked as part of an experienced environmental monitoring team to ensure environmental compliance and excellence during and after construction of a 17-turbine wind farm.

**Various Assessments, Antrim Gypsum Mine, NS (2024) – Field Lead/Support:** Completed wetland / watercourse delineation and fish habitat assessments. Wetland / watercourse delineation involved the identification and mapping of wetlands and watercourses. Fish habitat assessments included collecting data on flow, riparian habitat, channel morphology, as well as assessing whether fish can access a watercourse reach and the types of habitats available to different species.

**Wetland/Watercourse Delineation and Assessment, Rhodena Wind Project, NS (2022-2024) – Field Support:** Completed wetland / watercourse delineation and assessments across the Project Area. Provided project coordination support for GCP and EARD submission.

**Wetland/Watercourse Delineation and Assessment, Wedgeport Wind Project, NS (2022) – Field Support:.** Completed wetland / watercourse delineation and assessments across the Project Area.

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## AREAS OF SPECIALIZATION

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

## COMPUTER EXPERIENCE

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

## RELEVANT EXPERIENCE

Mr. Opra is a GIS Specialist with Strum working in our Environmental Assessments and Approvals 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.

## 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 and WHMIS (2022)
- RPAS Pilot Certification (2021)
- Over 200 hours ESRI Academy Training (2019 – Present)



## REPRESENTATIVE PROJECTS AND ROLES

**Environmental Constraint Analysis, NB, NS, NL, 2023-Present – Remote Sensing Scientist:** Land cover, landform, and hydro analysis for projects throughout the Maritimes. Using remotely sensed baseline data to create geospatial data products.

**Hydrologic Modelling, NB, NS, NL, 2023-Present – Remote Sensing Scientist:** Identifying stream networks and creating geospatial data products to guide project designs. Geospatial products that are created but are not limited to, Depth to Water, potential wetlands, potential watercourses, and catchment areas for various scale projects. High resolution remotely sensed data (e.g., LiDAR and Multispectral Imagery) is used to gain insights about complex hydrology.

**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.

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

**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.

**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 – 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) where used to identify textures. Graphic design software was used to aggregate the images captured from the SEM.

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## AREAS OF SPECIALIZATION

- Geographic Information Systems (GIS)
- Location, Spatial, and Data Analytics
- Database Management
- Geoprocessing, Model Building
- Civic Addressing

## COMPUTER EXPERIENCE

- GIS Software: ArcGIS Suite, QGIS
- Other Software: CorelDRAW X7
- Scripting: SQL, Python 2 & 3

## RELEVANT EXPERIENCE

Ms. Wallace is a GIS Technician working in the Environmental Assessments and Approvals group. She joined the team in early 2023 and has been helping the GIS team with data analysis and creating mapping products for environmental assessments and other projects.

Ms. Wallace received her Bachelor of Science with Honours in Geology at Saint Mary's University in 2019. While studying at Saint Mary's, Ms. Wallace was a research assistant, and was able to use a variety of tools to aid in the analysis of minerals and in their identification process. Ms. Wallace then went on to receive an Advanced Diploma in Geographic Information Systems at the Centre of Geographic Sciences in 2020.

Before joining Strum, Ms. Wallace worked for the Province of Nova Scotia as part of the Civic Addressing team, where she was able to continue to use GIS and was involved in the emergency management operations during Hurricane Fiona where she analysed data and created a dashboard to help the team with their planning going forward.

## REPRESENTATIVE PROJECTS AND ROLES

**Wind Farm Projects, NS, 2023 - Present - Geomatics Technician:** Compiled and checked collected field data, performed geospatial data analysis, and completed numerous drawings as a visual aid in environmental assessments and other reports.

**Detrital Mineral Provenance Analyses from the Cretaceous McMurray Formation, Alberta and the Holocene Portneuf River Delta, North Shore of Quebec (2021) – Research Assistant:** Used a scanning electron microscope to determine mineral composition and to identify mineral assemblages in different offshore wells in the Scotian Basin. Supplementary graphs were created to aid in demonstrating mineral assemblages and chemical composition.

**Sedimentary Petrology of the Upper Cree Member in the Cohasset A-52 Well, Scotian Basin, Offshore Nova Scotia (2020) – Research Assistant:** Used a scanning electron microscope to determine mineral composition and to identify mineral assemblages in different offshore wells in the Scotian Basin. Supplementary graphs were created to aid in demonstrating mineral assemblages and chemical composition.

**Electron Microprobe and Scanning Electron Microscope Mineral Analyses of Diagenetic Minerals from Lower Cretaceous Reservoir Sandstone, Scotian Basin, Offshore Nova Scotia (2019) – Research Assistant:** Computer software was used to combine all backscattered electron images captured from a scanning electron microscope.

