APPENDIX Q
EMI

strum
CONSULTING

#210 - 211 Horseshoe Lake Drive
Halifax, NS B3S 0B9
T: 902.835.5560 (24/7)

3-A Vincent's Way
Antigonish, NS B2G 2X3
T: 902.863.1465 (24/7)

#E120 – 120 Torbay Road
St. John's, NL A1A 2G8
T: 709.738.8478 (24/7)

September 15, 2023

Military Air Defence and Air Traffic Control Radars
Department of National Defence (DND)
Wind Turbines D Aero Rdns 1 Canadian Air Division
P.O. Box # 17000 Station Forces
Winnipeg MB R3J 3Y5
Email: +WindTurbines@forces.gc.ca

To whom it may concern,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by Wind Strength (our client) to support the proposed Bear Lake Wind Power Project (the "Project") within West Hants Regional Municipality, Halifax Regional Municipality and the Municipality of the District of Chester, Nova Scotia.

On behalf of our client, Strum is conducting an electromagnetic interference (EMI) study on the placement of 15 wind turbines between the communities of Vaughan, Wile Settlement, and Leminster.

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

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

- Total of 15 turbines
- Tip height of each turbine is 206.5 metres
- Hub height of each turbine is 125 metres
- 3-blade rotor; turbine blade sweep diameter is 163 metres (blade length is 81.5 metres)

A map showing the proposed locations of the turbines 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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15	404354.95	4962718.13	44.8115	-64.2096	222.98	125	81.5	429.48

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

Thank you,

Courtney Morrison, BA, MREM
Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

Bear Lake Wind Power Project

Site Overview

N

Study Area

Proposed Turbine Location

Transportation

Road

Unpaved Road

Utilities (line)

Existing Pipeline

Existing Transmission Lines

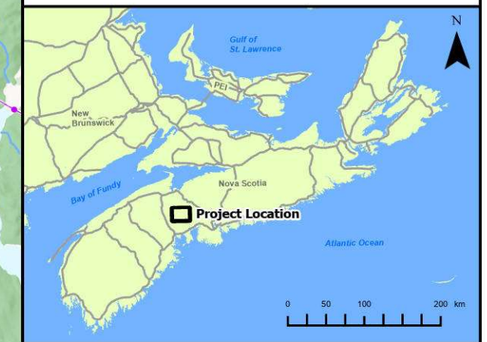
Water Features

Mapped Stream

Mapped Indefinite Stream

Mapped Lakes and Rivers

Mapped Wet Area



Coordinate System: NAD83 UTM Zone 20N

Sources: ESRI Basemaps, GeoNOVA, NSTD, HERE, Garmin, USGS, NRCan

Date: Sept 2023	Project #: 23-9128
Scale: 1:70,000	Drawing #: 1
Drawn By: M. Partridge	
Checked By: M. Savelle	

strum CONSULTING

0 1 2 3 4 km

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

Wind Turbine Submission Form

Turbine information						
Turbine Number	LAT dd mm ss.ss	LONG -ddd mm ss.ss	Ground Elevation (meters)	Nacelle Height (meters)	Rotor Diameter (meters)	Total Height (meters)
Example 1	*60 39 16.59*	*-110 36 14.01*	*126.00*	*100.00*	*96*	*274*
1	44 47 27.2313	-64 13 13.9082	238.95	125	163	445.45
2	44 47 10.2614	-64 12 33.1855	259.46	125	163	465.96
3	44 46 54.8358	-64 12 17.8016	255.79	125	163	462.29
4	44 46 52.9644	-64 11 52.3717	241.5	125	163	448.00
5	44 46 9.8801	-64 12 2.9455	198.82	125	163	405.32
6	44 45 33.1051	-64 14 12.7289	213.07	125	163	419.57
7	44 44 57.6494	-64 13 12.5777	230.32	125	163	436.82
8	44 46 3.9907	-64 12 48.0889	224.57	125	163	431.07
9	44 48 24.5597	-64 12 43.6148	239.17	125	163	445.67
10	44 48 14.8997	-64 12 16.2817	258.6	125	163	465.10
11	44 47 53.6766	-64 12 0.5008	244.49	125	163	450.99
12	44 47 27.2928	-64 12 37.6827	263.04	125	163	469.54
13	44 45 3.1512	-64 13 37.4799	239.11	125	163	445.61
14	44 45 44.2604	-64 13 20.9280	241.11	125	163	447.61
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September 15, 2023

Military Radio Communication Users
Department of National Defence (DND)
Wind Turbines
D Aero Rdns 1 Canadian Air Division
P.O. Box # 17000 Station Forces
Winnipeg MB R3J 3Y5
Email: +WindTurbines@forces.gc.ca

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West Hants Regional Municipality, Halifax Regional Municipality, and
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Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

Wind Turbine Submission Form

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General Mailbox <general@strum.com>

Re: Kmtnuk Wind Power Project + Bear Lake Wind Power Project

1 message

Sandra Mateos <smateos@strum.com> Thu, Oct 5, 2023 at 6:13 AM
To: +WindTurbines@forces.gc.ca
Cc: general@strum.com, cmorrison@strum.com

Good morning,

I attached the Excel files for both projects. If anything else is needed please let us know.

Sandra Mateos (she/her),

Project Assistant

T: 902.835.5560 (24/7)

LinkedIn • Twitter • Instagram

www.strum.com

Head Office:
Suite 210 - 211 Horseshoe Lake Dr.

Halifax, NS, B3S 0B9

On Tue, Oct 3, 2023 at 9:41 AM <+WindTurbines@forces.gc.ca> wrote:

> Good day,
>
> Could you please provide the excel version of the coordinates for these projects vice being embedded in a PDF?
>
> Thank you
>
> MWO / Adjum Jeff Bateman, CD
>
> Staff Officer Aerospace Systems 3, 1 Canadian Air Division/Canadian NORAD Region Headquarters

Canadian Armed Forces

jeffrey.bateman2@forces.gc.ca / Tel.: 204-833-2500 ext 2257 / CSN: 257-2257

Officier d'État Major Systèmes Aérospatiales 3, 1re Division Aéreienne du Canada/Région Canadienne du NORAD

Forces armées canadiennes

jeffrey.bateman2@forces.gc.ca / Tel.: 204-833-2500 ext 2257 / CSN: 257-2257

From: General Mailbox <general@strum.com>
Sent: Tuesday, September 19, 2023 5:20 AM
To: +WindTurbines@ATESS@TRENTON <+WindTurbines@forces.gc.ca>
Cc: Courtney Morrison <cmorrison@strum.com>; Sandra Mateos <smateos@strum.com>
Subject: Kmtnuk Wind Power Project

Good morning,

On behalf of our client, Strum is conducting an electromagnetic interference (“EMI”) study on the placement of 16 wind turbines located near the communities of Earltown, McCallum Settlement, and North River in Colchester County, Nova Scotia. Please find attached a notification letter for the proposed development.

A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Looking forward to hearing from you,

Courtney Morrison **(she/her), BA, MREM**

Community Engagement Coordinator

T: 902.835.5560 (24/7)

C: 902.293.4914

F: 902.835.5574

LinkedIn • Twitter • Instagram

www.strum.com

Head Office:
Suite 210 - 211 Horseshoe Lake Dr.

Halifax, NS, B3S 0B9

2 attachments

Wind Turbine Submission Form DND Kmtnuk (Nuttby Ridge).xlsx
13K

Wind Turbine Submission Form DND Bear Lake.xlsx
13K

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CONSULTING

#210 - 211 Horseshoe Lake Drive
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#E120 – 120 Torbay Road
St. John's, NL A1A 2G8
T: 709.738.8478 (24/7)

September 15, 2023

Vessel Traffic Systems Radars
Canadian Coast Guard
Email: windfarm.coordinator@dfo-mpo.gc.ca

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Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

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

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

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

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Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

strum CONSULTING

General Mailbox <general@strum.com>

RE: Bear Lake Wind Power Project

1 message

Grégoire, Martin <Martin.Gregoire@dfo-mpo.gc.ca> Fri, Sep 22, 2023 at 12:34 PM
To: General Mailbox <general@strum.com>
Cc: Courtney Morrison <cmorrison@strum.com>

Hello,

There is no CCG communication or radar site in the vicinity of the proposed wind farm (Bear Lake). Therefore no interference issues are anticipated.

Regards / Salutations,

Martin Grégoire

Canadian Coast Guard

Garde côtière canadienne

From: General Mailbox <general@strum.com>
Sent: Monday, 18 September, 2023 11:40 AM
To: CCG Wind Farm Coordinator / Coordinateur Parc Éolien GCC (DFO/MPO) <DFO.CCGWindFarmCoordinator-CoordinateurParcEolienGCC.MPO@dfo-mpo.gc.ca>
Cc: Courtney Morrison <cmorrison@strum.com>
Subject: Bear Lake Wind Power Project

Good afternoon,

On behalf of our client, Strum is conducting an electromagnetic interference (“EMI”) study on the placement of 15 wind turbines located near the communities of Upper Vaughn, New Ross and Windsor Forks in West Hants Regional Municipality, Halifax Regional Municipality and the Municipal District of Chester, Nova Scotia. Please find attached a notification letter for the proposed development.

A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Looking forward to hearing from you,

Courtney Morrison (she/her), BA, MREM

Community Engagement Coordinator

T: 902.835.5560 (24/7)

C: 902.293.4914

F: 902.835.5574

LinkedIn • Twitter • Instagram

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September 15, 2023

NAV CANADA
Email: landuse@navcanada.ca

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Land Use Proposal Submission Form – General

NAV CANADA file N°./ Ref N°	Transport Canada File N° / Ref N°

GENERAL INFORMATION

Company/Owner Name: 4516804 Nova Scotia Limited Partnership		Contact Person: Mark Savory	
Address: 1969 Upper Water St		City: Halifax	Prov: NS	Postal Code: B3J 3R7
Tel: (902) 835-5560	Cell:	Email: Mark.Savory@everwindfuels.com	
Applicant: Strum Consulting		Contact Person: Courtney Morrison	
Address: 210-211 Horseshoe Lake Dr		City: Halifax	Prov: NS	Postal Code: B3S 0B9
Tel: (902) 835-5560	Cell:	Email: cmorrison@strum.com	

DETAILS OF PROPOSAL

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

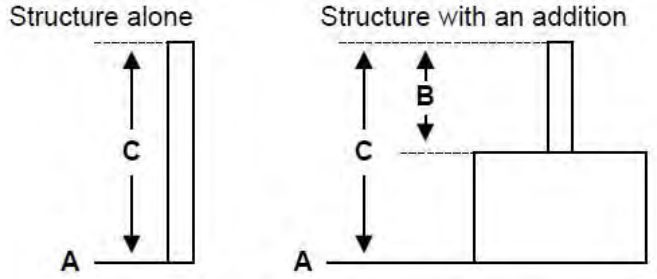
Additional document(s) to be submitted:

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

Project Identification: Bear Lake Wind Power Project	Nearest Town: Upper Vaungn
Street Address, etc.: See attached for location details	Province: NS

	Degrees	Minutes	Seconds		Degrees	Minutes	Seconds
Geographic Coordinates of Site in NAD 83:	Lat. N 44	/ 49	/ 16.4416		Long. W -64	/ 12	/ 12.1162

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

Type of Structure: Wind Farm	New Structure? ☒Yes ☐No		
	**A**. Ground Elevation (Above Sea Level)	198-263	☐ft ☒m
	B. Structure Height Addition	125	☐ft ☒m
	C. Structure Total Height (Above Ground Level) **Include all appurtenances**	206.5	☐ft ☒m
	Total Height (Above Sea Level) (**A** + **C**)	405-469	☐ft ☐m
Cranes to be used? ☒Yes ☐ No **If Yes: Crane details shall be submitted separately using the Land Use Proposal Submission Form – Crane(s).**	Approximate Duration of Construction: 12-15 months		
Proposed Construction Start Date: 1-May-24	If Temporary Structure, indicate Removal Date: 1-May-60		

Comments: See attached letter and drawing for additional details.

Known co-location with/on NAV CANADA Site: ☐Yes ☒No
A Third-Party Submission Form may be required for complex applications, fee applicable.