## EDUCATION

- Advanced Diploma in Geographic Information Systems (GIS), Centre of Geographic Sciences (COGS), Lawrencetown, NS (2020) ‘
- Bachelor of Science with Honours, Major in Geology, Saint Mary's University, Halifax, NS (2019)

## TRAINING

- Emergency First Aid CPR Level "C" & AED (2021)
- WHMIS (2023)
- Over 100 hours ESRI Academy Training (2019 – Present)

**Detrital Petrology and Provenance of the Logan Canyon Formation Sandstones, Scotian Basin (2019) –**

**Research Assistant:** Analyzed petrographic information from samples using a scanning electron microscope, where mineral composition was determined using Energy dispersive spectroscopy and identification was helped with backscattered electron images using texture and brightness as a guide. Heavy mineral separation and identification was used to determine mineral assemblages and understand origins.

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## 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

**Wind Farm Projects, NS, 2021-Present – Geomatics 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.

**Transmission Line Moose Tracking Surveys, NS, 2022 – Geomatics 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 - Geomatics Technician:** Responsible for the post-processing of field data and production of accurate GIS mapping products to be used in the reporting process.

## 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

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## 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 the GIS Manager with Strum working in our Environmental Assessment & Approvals 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.

## 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

**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 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 Chedabucto. 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

- Environmental Assessments
- Flora and Fauna Surveys
- Species at Risk Assessments
- Field Implementation
- Technical Review
- Project Management
- Project Design
- Staff Training

## RELEVANT EXPERIENCE

Mr. MacDonald a Senior Project Manager and Terrestrial Lead. He has a strong terrestrial survey design and oversight background and extensive experience in avian and botanical studies. Mark provides survey design and oversees the drafting of terrestrial baseline reports and effects assessments for many projects. He has consulted regularly with provincial regulatory agencies, local landowners, and other stakeholder groups.

Mark is a versatile, conservation-focused ecologist with over 17 years in adaptive project management in challenging environments. He is a dedicated learner with a proven record of quickly developing new skills and an excellent writer for both a technical and general audience. He is diplomatic and capable when navigating differing values of multiple stakeholders.

## REPRESENTATIVE PROJECTS AND ROLES

**Environmental Baseline Surveys, NS, 2022-Present – Project Manager:** Completion of environmental baseline surveys for multiple provincial environmental assessments for various wind power projects and quarries. This involves detailed desktop and constraints analyses to determine required field assessments, implementation of all field programs, interpretation and reporting of results, across multiple taxa and habitat types.

**Environmental Assessment, Various Projects, 2022-Present – Project Manager:** Lead terrestrial baseline reporting and environmental effects chapters for various mine, quarry, and wind projects, as well as other development projects across the maritime provinces (e.g., Walden Quarry Expansion, Six Mile Brook Quarry Expansion, Rhodena Wind Project, Wedgeport Wind Project, Caribou and Wood Islands Ferry Terminal Expansion Projects).

**Botanical Surveys, NS, 2022-2024 – Project Manager:** Planned and developed botanical survey programs, including species at risk and habitat assessments, for various mine, quarry, solar, and wind projects, as well as other development projects across the maritime provinces (e.g., Walden Quarry Expansion, Six Mile Brook Quarry Expansion, Shaw Sand Pit, Wedgeport Wind Project, Clydesdale Wind Project, Rhodena Wind Project, Wejipek Wind Project, Apitamkiejit Wind Project, Upper Afton Wind Project, New Prospect Wind Project, White Cedar Wind Project, Port Malcolm Solar Project, Caribou and Wood Islands Ferry Terminal Expansion Projects, Sungro Horticulture Peat Harvesting Projects, etc.).

**Avian Survey Design and Completion, 2022-2024 – Project Manager:** Planned and developed avian survey programs, including species at risk, coastal, migration, nocturnal owl surveys, breeding, and raptor/diurnal watch count surveys, for various mine, quarry, solar, and wind projects, as well as other development projects across the maritime provinces (e.g., Walden Quarry Expansion, Six Mile Brook Quarry Expansion, Shaw Sand Pit, Wedgeport Wind Project, Clydesdale Wind Project, Rhodena Wind Project, Wejipek Wind Project, Apitamkiejit Wind Project, Upper Afton Wind Project, New Prospect Wind Project, White Cedar Wind Project, Port Malcolm Solar Project, Caribou and Wood Islands Ferry Terminal Expansion Projects, Sungro Horticulture Peat Harvesting Projects, etc.).

## EDUCATION

- Masters of Science in Forestry, University of New Brunswick, Fredericton, NB (2012)
- Bachelor of Science in Forestry (Major in Forest Management, Minor in Wildlife Ecology), University of New Brunswick, Fredericton, NB (2004)

## TRAINING

- Emergency First Response & CPR (2022)
- Wilderness First Responder (2014)