Applicant/Representative Signature	Print Name	Date
	Courtney Morrison	18-Sep-23

Acknowledgement of reading *Detailed Land Use Proposal Guidelines* (Submitter's Initials) CM

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

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

Please submit by email to landuse@navcanada.ca

General Mailbox <general@strum.com>

Re: LU: 23-3786 - Bear Lake Wind Farm

1 message

General Mailbox <general@strum.com> Fri, Oct 6, 2023 at 1:38 PM
To: "Peca, Justin" <Justin.Peca@navcanada.ca>
Cc: Courtney Morrison <cmorrison@strum.com>

Good afternoon Mr. Justin

I attached the excel file. If you need anything else please let me know.

Courtney Morrison (she/her), BA, MREM

Community Engagement Coordinator

T: 902.835.5560 (24/7)

C: 902.293.4914

F: 902.835.5574

LinkedIn • Twitter • Instagram

www.strum.com

Head Office:
Suite 210 - 211 Horseshoe Lake Dr.

Halifax, NS, B3S 0B9

On Wed, Sep 20, 2023 at 12:12 PM Peca, Justin <Justin.Peca@navcanada.ca> wrote:

> Hi / Bonjour
>
> *La version française figure ci-dessous / French Text Follows*
>
> Thank you for your submission, your Land Use file number is 23-3786. Please reference this number for all transactions on this submission. **Attached, is our multiple Obstacle spreadsheet we request you fill out and submit to** landuse@navcanada.ca

At NAV CANADA, we are currently working on different ways to diminish our turnaround times. Please note that we currently have the following time frame published on our website: https://www.navcanada.ca/en/aeronautical-information/land-use-program.aspx

Processing times vary, but NAV CANADA attempts to respond within 8 to 12 weeks of receiving a complete proposal. The accuracy and completeness of the initial documentation and your cooperation and promptness in remedying deficiencies or inaccuracies will help to expedite the review process.

If you have any questions or would like an update of your file, please do not hesitate to contact us.

Merci pour votre soumission. Votre numéro de dossier d'utilisation de terrain est 23-3786. Veuillez mentionner ce numéro pour toutes les transactions reliées sur cette soumission.

Chez NAV CANADA, nous travaillons actuellement sur différentes façons de réduire nos délais d'exécution. Veuillez noter que nous avons actuellement le délai suivant publié sur notre site Web: https://www.navcanada.ca/en/aeronautical-information/land-use-program.aspx

Les délais de traitement varient selon l'exhaustivité et l'exactitude des renseignements soumis et selon la complexité du projet. En général, NAV CANADA tente de répondre dans un délai de 8 à 12 semaines.

N'hésitez pas à nous contacter si vous avez des questions ou souhaitez une mise à jour de votre dossier.

Regards / Merci,

Justin Peca
Land Use Specialist | Spécialiste d'utilisation de terrain

NAV CANADA
Group:landuse@navcanada.ca

1601 Tom Roberts Avenue PO Box 9824, Stn T Gloucester ON K1G 6R2

T. 613-248-4005
www.navcanada.ca

From: General Mailbox <general@strum.com>
Sent: September 18, 2023 2:50 PM
To: Land Use <LandUse@navcanada.ca>
Cc: Courtney Morrison <cmorrison@strum.com>
Subject: 23-3786 LUF

Good evening,

On behalf of our client, Strum is conducting an electromagnetic interference ("EMI") study on the placement of 15 wind turbines located near the communities of Upper Vaughn, New Ross, and Windsor Forks in West Hants Regional Municipality, Halifax Regional Municipality and, the Municipal District of Chester, Nova Scotia. Please find attached a notification letter for the proposed development.

A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Looking forward to hearing from you,

Courtney Morrison (she/her), BA, MREM

Community Engagement Coordinator

strum
CONSULTING

T: 902.835.5560 (24/7)

C: 902.293.4914

F: 902.835.5574

LinkedIn • Twitter • Instagram

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Head Office:
Suite 210 - 211 Horseshoe Lake Dr.

Halifax, NS, B3S 0B9

3 attachments

image001.png
1K

image001.png
1K

Bear Lake z-ldu-100-multiple-obstacle_Wind Turbines.xlsx
84K

strum
CONSULTING

#210 - 211 Horseshoe Lake Drive
Halifax, NS B3S 0B9
T: 902.835.5560 (24/7)

3-A Vincent's Way
Antigonish, NS B2G 2X3
T: 902.863.1465 (24/7)

#E120 – 120 Torbay Road
St. John's, NL A1A 2G8
T: 709.738.8478 (24/7)

September 15, 2023

Weather Radars
Environment Canada
Email: weatherradars@ec.gc.ca

To whom it may concern,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by Wind Strength (our client) to support the proposed Bear Lake Wind Power Project (the "Project") within West Hants Regional Municipality, Halifax Regional Municipality and the Municipality of the District of Chester, Nova Scotia.

On behalf of our client, Strum is conducting an electromagnetic interference (EMI) study on the placement of 15 wind turbines between the communities of Vaughan, Wile Settlement, and Leminster.

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

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

- Total of 15 turbines
- Tip height of each turbine is 206.5 metres
- Hub height of each turbine is 125 metres
- 3-blade rotor; turbine blade sweep diameter is 163 metres (blade length is 81.5 metres)

A map showing the proposed locations of the turbines 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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2	404341.25	4959909.73	44.7862	-64.2092	259.46	125	81.5	465.96
3	404672.25	4959428.73	44.7819	-64.2049	255.79	125	81.5	462.29
4	405230.25	4959362.73	44.7814	-64.1979	241.5	125	81.5	448.00
5	404978.25	4958036.73	44.7694	-64.2008	198.82	125	81.5	405.32
6	402108.25	4956944.73	44.7592	-64.2369	213.07	125	81.5	419.57
7	403414.25	4955830.73	44.7493	-64.2202	230.32	125	81.5	436.82
8	403983.25	4957869.73	44.7678	-64.2134	224.57	125	81.5	431.07
9	404146.25	4962205.73	44.8068	-64.2121	239.17	125	81.5	445.67
10	404742.25	4961898.73	44.8041	-64.2045	258.6	125	81.5	465.10
11	405079.25	4961238.73	44.7982	-64.2001	244.49	125	81.5	450.99
12	404250.25	4960436.73	44.7909	-64.2105	263.04	125	81.5	469.54
13	402869.25	4956008.73	44.7509	-64.2271	239.11	125	81.5	445.61
14	403252.25	4957271.73	44.7623	-64.2225	241.11	125	81.5	447.61
15	404354.95	4962718.13	44.8115	-64.2096	222.98	125	81.5	429.48

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

Thank you,

Courtney Morrison, BA, MREM
Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

strum CONSULTING

General Mailbox <general@strum.com>

RE: Bear Lake Wind Power Project

1 message

Radar (ECCC) <radarsmeteo-weatherradars@ec.gc.ca> Wed, Oct 4, 2023 at 10:29 AM
To: General Mailbox <general@strum.com>, "Radar (ECCC)" <radarsmeteo-weatherradars@ec.gc.ca>
Cc: Courtney Morrison <cmorrison@strum.com>

Hello Ms. Morrison,

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

When assessing the potential impact of all new energy projects, MSC's main goal is to avoid significant interference on its weather radar that would hinder the timely and accurate production of watches and warnings of significant weather for populated areas or vulnerable infrastructure.

Our preliminary assessment of the proposed project indicates that this project is not expected to affect our Weather radar operations significantly. Consequently, as mentioned in the attached letter, MSC ***does not have objections*** to the current proposal.

We wish you success with your project.

Kind regards,

Calvin Kwok on behalf of

radarsmeteo-weatherradars@ec.gc.ca

Meteorological Service of Canada

Environment and Climate Change Canada

Government of Canada Gouvernement du Canada Canada

From: General Mailbox <general@strum.com>
Sent: Monday, September 18, 2023 11:47 AM
To: Radar (ECCC) <radarsmeteo-weatherradars@ec.gc.ca>
Cc: Courtney Morrison <cmorrison@strum.com>
Subject: Bear Lake Wind Power Project

Good afternoon,

On behalf of our client, Strum is conducting an electromagnetic interference (“EMI”) study on the placement of 15 wind turbines located near the communities of Upper Vaughn, New Ross and Windsor Forks in West Hants Regional Municipality, Halifax Regional Municipality and the Municipal District of Chester, Nova Scotia. Please find attached a notification letter for the proposed development.

A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Looking forward to hearing from you,

Courtney Morrison (she/her), BA, MREM

Community Engagement Coordinator

strum
CONSULTING

T: 902.835.5560 (24/7)

C: 902.293.4914

F: 902.835.5574

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www.strum.com

Head Office:
Suite 210 - 211 Horseshoe Lake Dr.

Halifax, NS, B3S 0B9

Letter_A_Project_Bear_Lake_September_2023.pdf
172K

Meteorological Service of Canada
Service météorologique du Canada

September 20, 2023

Courtney Morrison
Strum Consulting

Subject: Bear Lake Wind Farm Project – Updated Preliminary Analysis of Impacts on ECCC Radars (Gore Radar)

Dear Ms. Morrison,

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 September 18, 2023, for the proposed Bear Lake Wind Farm Project (located 51 km away from ECCC's Gore Radar - Gore, NS). Our preliminary assessment of the proposed project indicates that any potential interference that may be created, should not be severe for our radar operations. Consequently, we do not have objections to the current proposal. This being said, we are noticing a growing number of turbine proposals in this area and we are monitoring the impacts of the global interference footprint on our radar operations. If the impacts become more significant in the future, we could contact you to discuss potential mitigation measures.

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

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

Sincerely,

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

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#210 - 211 Horseshoe Lake Drive
Halifax, NS B3S 0B9
T: 902.835.5560 (24/7)

3-A Vincent's Way
Antigonish, NS B2G 2X3
T: 902.863.1465 (24/7)

#E120 – 120 Torbay Road
St. John's, NL A1A 2G8
T: 709.738.8478 (24/7)

September 15, 2023

Mr. Phil Tanguay
Royal Canadian Mounted Police (RCMP)
Email: Windfarm_Coordinator@rcmp-grc.gc.ca

Mr. Phil Tanguay,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by Wind Strength (our client) to support the proposed Bear Lake Wind Power Project (the "Project") within West Hants Regional Municipality, Halifax Regional Municipality and the Municipality of the District of Chester, Nova Scotia.

On behalf of our client, Strum is conducting an electromagnetic interference (EMI) study on the placement of 15 wind turbines between the communities of Vaughan, Wile Settlement, and Leminster.

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

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

- Total of 15 turbines
- Tip height of each turbine is 206.5 metres
- Hub height of each turbine is 125 metres
- 3-blade rotor; turbine blade sweep diameter is 163 metres (blade length is 81.5 metres)

A map showing the proposed locations of the turbines 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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4	405230.25	4959362.73	44.7814	-64.1979	241.5	125	81.5	448.00
5	404978.25	4958036.73	44.7694	-64.2008	198.82	125	81.5	405.32
6	402108.25	4956944.73	44.7592	-64.2369	213.07	125	81.5	419.57
7	403414.25	4955830.73	44.7493	-64.2202	230.32	125	81.5	436.82
8	403983.25	4957869.73	44.7678	-64.2134	224.57	125	81.5	431.07
9	404146.25	4962205.73	44.8068	-64.2121	239.17	125	81.5	445.67
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Thank you for your time and consideration of this Project. Upon review, should you have any questions, concerns, or identify a need for additional information, please do not hesitate to contact a member of our team and we will follow up with you directly. Your feedback and support in this matter is most appreciated.

Thank you,

Courtney Morrison, BA, MREM
Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

strum CONSULTING

General Mailbox <general@strum.com>

Re: Bear Lake Wind Power Project

1 message

General Mailbox <general@strum.com> Mon, Sep 25, 2023 at 5:21 PM
To: Windfarm_Coordinator <windfarm_coordinator@rcmp-grc.gc.ca>

Good evening Mr. Tanguay.

Absolutely, I attached the Excel file. If you need anything else, please let me know.

Best regards,

Courtney Morrison (she/her), BA, MREM

Community Engagement Coordinator

strum CONSULTING

T: 902.835.5560 (24/7)

C: 902.293.4914

F: 902.835.5574

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www.strum.com

Head Office:
Suite 210 - 211 Horseshoe Lake Dr.

Halifax, NS, B3S 0B9

On Tue, Sep 19, 2023 at 12:49 PM Windfarm_Coordinator <windfarm_coordinator@rcmp-grc.gc.ca> wrote:

> Good day Ms. Morrison,
>
> We have received your request for coordination on your project – Bear Lake. Would it be possible to provide the wind turbine data table via excel format or provide the password to unlock the PDF so that we may feed the data to our system.
>
> Thank you in advance for your cooperation,

Phil Tanguay

Wind Farm Coordinator, National Radio Services

Royal Canadian Mounted Police (RCMP) / Government of Canada

windfarm_coordinator@rcmp-grc.gc.ca / Tel: 343-552-1290

Coordonnateur parc éolien, Services de radio nationaux

Gendarmerie royale du Canada (GRC) / Gouvernement du Canada

windfarm_coordinator@rcmp-grc.gc.ca / Tél: 343-552-1290

From: General Mailbox <general@strum.com>
Sent: September 18, 2023 11:49 AM
To: Windfarm_Coordinator <windfarm_coordinator@rcmp-grc.gc.ca>
Cc: Courtney Morrison <cmorrison@strum.com>
Subject: Bear Lake Wind Power Project

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Courtney Morrison **(she/her), BA, MREM**

Community Engagement Coordinator

Image removed by sender.

T: 902.835.5560 (24/7)

C: 902.293.4914

F: 902.835.5574

LinkedIn • Twitter • Instagram

www.strum.com

Head Office:
Suite 210 - 211 Horseshoe Lake Dr.

Halifax, NS, B3S 0B9

3 attachments

image001.jpg
1K

image001.jpg
1K

Kmtnuk(Nuttby Ridge) Turbine Heights and Locations for EMI.xlsx
12K

strum
CONSULTING

#210 - 211 Horseshoe Lake Drive
Halifax, NS B3S 0B9
T: 902.835.5560 (24/7)

3-A Vincent's Way
Antigonish, NS B2G 2X3
T: 902.863.1465 (24/7)

#E120 – 120 Torbay Road
St. John's, NL A1A 2G8
T: 709.738.8478 (24/7)

September 15, 2023

Chief Clary Coolen
District 2 - Hubbards Fire Department
36 Highway 329
P.O. Box # 29
Hubbards NS B0J 1T0
Email: hubbards@chesterfire.ca

Chief Clary Coolen,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

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10	404742.25	4961898.73	44.8041	-64.2045	258.6	125	81.5	465.10
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12	404250.25	4960436.73	44.7909	-64.2105	263.04	125	81.5	469.54
13	402869.25	4956008.73	44.7509	-64.2271	239.11	125	81.5	445.61
14	403252.25	4957271.73	44.7623	-64.2225	241.11	125	81.5	447.61
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Courtney Morrison, BA, MREM
Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

strum
CONSULTING

#210 - 211 Horseshoe Lake Drive
Halifax, NS B3S 0B9
T: 902.835.5560 (24/7)

3-A Vincent's Way
Antigonish, NS B2G 2X3
T: 902.863.1465 (24/7)

#E120 – 120 Torbay Road
St. John's, NL A1A 2G8
T: 709.738.8478 (24/7)

September 15, 2023

Chief Lyle Russell
District 6 - New Ross Fire Department
4929 Route #12
P.O. Box # 135
New Ross NS B0J 2M0
Email: new.ross@chesterfire.ca

Chief Lyle Russell,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by Wind Strength (our client) to support the proposed Bear Lake Wind Power Project (the "Project") within West Hants Regional Municipality, Halifax Regional Municipality and the Municipality of the District of Chester, Nova Scotia.

On behalf of our client, Strum is conducting an electromagnetic interference (EMI) study on the placement of 15 wind turbines between the communities of Vaughan, Wile Settlement, and Leminster.

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

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Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
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September 15, 2023

Deputy Chief Jeff Pinch
South West Hants Fire Station
1884 NS-14
Windsor NS B0N 2T0

Dear Deputy Chief Jeff Pinch,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

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cmorrison@strum.com

Melanie Smith, BSc., MES
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September 15, 2023

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

To whom it may concern,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

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Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

strum CONSULTING

General Mailbox <general@strum.com>

RE: Bear Lake Wind Power Project

1 message

DuChene, Bethany (ISED/ISDE) <bethany.duchene@ised-isde.gc.ca> Tue, Sep 19, 2023 at 3:54 PM
To: "general@strum.com" <general@strum.com>

Good afternoon,

This message is to confirm that ISED has received the information package for the Bear Lake Wind Power Project proposal. We will reach out if any further information or action is needed.

Regards,

Bethany DuChene

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

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

From: General Mailbox <general@strum.com>
Sent: September 18, 2023 12:48 PM
To: ic.spectrumnsd-spectredne.ic@canada.ca
Cc: Courtney Morrison <cmorrison@strum.com>
Subject: Bear Lake Wind Power Project

Good afternoon,

On behalf of our client, Strum is conducting an electromagnetic interference (“EMI”) study on the placement of 15 wind turbines located near the communities of Upper Vaughn, New Ross and Windsor Forks in West Hants Regional Municipality, Halifax Regional Municipality and the Municipal District of Chester, Nova Scotia. Please find attached a notification letter for the proposed development.

A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Looking forward to hearing from you,

Courtney Morrison (she/her), BA, MREM

Community Engagement Coordinator

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T: 902.835.5560 (24/7)

C: 902.293.4914

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T: 709.738.8478 (24/7)

September 15, 2023

Mr. Sunny Saini
Bell Aliant
Email: sunny.saini@bell.ca

Mr. Saini,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

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Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

strum CONSULTING

General Mailbox <general@strum.com>

RE: Bear Lake Wind Power Project

1 message

Saini, Sunny <sunny.saini@bell.ca> Tue, Sep 19, 2023 at 2:08 PM
To: General Mailbox <general@strum.com>, "Butler, Joel" <Joel.Butler@bellaliant.ca>
Cc: Courtney Morrison <cmorrison@strum.com>

Hi Courtney,

Please see comments below -

1) This size of wind farm is likely to have sub-transmission lines from individual turbines to a step-up substation feeding bulk power to the utility transmission line. This infrastructure is not there in the map provided.

2) Concern here is not EMI from the turbine towers, but from the transmission lines that are 44kV or more connecting them.

- In summary, the primary EMI / RF concern that should be addressed is corona emissions from High Voltage Transmission lines to any radio base station within LoS, or to a mobile operating nearby or under the transmission lines. Any such transmission lines must use low corona design techniques and hardware.
  - **Will high voltage Transmission lines exist in this project? If yes, where?**
  - **Will they utilize low corona hardware?**

Thanks,

Bell

Sunny Saini

Project Manager

RAN Support & Solutions

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

From: General Mailbox <general@strum.com>
Sent: September-18-23 11:52 AM

To: Butler, Joel <Joel.Butler@bellaliant.ca>; Saini, Sunny <sunny.saini@bell.ca>
Cc: Courtney Morrison <cmorrison@strum.com>
Subject: [EXT]Bear Lake Wind Power Project

Good afternoon Mr. Butler and Mr. Saini,

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Community Engagement Coordinator

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C: 902.293.4914

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T: 709.738.8478 (24/7)

September 15, 2023

Mr. Jeff Gilham
Eastlink Inc.
Email: ceo@corp.eastlink.ca

Dear Mr. Gilham,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
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msmith@strum.com

strum CONSULTING

General Mailbox <general@strum.com>

RE: Bear Lake Wind Power Project

For the office of Jeff Gillham, Chief Executive Officer <CEO@corp.eastlink.ca> Mon, Sep 18, 2023 at 1:00 PM
To: General Mailbox <general@strum.com>

Good afternoon Courtney,

Thank you for your information, I have passed it along to our Engineering team, who will be in contact with any questions.

Sincerely,

Andrew

For the office of Jeff Gillham, Chief Executive Officer
CEO@corp.eastlink.ca

From: General Mailbox <general@strum.com>
Sent: Monday, September 18, 2023 12:53
To: For the office of Jeff Gillham, Chief Executive Officer <CEO@corp.eastlink.ca>
Cc: Courtney Morrison <cmorrison@strum.com>
Subject: Bear Lake Wind Power Project

Good afternoon Mr. Gilham,

On behalf of our client, Strum is conducting an electromagnetic interference (“EMI”) study on the placement of 15 wind turbines located near the communities of Upper Vaughn, New Ross and Windsor Forks in West Hants Regional Municipality, Halifax Regional Municipality and the Municipal District of Chester, Nova Scotia. Please find attached a notification letter for the proposed development.

A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.

Looking forward to hearing from you,

Courtney Morrison (she/her), BA, MREM

Community Engagement Coordinator

strum CONSULTING

T: 902.835.5560 (24/7)

C: 902.293.4914

F: 902.835.5574

LinkedIn • Twitter • Instagram

www.strum.com

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Halifax, NS, B3S 0B9

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3-A Vincent's Way
Antigonish, NS B2G 2X3
T: 902.863.1465 (24/7)

#E120 – 120 Torbay Road
St. John's, NL A1A 2G8
T: 709.738.8478 (24/7)

September 15, 2023

Ms. Heather Allen-Johnson
NCS Managed Services
Email: heather@ncsnetwork.net

Dear Ms. Allen-Johnson,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

Strum Consulting, a Nova Scotia-based environmental and engineering consulting firm, has been retained by Wind Strength (our client) to support the proposed Bear Lake Wind Power Project (the "Project") within West Hants Regional Municipality, Halifax Regional Municipality and the Municipality of the District of Chester, Nova Scotia.

On behalf of our client, Strum is conducting an electromagnetic interference (EMI) study on the placement of 15 wind turbines between the communities of Vaughan, Wile Settlement, and Leminster.

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

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

- Total of 15 turbines
- Tip height of each turbine is 206.5 metres
- Hub height of each turbine is 125 metres
- 3-blade rotor; turbine blade sweep diameter is 163 metres (blade length is 81.5 metres)

A map showing the proposed locations of the turbines 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	403454.25	4960446.73	44.7909	-64.2205	238.95	125	81.5	445.45
2	404341.25	4959909.73	44.7862	-64.2092	259.46	125	81.5	465.96
3	404672.25	4959428.73	44.7819	-64.2049	255.79	125	81.5	462.29
4	405230.25	4959362.73	44.7814	-64.1979	241.5	125	81.5	448.00
5	404978.25	4958036.73	44.7694	-64.2008	198.82	125	81.5	405.32
6	402108.25	4956944.73	44.7592	-64.2369	213.07	125	81.5	419.57
7	403414.25	4955830.73	44.7493	-64.2202	230.32	125	81.5	436.82
8	403983.25	4957869.73	44.7678	-64.2134	224.57	125	81.5	431.07
9	404146.25	4962205.73	44.8068	-64.2121	239.17	125	81.5	445.67
10	404742.25	4961898.73	44.8041	-64.2045	258.6	125	81.5	465.10
11	405079.25	4961238.73	44.7982	-64.2001	244.49	125	81.5	450.99
12	404250.25	4960436.73	44.7909	-64.2105	263.04	125	81.5	469.54
13	402869.25	4956008.73	44.7509	-64.2271	239.11	125	81.5	445.61
14	403252.25	4957271.73	44.7623	-64.2225	241.11	125	81.5	447.61
15	404354.95	4962718.13	44.8115	-64.2096	222.98	125	81.5	429.48

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

Thank you,

Courtney Morrison, BA, MREM
Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

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3-A Vincent's Way
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T: 902.863.1465 (24/7)

#E120 – 120 Torbay Road
St. John's, NL A1A 2G8
T: 709.738.8478 (24/7)

September 15, 2023

Mr. Emerich R Winkler Jr.
NCS Managed Services Inc.
Email: emerich@ncsnetwork.net

Dea Mr. Winkler,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

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Thank you,

Courtney Morrison, BA, MREM
Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

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September 15, 2023

Seaside Communications
1318 Grand Lake Road
P.O. Box # 4558
Reserve Mines NS B1E 1L2
Email: support@seaside.ns.ca

To whom it may concern,

Re: Bear Lake Wind Power Project
West Hants Regional Municipality, Halifax Regional Municipality, and
The Municipality of the District of Chester, Nova Scotia

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Thank you,

Courtney Morrison, BA, MREM
Communications and Engagement Lead
Environmental Assessment and Approvals
cmorrison@strum.com

Melanie Smith, BSc., MES
Vice President
Environmental Assessment and Approvals
msmith@strum.com

General Mailbox <general@strum.com>

We got your email!

support@seaside.ns.ca <support@seaside.ns.ca> Mon, Sep 18, 2023 at 4:17 PM
To: General Mailbox <general@strum.com>

General Mailbox writes:

> Good afternoon,
>
> On behalf of our client, Strum is conducting an electromagnetic interference (“EMI”) study on the placement of 15 wind turbines located near the communities of Upper Vaughn, New Ross and Windsor Forks in West Hants Regional Municipality, Halifax Regional Municipality and the Municipal District of Chester, Nova Scotia. Please find attached a notification letter for the proposed development.
>
> A confirmation of receipt would be greatly appreciated. For questions or comments, kindly contact the undersigned.
>
> Looking forward to hearing from you,
>
> *Courtney Morrison **(she/her), BA, MREM*
>
> *Community Engagement Coordinator*
>
> T: 902.835.5560 (24/7)
>
> C: 902.293.4914
>
> F: 902.835.5574
>
> LinkedIn <https://www.linkedin.com/company/strum-consulting> • Twitter <https://twitter.com/StrumConsultant>• Instagram <https://www.instagram.com/strumconsulting/>
>
> www.strum.com
>
> *Head Office*:
> Suite 210 - 211 Horseshoe Lake Dr.
>
> Halifax, NS, B3S 0B9
>
> *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.

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 support@seaside.ns.ca

APPENDIX R
SHADOW FLICKER MODELLING RESULTS

Licensed user:
Strum Consulting
#210 - 211 Horseshoe Lake Drive
CA-HALIFAX B3S 0B9
902.835.5560 (24/7)
Eric Johnson / ejohnson@strum.com
Calculated:
2023-10-16 9:57 AM/3.5.552

SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO A

Assumptions for shadow calculations

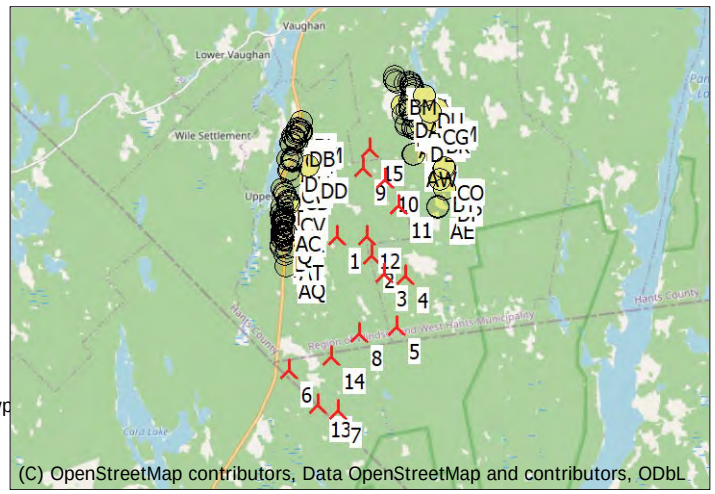
Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

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

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Elevation Grid Data Object: 20230424_BearLake_EMDGrid_0.wp
Obstacles used in calculation
Receptor grid resolution: 1.0 m

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



Scale 1:200,000
New WTG
Shadow receptor

WTGs

	Easting	Northing	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	403,454.25	4,960,446.73	238.9	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
2	404,341.25	4,959,909.73	259.5	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
3	404,672.25	4,959,428.73	255.8	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
4	405,230.25	4,959,362.73	241.5	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
5	404,978.25	4,958,036.73	198.8	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
6	402,108.25	4,956,944.73	213.1	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
7	403,414.25	4,955,830.73	230.3	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
8	403,983.25	4,957,869.73	224.6	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
9	404,146.25	4,962,205.73	239.2	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
10	404,742.25	4,961,898.73	258.6	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
11	405,079.25	4,961,238.73	244.5	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
12	404,250.25	4,960,436.73	263.0	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
13	402,869.25	4,956,008.73	239.1	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
14	403,252.25	4,957,271.73	241.1	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
15	404,354.95	4,962,718.13	223.0	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7

Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]		[m]
A	402,077.21	4,960,343.00	166.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
B	402,113.54	4,960,346.59	168.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
C	402,012.44	4,960,359.37	162.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
D	401,995.84	4,960,377.94	160.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
E	402,067.92	4,960,405.81	165.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
F	402,012.65	4,960,463.16	162.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
G	402,081.54	4,960,482.66	165.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
H	402,013.90	4,960,490.60	162.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
I	401,985.86	4,960,511.36	160.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
J	401,971.89	4,960,512.90	158.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
K	402,086.69	4,960,537.84	164.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
L	402,115.53	4,960,546.63	164.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
M	402,105.39	4,960,547.60	164.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
N	402,098.08	4,960,548.37	164.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
O	402,096.98	4,960,567.81	163.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
P	402,099.41	4,960,576.54	163.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
Q	402,071.65	4,960,584.35	162.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
R	402,000.57	4,960,585.34	160.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0

To be continued on next page...

Licensed user:
Strum Consulting
#210 - 211 Horseshoe Lake Drive
CA-HALIFAX B3S 0B9
902.835.5560 (24/7)
Eric Johnson / ejohnson@strum.com
Calculated:
2023-10-16 9:57 AM/3.5.552

SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO A

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]		[m]
S	401,996.20	4,960,602.59	160.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
T	402,025.70	4,960,602.70	161.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
U	402,063.72	4,960,623.45	161.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
V	402,151.60	4,961,128.00	139.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
W	406,136.30	4,961,171.50	179.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
X	402,042.24	4,960,662.47	160.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
Y	402,028.92	4,960,734.18	159.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
Z	402,030.95	4,960,896.38	154.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AA	402,008.06	4,960,897.37	154.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AB	402,038.09	4,960,919.97	153.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AC	402,029.46	4,960,929.69	153.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AD	402,024.16	4,960,978.15	151.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AE	406,125.01	4,961,189.96	178.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AF	402,171.32	4,961,239.09	136.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AG	401,989.86	4,961,257.23	140.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AH	402,035.28	4,960,749.51	158.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AI	402,022.92	4,960,771.47	158.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AJ	402,020.02	4,960,817.92	157.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AK	402,001.54	4,960,852.35	156.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AL	402,020.11	4,960,856.70	156.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AM	402,083.75	4,960,880.65	153.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AN	401,955.07	4,961,043.91	151.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AO	402,000.65	4,961,047.27	150.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AP	402,131.05	4,961,063.04	137.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AQ	402,067.70	4,959,668.60	164.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AR	402,063.36	4,959,961.63	164.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AS	402,113.14	4,960,042.77	168.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AT	402,107.05	4,960,169.25	168.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AU	401,951.95	4,960,198.08	156.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AV	401,956.34	4,960,217.46	157.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AW	405,505.90	4,962,584.32	169.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AX	405,491.36	4,962,586.87	168.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AY	405,325.44	4,963,329.80	166.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AZ	405,697.55	4,963,353.42	161.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BA	405,891.03	4,963,354.83	164.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BB	405,520.31	4,964,227.58	165.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BC	405,517.91	4,964,266.61	167.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BD	405,493.50	4,964,320.30	173.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BE	405,704.06	4,963,368.96	162.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BF	405,321.00	4,963,377.43	167.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BG	405,469.08	4,964,394.24	172.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BH	405,488.78	4,964,395.52	169.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BI	405,462.60	4,964,436.80	169.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BJ	405,302.60	4,964,439.50	186.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BK	406,008.68	4,963,439.22	166.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BL	402,552.30	4,963,451.70	121.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BM	405,074.67	4,964,474.95	187.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BN	405,415.59	4,964,475.05	175.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BO	405,045.37	4,964,538.14	188.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BP	405,862.90	4,963,486.60	162.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BQ	405,717.20	4,963,492.20	161.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BR	405,911.04	4,963,521.00	164.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BS	405,030.79	4,964,601.13	188.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BT	406,185.10	4,961,882.10	159.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BU	406,163.45	4,961,887.80	160.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BV	405,872.10	4,963,549.00	162.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BW	405,515.10	4,963,571.40	159.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BX	405,535.72	4,963,572.39	159.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BY	402,283.03	4,962,878.99	107.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BZ	405,245.27	4,963,625.10	181.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CA	406,160.72	4,963,638.72	169.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CB	405,878.80	4,963,640.70	162.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CC	405,035.73	4,964,620.79	189.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CD	402,289.46	4,961,997.45	160.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0

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SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO A

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]		[m]
CE	402,270.11	4,962,921.17	107.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CF	405,964.18	4,963,674.29	167.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CG	405,967.37	4,963,684.73	167.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CH	402,398.77	4,962,947.00	118.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CI	405,336.30	4,963,735.60	174.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CJ	405,451.80	4,963,744.00	163.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CK	405,440.94	4,963,750.76	163.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CL	402,371.60	4,963,007.00	120.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CM	406,139.14	4,963,768.35	161.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CN	402,179.56	4,961,320.02	137.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CO	406,331.55	4,962,172.45	160.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CP	402,387.30	4,963,027.90	121.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CQ	402,341.99	4,963,062.81	115.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CR	402,333.56	4,963,069.30	114.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CS	402,173.88	4,961,366.17	138.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CT	402,182.30	4,961,378.40	141.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CU	402,167.80	4,961,409.70	139.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CV	402,153.90	4,961,413.00	136.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CW	402,200.07	4,962,183.28	128.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CX	406,289.76	4,962,204.89	159.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CY	402,215.02	4,962,210.30	127.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CZ	405,442.60	4,963,847.50	166.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DA	405,219.79	4,963,857.88	189.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DB	402,405.04	4,963,125.42	116.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DC	402,115.08	4,961,487.44	131.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DD	402,717.83	4,962,303.75	200.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DE	402,409.37	4,963,178.61	113.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DF	402,502.89	4,963,182.51	119.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DG	402,533.70	4,963,188.90	120.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DH	402,422.44	4,963,204.86	112.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DI	405,436.46	4,963,945.00	170.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DJ	402,076.43	4,961,574.31	131.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DK	405,580.84	4,963,213.77	166.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DL	405,597.69	4,963,234.78	164.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DM	402,533.20	4,963,237.70	121.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DN	405,488.60	4,964,017.40	163.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DO	402,062.67	4,961,603.82	131.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DP	406,321.59	4,961,641.81	159.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DQ	402,325.55	4,962,430.22	121.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DR	402,333.36	4,962,449.59	120.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DS	405,515.52	4,963,261.94	163.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DT	402,448.86	4,963,280.29	114.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DU	405,806.40	4,964,118.60	160.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DV	405,498.07	4,964,124.16	165.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DW	402,290.78	4,962,473.13	111.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DX	402,181.90	4,962,488.40	111.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DY	402,276.54	4,962,497.38	108.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DZ	402,445.07	4,963,298.22	114.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
EA	405,510.80	4,963,306.15	163.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
EB	405,502.32	4,964,181.93	167.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
EC	402,015.34	4,961,695.77	123.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
ED	402,010.50	4,961,719.18	122.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
EE	402,302.85	4,962,513.00	109.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0

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	13:29	38	0:28
B	14:08	39	0:28
C	11:58	35	0:26

To be continued on next page...

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SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO A

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
D	11:43	36	0:26
E	12:44	37	0:27
F	11:35	34	0:26
G	12:33	36	0:27
H	11:26	34	0:26
I	10:59	32	0:26
J	10:42	32	0:25
K	12:26	35	0:27
L	13:01	36	0:28
M	12:47	36	0:28
N	12:39	36	0:28
O	12:30	35	0:28
P	12:27	34	0:28
Q	12:01	35	0:27
R	10:54	33	0:26
S	10:49	33	0:26
T	11:16	34	0:26
U	11:38	34	0:27
V	12:21	36	0:26
W	41:32	102	0:36
X	11:19	33	0:26
Y	10:56	33	0:26
Z	10:34	32	0:25
AA	10:20	32	0:25
AB	10:45	33	0:25
AC	10:29	33	0:25
AD	10:23	32	0:25
AE	43:22	106	0:36
AF	13:00	39	0:26
AG	10:08	34	0:23
AH	10:54	32	0:26
AI	10:46	33	0:26
AJ	10:36	32	0:26
AK	10:23	32	0:25
AL	10:32	32	0:25
AM	11:25	33	0:26
AN	9:32	31	0:24
AO	10:10	33	0:24
AP	11:59	36	0:26
AQ	1:51	15	0:09
AR	21:57	65	0:27
AS	19:43	55	0:28
AT	16:01	45	0:28
AU	12:11	38	0:25
AV	12:06	36	0:26
AW	75:53	178	0:38
AX	79:12	179	0:38
AY	39:46	102	0:34
AZ	12:36	38	0:26
BA	9:38	32	0:23
BB	0:00	0	0:00
BC	0:00	0	0:00
BD	0:00	0	0:00
BE	12:30	38	0:26
BF	35:30	96	0:34
BG	0:00	0	0:00
BH	0:00	0	0:00
BI	0:00	0	0:00
BJ	0:00	0	0:00
BK	0:00	0	0:00
BL	0:00	0	0:00
BM	0:00	0	0:00
BN	0:00	0	0:00

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SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO A

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
BO	0:00	0	0:00
BP	10:24	36	0:23
BQ	12:59	40	0:25
BR	9:56	35	0:22
BS	0:00	0	0:00
BT	29:15	80	0:30
BU	30:17	80	0:31
BV	10:37	36	0:23
BW	21:44	62	0:28
BX	20:31	60	0:27
BY	0:00	0	0:00
BZ	20:25	50	0:30
CA	0:00	0	0:00
CB	11:17	40	0:22
CC	0:00	0	0:00
CD	0:00	0	0:00
CE	0:00	0	0:00
CF	0:00	0	0:00
CG	0:00	0	0:00
CH	0:00	0	0:00
CI	11:25	36	0:24
CJ	20:31	54	0:27
CK	18:51	50	0:27
CL	0:00	0	0:00
CM	0:00	0	0:00
CN	13:46	42	0:25
CO	27:09	85	0:25
CP	0:00	0	0:00
CQ	0:00	0	0:00
CR	0:00	0	0:00
CS	14:12	44	0:25
CT	14:36	45	0:25
CU	14:45	47	0:25
CV	14:18	46	0:24
CW	0:00	0	0:00
CX	34:11	110	0:26
CY	0:00	0	0:00
CZ	5:36	26	0:16
DA	0:00	0	0:00
DB	0:00	0	0:00
DC	14:27	48	0:24
DD	21:15	69	0:26
DE	0:00	0	0:00
DF	0:00	0	0:00
DG	0:00	0	0:00
DH	0:00	0	0:00
DI	0:00	0	0:00
DJ	0:00	0	0:00
DK	29:02	89	0:29
DL	28:20	90	0:29
DM	0:00	0	0:00
DN	0:00	0	0:00
DO	0:00	0	0:00
DP	24:27	72	0:29
DQ	0:00	0	0:00
DR	0:00	0	0:00
DS	37:28	115	0:30
DT	0:00	0	0:00
DU	0:00	0	0:00
DV	0:00	0	0:00
DW	0:00	0	0:00
DX	0:00	0	0:00
DY	0:00	0	0:00

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SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO A

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
DZ	0:00	0	0:00
EA	38:50	112	0:30
EB	0:00	0	0:00
EC	0:00	0	0:00
ED	0:00	0	0:00
EE	0:00	0	0:00

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

No.	Name	Worst case [h/year]
1	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (46)	165:48
2	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (47)	0:00
3	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (48)	0:00
4	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (49)	0:00
5	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (50)	0:00
6	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (51)	0:00
7	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (52)	0:00
8	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (53)	0:00
9	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (54)	73:21
10	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (55)	106:20
11	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (56)	90:21
12	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (57)	0:00
13	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (58)	0:00
14	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (59)	0:00
15	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (60)	133:06

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.

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Calculated:
2023-10-17 9:34 AM/3.5.552

SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO B

Assumptions for shadow calculations

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

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

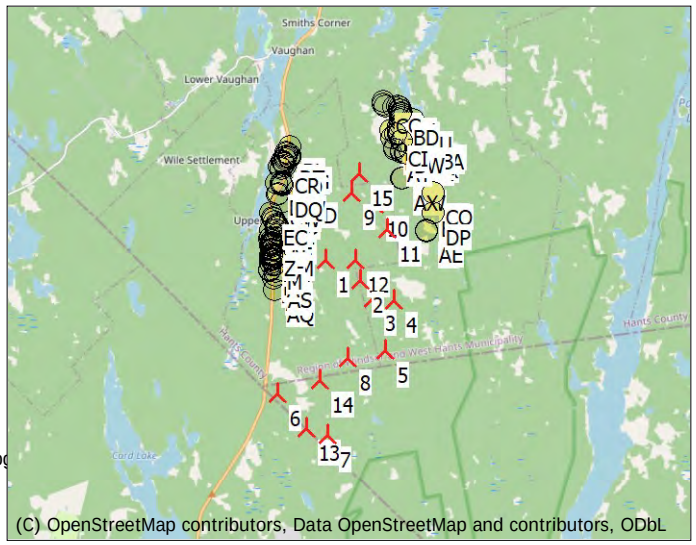
Sunshine probability S (Average daily sunshine hours) [KENTVILLE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.53	3.50	4.28	4.96	6.33	7.24	7.51	7.27	5.85	4.44	2.81	1.86

No operational time reduction. It is assumed the WTGs are always running with worst case wind direction.

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Elevation Grid Data Object: 20230424_BearLake_EMDGrid_0.wpg
Obstacles used in calculation
Receptor grid resolution: 1.0 m

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



Scale 1:200,000
New WTG
Shadow receptor

WTGs

	Easting	Northing	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	403,454.25	4,960,446.73	238.9	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
2	404,341.25	4,959,909.73	259.5	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
3	404,672.25	4,959,428.73	255.8	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
4	405,230.25	4,959,362.73	241.5	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
5	404,978.25	4,958,036.73	198.8	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
6	402,108.25	4,956,944.73	213.1	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
7	403,414.25	4,955,830.73	230.3	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
8	403,983.25	4,957,869.73	224.6	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
9	404,146.25	4,962,205.73	239.2	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
10	404,742.25	4,961,898.73	258.6	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
11	405,079.25	4,961,238.73	244.5	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
12	404,250.25	4,960,436.73	263.0	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
13	402,869.25	4,956,008.73	239.1	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
14	403,252.25	4,957,271.73	241.1	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7
15	404,354.95	4,962,718.13	223.0	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	1,788	10.7

Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]		[m]
A	402,077.21	4,960,343.00	166.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
B	402,113.54	4,960,346.59	168.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
C	402,012.44	4,960,359.37	162.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
D	401,995.84	4,960,377.94	160.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
E	402,067.92	4,960,405.81	165.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
F	402,012.65	4,960,463.16	162.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
G	402,081.54	4,960,482.66	165.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
H	402,013.90	4,960,490.60	162.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
I	401,985.86	4,960,511.36	160.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
J	401,971.89	4,960,512.90	158.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
K	402,086.69	4,960,537.84	164.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
L	402,115.53	4,960,546.63	164.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
M	402,105.39	4,960,547.60	164.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
N	402,098.08	4,960,548.37	164.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
O	402,096.98	4,960,567.81	163.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0

To be continued on next page...

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Calculated:
2023-10-17 9:34 AM/3.5.552

SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO B

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]		[m]
P	402,099.41	4,960,576.54	163.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
Q	402,071.65	4,960,584.35	162.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
R	402,000.57	4,960,585.34	160.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
S	401,996.20	4,960,602.59	160.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
T	402,025.70	4,960,602.70	161.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
U	402,063.72	4,960,623.45	161.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
V	402,151.60	4,961,128.00	139.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
W	406,136.30	4,961,171.50	179.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
X	402,042.24	4,960,662.47	160.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
Y	402,028.92	4,960,734.18	159.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
Z	402,030.95	4,960,896.38	154.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AA	402,008.06	4,960,897.37	154.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AB	402,038.09	4,960,919.97	153.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AC	402,029.46	4,960,929.69	153.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AD	402,024.16	4,960,978.15	151.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AE	406,125.01	4,961,189.96	178.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AF	402,171.32	4,961,239.09	136.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AG	401,989.86	4,961,257.23	140.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AH	402,035.28	4,960,749.51	158.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AI	402,022.92	4,960,771.47	158.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AJ	402,020.02	4,960,817.92	157.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AK	402,001.54	4,960,852.35	156.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AL	402,020.11	4,960,856.70	156.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AM	402,083.75	4,960,880.65	153.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AN	401,955.07	4,961,043.91	151.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AO	402,000.65	4,961,047.27	150.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AP	402,131.05	4,961,063.04	137.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AQ	402,067.70	4,959,668.60	164.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AR	402,063.36	4,959,961.63	164.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AS	402,113.14	4,960,042.77	168.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AT	402,107.05	4,960,169.25	168.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AU	401,951.95	4,960,198.08	156.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AV	401,956.34	4,960,217.46	157.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AW	405,505.90	4,962,584.32	169.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AX	405,491.36	4,962,586.87	168.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AY	405,325.44	4,963,329.80	166.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
AZ	405,697.55	4,963,353.42	161.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BA	405,891.03	4,963,354.83	164.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BB	405,520.31	4,964,227.58	165.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BC	405,517.91	4,964,266.61	167.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BD	405,493.50	4,964,320.30	173.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BE	405,704.06	4,963,368.96	162.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BF	405,321.00	4,963,377.43	167.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BG	405,469.08	4,964,394.24	172.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BH	405,488.78	4,964,395.52	169.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BI	405,462.60	4,964,436.80	169.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BJ	405,302.60	4,964,439.50	186.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BK	406,008.68	4,963,439.22	166.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BL	402,552.30	4,963,451.70	121.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BM	405,074.67	4,964,474.95	187.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BN	405,415.59	4,964,475.05	175.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BO	405,045.37	4,964,538.14	188.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BP	405,862.90	4,963,486.60	162.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BQ	405,717.20	4,963,492.20	161.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BR	405,911.04	4,963,521.00	164.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BS	405,030.79	4,964,601.13	188.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BT	406,185.10	4,961,882.10	159.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BU	406,163.45	4,961,887.80	160.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BV	405,872.10	4,963,549.00	162.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BW	405,515.10	4,963,571.40	159.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BX	405,535.72	4,963,572.39	159.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BY	402,283.03	4,962,878.99	107.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
BZ	405,245.27	4,963,625.10	181.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CA	406,160.72	4,963,638.72	169.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CB	405,878.80	4,963,640.70	162.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0

To be continued on next page...

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SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO B

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]		[m]
CC	405,035.73	4,964,620.79	189.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CD	402,289.46	4,961,997.45	160.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CE	402,270.11	4,962,921.17	107.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CF	405,964.18	4,963,674.29	167.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CG	405,967.37	4,963,684.73	167.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CH	402,398.77	4,962,947.00	118.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CI	405,336.30	4,963,735.60	174.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CJ	405,451.80	4,963,744.00	163.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CK	405,440.94	4,963,750.76	163.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CL	402,371.60	4,963,007.00	120.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CM	406,139.14	4,963,768.35	161.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CN	402,179.56	4,961,320.02	137.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CO	406,331.55	4,962,172.45	160.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CP	402,387.30	4,963,027.90	121.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CQ	402,341.99	4,963,062.81	115.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CR	402,333.56	4,963,069.30	114.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CS	402,173.88	4,961,366.17	138.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CT	402,182.30	4,961,378.40	141.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CU	402,167.80	4,961,409.70	139.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CV	402,153.90	4,961,413.00	136.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CW	402,200.07	4,962,183.28	128.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CX	406,289.76	4,962,204.89	159.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CY	402,215.02	4,962,210.30	127.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
CZ	405,442.60	4,963,847.50	166.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DA	405,219.79	4,963,857.88	189.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DB	402,405.04	4,963,125.42	116.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DC	402,115.08	4,961,487.44	131.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DD	402,717.83	4,962,303.75	200.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DE	402,409.37	4,963,178.61	113.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DF	402,502.89	4,963,182.51	119.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DG	402,533.70	4,963,188.90	120.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DH	402,422.44	4,963,204.86	112.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DI	405,436.46	4,963,945.00	170.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DJ	402,076.43	4,961,574.31	131.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DK	405,580.84	4,963,213.77	166.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DL	405,597.69	4,963,234.78	164.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DM	402,533.20	4,963,237.70	121.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DN	405,488.60	4,964,017.40	163.4	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DO	402,062.67	4,961,603.82	131.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DP	406,321.59	4,961,641.81	159.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DQ	402,325.55	4,962,430.22	121.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DR	402,333.36	4,962,449.59	120.5	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DS	405,515.52	4,963,261.94	163.1	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DT	402,448.86	4,963,280.29	114.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DU	405,806.40	4,964,118.60	160.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DV	405,498.07	4,964,124.16	165.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DW	402,290.78	4,962,473.13	111.8	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DX	402,181.90	4,962,488.40	111.6	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DY	402,276.54	4,962,497.38	108.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
DZ	402,445.07	4,963,298.22	114.3	1.0	1.0	1.0	90.0	"Green house mode"	2.0
EA	405,510.80	4,963,306.15	163.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0
EB	405,502.32	4,964,181.93	167.0	1.0	1.0	1.0	90.0	"Green house mode"	2.0
EC	402,015.34	4,961,695.77	123.2	1.0	1.0	1.0	90.0	"Green house mode"	2.0
ED	402,010.50	4,961,719.18	122.7	1.0	1.0	1.0	90.0	"Green house mode"	2.0
EE	402,302.85	4,962,513.00	109.9	1.0	1.0	1.0	90.0	"Green house mode"	2.0

Calculation Results

Shadow receptor

No.	Shadow, expected values Shadow hours per year [h/year]
A	5:51
B	6:09

To be continued on next page...

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#210 -211 Horseshoe Lake Drive
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Eric Johnson / ejohnson@strum.com
Calculated:
2023-10-17 9:34 AM/3.5.552

SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO B

...continued from previous page

No.	Shadow, expected values Shadow hours per year [h/year]
C	5:10
D	5:01
E	5:25
F	4:50
G	5:13
H	4:45
I	4:33
J	4:26
K	5:09
L	5:23
M	5:17
N	5:14
O	5:11
P	5:09
Q	4:58
R	4:30
S	4:28
T	4:39
U	4:48
V	4:29
W	18:43
X	4:40
Y	4:25
Z	4:00
AA	3:55
AB	4:04
AC	3:57
AD	3:53
AE	19:31
AF	4:19
AG	3:30
AH	4:23
AI	4:17
AJ	4:08
AK	4:00
AL	4:03
AM	4:21
AN	3:32
AO	3:46
AP	4:26
AQ	0:51
AR	10:12
AS	9:11
AT	7:18
AU	5:25
AV	5:21
AW	25:09
AX	26:01
AY	11:10
AZ	4:29
BA	3:33
BB	0:00
BC	0:00
BD	0:00
BE	4:24
BF	9:50
BG	0:00
BH	0:00
BI	0:00
BJ	0:00
BK	0:00
BL	0:00
BM	0:00
BN	0:00

To be continued on next page...

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Calculated:
2023-10-17 9:34 AM/3.5.552

SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO B

...continued from previous page

No.	Shadow, expected values Shadow hours per year [h/year]
BO	0:00
BP	3:29
BQ	4:04
BR	3:15
BS	0:00
BT	10:48
BU	11:04
BV	3:20
BW	6:03
BX	5:46
BY	0:00
BZ	4:41
CA	0:00
CB	3:19
CC	0:00
CD	0:00
CE	0:00
CF	0:00
CG	0:00
CH	0:00
CI	2:31
CJ	4:47
CK	4:21
CL	0:00
CM	0:00
CN	4:10
CO	8:41
CP	0:00
CQ	0:00
CR	0:00
CS	4:11
CT	4:16
CU	4:16
CV	4:09
CW	0:00
CX	10:10
CY	0:00
CZ	1:11
DA	0:00
DB	0:00
DC	4:06
DD	9:11
DE	0:00
DF	0:00
DG	0:00
DH	0:00
DI	0:00
DJ	0:00
DK	9:28
DL	9:12
DM	0:00
DN	0:00
DO	0:00
DP	9:56
DQ	0:00
DR	0:00
DS	11:20
DT	0:00
DU	0:00
DV	0:00
DW	0:00
DX	0:00
DY	0:00
DZ	0:00

To be continued on next page...

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SHADOW - Main Result

Calculation: Bear Lake Wind Power Project - ASSESSMENT SCENARIO B

...continued from previous page

Shadow, expected values

No.	Shadow hours per year [h/year]
EA	11:19
EB	0:00
EC	0:00
ED	0:00
EE	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (46)	165:48	66:19
2	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (47)	0:00	0:00
3	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (48)	0:00	0:00
4	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (49)	0:00	0:00
5	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (50)	0:00	0:00
6	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (51)	0:00	0:00
7	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (52)	0:00	0:00
8	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (53)	0:00	0:00
9	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (54)	73:21	21:51
10	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (55)	106:20	38:15
11	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (56)	90:21	31:09
12	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (57)	0:00	0:00
13	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (58)	0:00	0:00
14	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (59)	0:00	0:00
15	NORDEX N163/5.9 5900 163.0 !O! hub: 125.0 m (TOT: 206.5 m) (60)	133:06	43:56

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.

APPENDIX S
SOUND MODELLING RESULTS

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 & Klokker, 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).

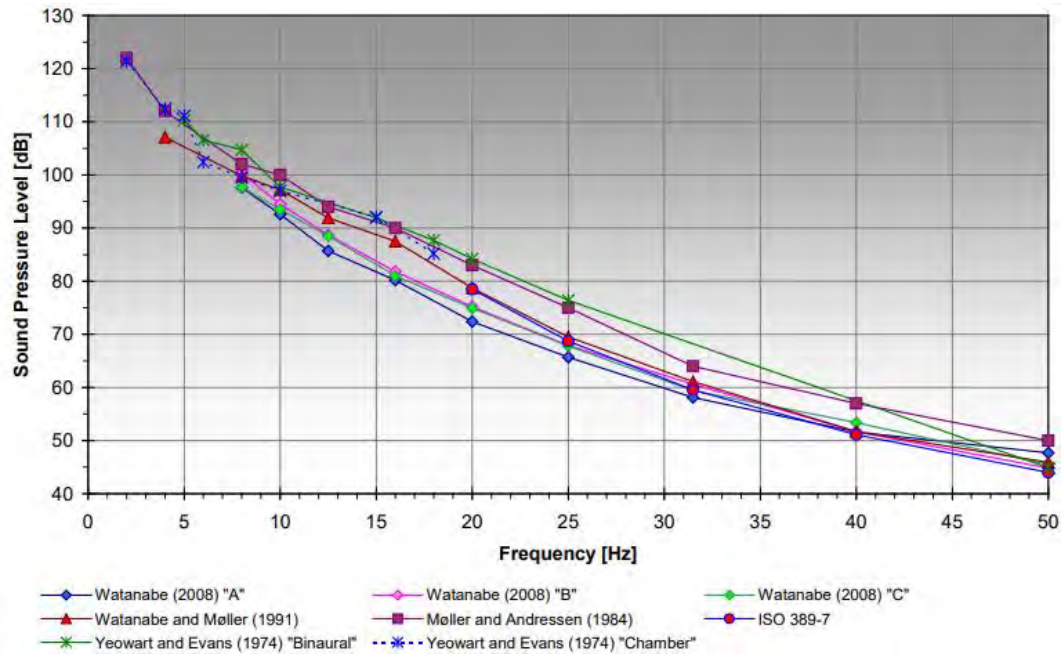

Figure S.1. Threshold of Hearing Data from Various Papers (Source: HGC, 2010)

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

Source: Sonus 2010

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

Infrasound and Potential Health Concerns

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

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

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

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

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

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

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1355 Bedford Highway
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902.835.5560 (24/7)
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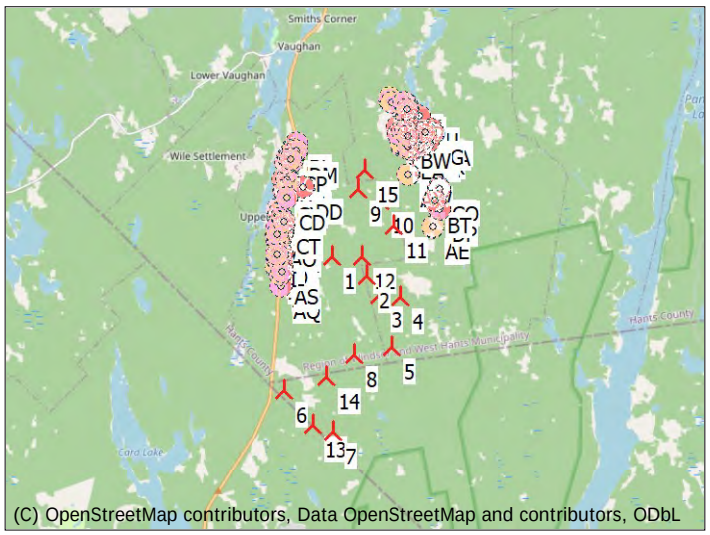
Calculated:
2023-09-13 2:38 PM/3.5.552

DECIBEL - Main Result

Calculation: 2023 09 13 - Noise Model (35.0dBA Ambient Value Included)

Noise calculation model:
ISO 9613-2 General
Wind speed (in 10 m height):
Loudest up to 95% rated power
Ground attenuation:
General, Ground factor: 1.0
Meteorological coefficient, C0:
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
WTG catalogue
Height above ground level, when no value in NSA object:
1.5 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)



Scale 1:200,000
New WTG
Noise sensitive area

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

WTGs

	Easting	Northing	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	Wind speed	LwA,ref
			[m]					[kW]	[m]	[m]			[m/s]	[dB(A)]
1	403,454.25	4,960,446.73	238.9	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
2	404,341.25	4,959,909.73	259.5	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
3	404,672.25	4,959,428.73	255.8	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
4	405,230.25	4,959,362.73	241.5	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
5	404,978.25	4,958,036.73	198.8	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
6	402,108.25	4,956,944.73	213.1	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
7	403,414.25	4,955,830.73	230.3	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
8	403,983.25	4,957,869.73	224.6	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
9	404,146.25	4,962,205.73	239.2	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
10	404,742.25	4,961,898.73	258.6	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
11	405,079.25	4,961,238.73	244.5	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
12	404,250.25	4,960,436.73	263.0	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
13	402,869.25	4,956,008.73	239.1	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
14	403,252.25	4,957,271.73	241.1	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2
15	404,354.95	4,962,718.13	223.0	NORDEX N163/5.9 590...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	Mode 0.a 120m HH - 109.2 dB(A)	7.0	109.2

Calculation Results

Sound level

Noise sensitive area No.	Name	Easting	Northing	Z	Immission height	Demands Ambient noise	Demands Additional exposure	Sound level Ambient+WTGs	Sound level From WTGs	Sound level Ambient+WTGs	Sound level Additional exposure	Distance to noise demand	Demands fulfilled ? Noise
				[m]	[m]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[m]	
A	Noise sensitive point: User defined (1)	402,077.21	4,960,343.00	166.4	1.5	35.0	5.0	40.0	32.0	36.8	1.8	846	Yes
B	Noise sensitive point: User defined (2)	402,113.54	4,960,346.59	168.6	1.5	35.0	5.0	40.0	32.3	36.9	1.9	810	Yes
C	Noise sensitive point: User defined (3)	402,012.44	4,960,359.37	162.1	1.5	35.0	5.0	40.0	31.7	36.7	1.7	910	Yes
D	Noise sensitive point: User defined (4)	401,995.84	4,960,377.94	160.8	1.5	35.0	5.0	40.0	31.6	36.6	1.6	927	Yes
E	Noise sensitive point: User defined (5)	402,067.92	4,960,405.81	165.1	1.5	35.0	5.0	40.0	32.0	36.8	1.8	854	Yes
F	Noise sensitive point: User defined (6)	402,012.65	4,960,463.16	162.0	1.5	35.0	5.0	40.0	31.6	36.6	1.6	908	Yes
G	Noise sensitive point: User defined (7)	402,081.54	4,960,482.66	165.1	1.5	35.0	5.0	40.0	32.0	36.8	1.8	839	Yes
H	Noise sensitive point: User defined (8)	402,013.90	4,960,490.60	162.0	1.5	35.0	5.0	40.0	31.6	36.6	1.6	907	Yes
I	Noise sensitive point: User defined (9)	401,985.86	4,960,511.36	160.1	1.5	35.0	5.0	40.0	31.5	36.6	1.6	935	Yes
J	Noise sensitive point: User defined (10)	401,971.89	4,960,512.90	158.9	1.5	35.0	5.0	40.0	31.4	36.6	1.6	949	Yes
K	Noise sensitive point: User defined (11)	402,086.69	4,960,537.84	164.0	1.5	35.0	5.0	40.0	32.0	36.8	1.8	836	Yes
L	Noise sensitive point: User defined (12)	402,115.53	4,960,546.63	164.4	1.5	35.0	5.0	40.0	32.2	36.8	1.8	807	Yes
M	Noise sensitive point: User defined (13)	402,105.39	4,960,547.60	164.2	1.5	35.0	5.0	40.0	32.2	36.8	1.8	818	Yes
N	Noise sensitive point: User defined (14)	402,098.08	4,960,548.37	164.0	1.5	35.0	5.0	40.0	32.1	36.8	1.8	825	Yes
O	Noise sensitive point: User defined (15)	402,096.98	4,960,567.81	163.4	1.5	35.0	5.0	40.0	32.1	36.8	1.8	828	Yes
P	Noise sensitive point: User defined (16)	402,099.41	4,960,576.54	163.2	1.5	35.0	5.0	40.0	32.1	36.8	1.8	826	Yes
Q	Noise sensitive point: User defined (17)	402,071.65	4,960,584.35	162.9	1.5	35.0	5.0	40.0	31.9	36.7	1.7	855	Yes
R	Noise sensitive point: User defined (18)	402,000.57	4,960,585.34	160.8	1.5	35.0	5.0	40.0	31.5	36.6	1.6	926	Yes
S	Noise sensitive point: User defined (19)	401,996.20	4,960,602.59	160.0	1.5	35.0	5.0	40.0	31.5	36.6	1.6	932	Yes

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DECIBEL - Main Result

Calculation: 2023 09 13 - Noise Model (35.0dBA Ambient Value Included)

...continued from previous page

Noise sensitive area No.	Name	Easting	Northing	Z	Immission height	Demands Ambient noise	Demands Additional exposure	Sound level Ambient+WTGs	Sound level From WTGs	Sound level Ambient+WTGs	Additional exposure	Distance to noise demand	Demands fulfilled ? Noise
				[m]	[m]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[m]	
T	Noise sensitive point: User defined (20)	402,025.70	4,960,602.70	161.7	1.5	35.0	5.0	40.0	31.6	36.6	1.6	903	Yes
U	Noise sensitive point: User defined (21)	402,063.72	4,960,623.45	161.8	1.5	35.0	5.0	40.0	31.9	36.7	1.7	868	Yes
V	Noise sensitive point: User defined (22)	402,151.60	4,961,128.00	139.7	1.5	35.0	5.0	40.0	31.7	36.7	1.7	933	Yes
W	Noise sensitive point: User defined (23)	406,136.30	4,961,171.50	179.4	1.5	35.0	5.0	40.0	34.9	38.0	3.0	495	Yes
X	Noise sensitive point: User defined (24)	402,042.24	4,960,662.47	160.1	1.5	35.0	5.0	40.0	31.7	36.7	1.7	895	Yes
Y	Noise sensitive point: User defined (25)	402,028.92	4,960,734.18	159.0	1.5	35.0	5.0	40.0	31.6	36.6	1.6	919	Yes
Z	Noise sensitive point: User defined (26)	402,030.95	4,960,896.38	154.3	1.5	35.0	5.0	40.0	31.4	36.6	1.6	958	Yes
AA	Noise sensitive point: User defined (27)	402,008.06	4,960,897.37	154.4	1.5	35.0	5.0	40.0	31.3	36.5	1.5	980	Yes
AB	Noise sensitive point: User defined (28)	402,038.09	4,960,919.97	153.2	1.5	35.0	5.0	40.0	31.4	36.6	1.6	959	Yes
AC	Noise sensitive point: User defined (29)	402,029.46	4,960,929.69	153.1	1.5	35.0	5.0	40.0	31.3	36.6	1.6	970	Yes
AD	Noise sensitive point: User defined (30)	402,024.16	4,960,978.15	151.7	1.5	35.0	5.0	40.0	31.2	36.5	1.5	991	Yes
AE	Noise sensitive point: User defined (31)	406,125.01	4,961,189.96	178.6	1.5	35.0	5.0	40.0	35.0	38.0	3.0	482	Yes
AF	Noise sensitive point: User defined (32)	402,171.32	4,961,239.09	136.6	1.5	35.0	5.0	40.0	31.6	36.6	1.6	966	Yes
AG	Noise sensitive point: User defined (33)	401,989.86	4,961,257.23	140.7	1.5	35.0	5.0	40.0	30.7	36.4	1.4	1,135	Yes
AH	Noise sensitive point: User defined (34)	402,035.28	4,960,749.51	158.9	1.5	35.0	5.0	40.0	31.6	36.6	1.6	916	Yes
AI	Noise sensitive point: User defined (35)	402,022.92	4,960,771.47	158.3	1.5	35.0	5.0	40.0	31.5	36.6	1.6	932	Yes
AJ	Noise sensitive point: User defined (36)	402,020.02	4,960,817.92	157.8	1.5	35.0	5.0	40.0	31.4	36.6	1.6	946	Yes
AK	Noise sensitive point: User defined (37)	402,001.54	4,960,852.35	156.0	1.5	35.0	5.0	40.0	31.3	36.5	1.5	973	Yes
AL	Noise sensitive point: User defined (38)	402,020.11	4,960,856.70	156.3	1.5	35.0	5.0	40.0	31.4	36.6	1.6	956	Yes
AM	Noise sensitive point: User defined (39)	402,083.75	4,960,880.65	153.3	1.5	35.0	5.0	40.0	31.7	36.7	1.7	903	Yes
AN	Noise sensitive point: User defined (40)	401,955.07	4,961,043.91	151.2	1.5	35.0	5.0	40.0	30.8	36.4	1.4	1,078	Yes
AO	Noise sensitive point: User defined (41)	402,000.65	4,961,047.27	150.5	1.5	35.0	5.0	40.0	31.0	36.5	1.5	1,036	Yes
AP	Noise sensitive point: User defined (42)	402,131.05	4,961,063.04	137.6	1.5	35.0	5.0	40.0	31.7	36.7	1.7	923	Yes
AQ	Noise sensitive point: User defined (43)	402,067.70	4,959,668.60	164.1	1.5	35.0	5.0	40.0	31.6	36.6	1.6	1,048	Yes
AR	Noise sensitive point: User defined (44)	402,063.36	4,959,961.63	164.8	1.5	35.0	5.0	40.0	31.8	36.7	1.7	936	Yes
AS	Noise sensitive point: User defined (45)	402,113.14	4,960,042.77	168.8	1.5	35.0	5.0	40.0	32.1	36.8	1.8	864	Yes
AT	Noise sensitive point: User defined (46)	402,107.05	4,960,169.25	168.4	1.5	35.0	5.0	40.0	32.2	36.8	1.8	841	Yes
AU	Noise sensitive point: User defined (47)	401,951.95	4,960,198.08	156.6	1.5	35.0	5.0	40.0	31.3	36.5	1.5	989	Yes
AV	Noise sensitive point: User defined (48)	401,956.34	4,960,217.46	157.3	1.5	35.0	5.0	40.0	31.3	36.6	1.6	981	Yes
AW	Noise sensitive point: User defined (49)	405,505.90	4,962,584.32	169.0	1.5	35.0	5.0	40.0	36.2	38.7	3.7	382	Yes
AX	Noise sensitive point: User defined (50)	405,491.36	4,962,586.87	168.2	1.5	35.0	5.0	40.0	36.3	38.7	3.7	371	Yes
AY	Noise sensitive point: User defined (51)	405,325.44	4,963,329.80	166.3	1.5	35.0	5.0	40.0	33.9	37.5	2.5	579	Yes
AZ	Noise sensitive point: User defined (52)	405,697.55	4,963,353.42	161.6	1.5	35.0	5.0	40.0	31.8	36.7	1.7	907	Yes
BA	Noise sensitive point: User defined (53)	405,891.03	4,963,354.83	164.0	1.5	35.0	5.0	40.0	30.9	36.4	1.4	1,078	Yes
BB	Noise sensitive point: User defined (54)	405,520.31	4,964,227.58	165.2	1.5	35.0	5.0	40.0	28.5	35.9	0.9	1,358	Yes
BC	Noise sensitive point: User defined (55)	405,517.91	4,964,266.61	167.4	1.5	35.0	5.0	40.0	28.3	35.8	0.8	1,388	Yes
BD	Noise sensitive point: User defined (56)	405,493.50	4,964,320.30	173.7	1.5	35.0	5.0	40.0	28.1	35.8	0.8	1,419	Yes
BE	Noise sensitive point: User defined (57)	405,704.06	4,963,368.96	162.1	1.5	35.0	5.0	40.0	31.7	36.7	1.7	920	Yes
BF	Noise sensitive point: User defined (58)	405,321.00	4,963,377.43	167.8	1.5	35.0	5.0	40.0	33.6	37.4	2.4	605	Yes
BG	Noise sensitive point: User defined (59)	405,469.08	4,964,394.24	172.6	1.5	35.0	5.0	40.0	27.9	35.8	0.8	1,466	Yes
BH	Noise sensitive point: User defined (60)	405,488.78	4,964,395.52	169.2	1.5	35.0	5.0	40.0	27.8	35.8	0.8	1,479	Yes
BI	Noise sensitive point: User defined (61)	405,462.60	4,964,436.80	169.6	1.5	35.0	5.0	40.0	27.7	35.7	0.7	1,498	Yes
BJ	Noise sensitive point: User defined (62)	405,302.60	4,964,439.50	186.1	1.5	35.0	5.0	40.0	28.0	35.8	0.8	1,420	Yes
BK	Noise sensitive point: User defined (63)	406,008.68	4,963,439.22	166.6	1.5	35.0	5.0	40.0	30.1	36.2	1.2	1,221	Yes
BL	Noise sensitive point: User defined (64)	402,552.30	4,963,451.70	121.9	1.5	35.0	5.0	40.0	29.1	36.0	1.0	1,336	Yes
BM	Noise sensitive point: User defined (65)	405,074.67	4,964,474.95	187.6	1.5	35.0	5.0	40.0	28.2	35.8	0.8	1,355	Yes
BN	Noise sensitive point: User defined (66)	405,415.59	4,964,475.05	175.2	1.5	35.0	5.0	40.0	27.6	35.7	0.7	1,506	Yes
BO	Noise sensitive point: User defined (67)	405,045.37	4,964,538.14	188.5	1.5	35.0	5.0	40.0	28.0	35.8	0.8	1,402	Yes
BP	Noise sensitive point: User defined (68)	405,862.90	4,963,486.60	162.6	1.5	35.0	5.0	40.0	30.5	36.3	1.3	1,117	Yes
BQ	Noise sensitive point: User defined (69)	405,717.20	4,963,492.20	161.2	1.5	35.0	5.0	40.0	31.1	36.5	1.5	996	Yes
BR	Noise sensitive point: User defined (70)	405,911.04	4,963,521.00	164.7	1.5	35.0	5.0	40.0	30.2	36.2	1.2	1,176	Yes
BS	Noise sensitive point: User defined (71)	405,030.79	4,964,601.13	188.7	1.5	35.0	5.0	40.0	27.7	35.7	0.7	1,456	Yes
BT	Noise sensitive point: User defined (72)	406,185.10	4,961,882.10	159.9	1.5	35.0	5.0	40.0	33.7	37.4	2.4	684	Yes
BU	Noise sensitive point: User defined (73)	406,163.45	4,961,887.80	160.5	1.5	35.0	5.0	40.0	33.8	37.5	2.5	667	Yes
BV	Noise sensitive point: User defined (74)	405,872.10	4,963,549.00	162.9	1.5	35.0	5.0	40.0	30.2	36.3	1.3	1,158	Yes
BW	Noise sensitive point: User defined (75)	405,515.10	4,963,571.40	159.3	1.5	35.0	5.0	40.0	31.6	36.6	1.6	878	Yes
BX	Noise sensitive point: User defined (76)	405,535.72	4,963,572.39	159.2	1.5	35.0	5.0	40.0	31.6	36.6	1.6	894	Yes
BY	Noise sensitive point: User defined (77)	402,283.03	4,962,878.99	107.4	1.5	35.0	5.0	40.0	29.4	36.0	1.0	1,368	Yes
BZ	Noise sensitive point: User defined (78)	405,245.27	4,963,625.10	181.1	1.5	35.0	5.0	40.0	32.5	37.0	2.0	717	Yes
CA	Noise sensitive point: User defined (79)	406,160.72	4,963,638.72	169.7	1.5	35.0	5.0	40.0	28.8	35.9	0.9	1,451	Yes
CB	Noise sensitive point: User defined (80)	405,878.80	4,963,640.70	162.0	1.5	35.0	5.0	40.0	29.8	36.2	1.2	1,211	Yes
CC	Noise sensitive point: User defined (81)	405,035.73	4,964,620.79	189.4	1.5	35.0	5.0	40.0	27.6	35.7	0.7	1,476	Yes
CD	Noise sensitive point: User defined (82)	402,289.46	4,961,997.45	160.5	1.5	35.0	5.0	40.0	30.9	36.4	1.4	1,273	Yes
CE	Noise sensitive point: User defined (83)	402,270.11	4,962,921.17	107.3	1.5	35.0	5.0	40.0	29.2	36.0	1.0	1,392	Yes
CF	Noise sensitive point: User defined (84)	405,964.18	4,963,674.29	167.2	1.5	35.0	5.0	40.0	29.4	36.1	1.1	1,302	Yes
CG	Noise sensitive point: User defined (85)	405,967.37	4,963,684.73	167.1	1.5	35.0	5.0	40.0	29.3	36.0	1.0	1,310	Yes
CH	Noise sensitive point: User defined (86)	402,398.77	4,962,947.00	118.9	1.5	35.0	5.0	40.0	29.7	36.1	1.1	1,277	Yes
CI	Noise sensitive point: User defined (87)	405,336.30	4,963,735.60	174.5	1.5	35.0	5.0	40.0	31.5	36.6	1.6	860	Yes
CJ	Noise sensitive point: User defined (88)	405,451.80	4,963,744.00	163.1	1.5	35.0	5.0	40.0	31.0	36.5	1.5	945	Yes
CK	Noise sensitive point: User defined (89)	405,440.94	4,963,750.76	163.9	1.5	35.0	5.0	40.0	31.0	36.5	1.5	942	Yes
CL	Noise sensitive point: User defined (90)	402,371.60	4,963,007.00	120.7	1.5	35.0	5.0	40.0	29.5	36.1	1.1	1,323	Yes
CM	Noise sensitive point: User defined (91)	406,139.14	4,963,768.35	161.8	1.5	35.0	5.0	40.0	28.4	35.9	0.9	1,500	Yes
CN	Noise sensitive point: User defined (92)	402,179.56	4,961,320.02	137.9	1.5	35.0	5.0	40.0	31.5	36.6	1.6	1,002	Yes
CO	Noise sensitive point: User defined (93)	406,331.55	4,962,172.45	160.2	1.5	35.0	5.0	40.0	32.2	36.8	1.8	941	Yes
CP	Noise sensitive point: User defined (94)	402,387.30	4,963,027.90	121.4	1.5	35.0	5.0	40.0	29.5	36.1	1.1	1,315	Yes
CQ	Noise sensitive point: User defined (95)	402,341.99	4,963,062.81	115.9	1.5	35.0	5.0	40.0	29.2	36.0	1.0	1,369	Yes
CR	Noise sensitive point: User defined (96)	402,333.56	4,963,069.30	114.7	1.5	35.0	5.0	40.0	29.2	36.0	1.0	1,379	Yes
CS	Noise sensitive point: User defined (97)	402,173.88	4,961,366.17	138.7	1.5	35.0	5.0	40.0	31.4	36.6	1.6	1,033	Yes

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DECIBEL - Main Result

Calculation: 2023 09 13 - Noise Model (35.0dBA Ambient Value Included)

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Noise sensitive area						Demands	Sound level				Demands fulfilled ?
No.	Name	Easting	Northing	Z	Immission height	Ambient noise	Additional exposure	Ambient+WTGs	From WTGs	Ambient+WTGs	Additional exposure	Distance to noise demand	Noise
				[m]	[m]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[m]	
CT	Noise sensitive point: User defined (98)	402,182.30	4,961,378.40	141.0	1.5	35.0	5.0	40.0	31.4	36.6	1.6	1,033	Yes
CU	Noise sensitive point: User defined (99)	402,167.80	4,961,409.70	139.4	1.5	35.0	5.0	40.0	31.3	36.5	1.5	1,063	Yes
CV	Noise sensitive point: User defined (100)	402,153.90	4,961,413.00	136.7	1.5	35.0	5.0	40.0	31.2	36.5	1.5	1,077	Yes
CW	Noise sensitive point: User defined (101)	402,200.07	4,962,183.28	128.3	1.5	35.0	5.0	40.0	30.2	36.2	1.2	1,352	Yes
CX	Noise sensitive point: User defined (102)	406,289.76	4,962,204.89	159.2	1.5	35.0	5.0	40.0	32.4	36.9	1.9	915	Yes
CY	Noise sensitive point: User defined (103)	402,215.02	4,962,210.30	127.0	1.5	35.0	5.0	40.0	30.2	36.3	1.3	1,336	Yes
CZ	Noise sensitive point: User defined (104)	405,442.60	4,963,847.50	166.7	1.5	35.0	5.0	40.0	30.5	36.3	1.3	1,014	Yes
DA	Noise sensitive point: User defined (105)	405,219.79	4,963,857.88	189.8	1.5	35.0	5.0	40.0	31.3	36.5	1.5	883	Yes
DB	Noise sensitive point: User defined (106)	402,405.04	4,963,125.42	116.9	1.5	35.0	5.0	40.0	29.3	36.0	1.0	1,332	Yes
DC	Noise sensitive point: User defined (107)	402,115.08	4,961,487.44	131.9	1.5	35.0	5.0	40.0	30.9	36.4	1.4	1,152	Yes
DD	Noise sensitive point: User defined (108)	402,717.83	4,962,303.75	200.1	1.5	35.0	5.0	40.0	32.7	37.0	2.0	835	Yes
DE	Noise sensitive point: User defined (109)	402,409.37	4,963,178.61	113.1	1.5	35.0	5.0	40.0	29.2	36.0	1.0	1,349	Yes
DF	Noise sensitive point: User defined (110)	402,502.89	4,963,182.51	119.0	1.5	35.0	5.0	40.0	29.6	36.1	1.1	1,264	Yes
DG	Noise sensitive point: User defined (111)	402,533.70	4,963,188.90	120.7	1.5	35.0	5.0	40.0	29.8	36.1	1.1	1,238	Yes
DH	Noise sensitive point: User defined (112)	402,422.44	4,963,204.86	112.9	1.5	35.0	5.0	40.0	29.2	36.0	1.0	1,347	Yes
DI	Noise sensitive point: User defined (113)	405,436.46	4,963,945.00	170.1	1.5	35.0	5.0	40.0	30.1	36.2	1.2	1,084	Yes
DJ	Noise sensitive point: User defined (114)	402,076.43	4,961,574.31	131.8	1.5	35.0	5.0	40.0	30.6	36.3	1.3	1,234	Yes
DK	Noise sensitive point: User defined (115)	405,580.84	4,963,213.77	166.2	1.5	35.0	5.0	40.0	33.0	37.1	2.1	738	Yes
DL	Noise sensitive point: User defined (116)	405,597.69	4,963,234.78	164.0	1.5	35.0	5.0	40.0	32.9	37.1	2.1	762	Yes
DM	Noise sensitive point: User defined (117)	402,533.20	4,963,237.70	121.9	1.5	35.0	5.0	40.0	29.6	36.1	1.1	1,258	Yes
DN	Noise sensitive point: User defined (118)	405,488.60	4,964,017.40	163.4	1.5	35.0	5.0	40.0	29.5	36.1	1.1	1,172	Yes
DO	Noise sensitive point: User defined (119)	402,062.67	4,961,603.82	131.1	1.5	35.0	5.0	40.0	30.5	36.3	1.3	1,263	Yes
DP	Noise sensitive point: User defined (120)	406,321.59	4,961,641.81	159.7	1.5	35.0	5.0	40.0	33.2	37.2	2.2	731	Yes
DQ	Noise sensitive point: User defined (121)	402,325.55	4,962,430.22	121.5	1.5	35.0	5.0	40.0	30.4	36.3	1.3	1,236	Yes
DR	Noise sensitive point: User defined (122)	402,333.36	4,962,449.59	120.5	1.5	35.0	5.0	40.0	30.4	36.3	1.3	1,230	Yes
DS	Noise sensitive point: User defined (123)	405,515.52	4,963,261.94	163.1	1.5	35.0	5.0	40.0	33.2	37.2	2.2	704	Yes
DT	Noise sensitive point: User defined (124)	402,448.86	4,963,280.29	114.7	1.5	35.0	5.0	40.0	29.1	36.0	1.0	1,352	Yes
DU	Noise sensitive point: User defined (125)	405,806.40	4,964,118.60	160.9	1.5	35.0	5.0	40.0	28.2	35.8	0.8	1,461	Yes
DV	Noise sensitive point: User defined (126)	405,498.07	4,964,124.16	165.0	1.5	35.0	5.0	40.0	29.0	36.0	1.0	1,261	Yes
DW	Noise sensitive point: User defined (127)	402,290.78	4,962,473.13	111.8	1.5	35.0	5.0	40.0	30.2	36.2	1.2	1,275	Yes
DX	Noise sensitive point: User defined (128)	402,181.90	4,962,488.40	111.6	1.5	35.0	5.0	40.0	29.6	36.1	1.1	1,385	Yes
DY	Noise sensitive point: User defined (129)	402,276.54	4,962,497.38	108.9	1.5	35.0	5.0	40.0	30.1	36.2	1.2	1,292	Yes
DZ	Noise sensitive point: User defined (130)	402,445.07	4,963,298.22	114.3	1.5	35.0	5.0	40.0	29.1	36.0	1.0	1,363	Yes
EA	Noise sensitive point: User defined (131)	405,510.80	4,963,306.15	163.9	1.5	35.0	5.0	40.0	33.0	37.1	2.1	723	Yes
EB	Noise sensitive point: User defined (132)	405,502.32	4,964,181.93	167.0	1.5	35.0	5.0	40.0	28.7	35.9	0.9	1,310	Yes
EC	Noise sensitive point: User defined (133)	402,015.34	4,961,695.77	123.2	1.5	35.0	5.0	40.0	30.1	36.2	1.2	1,358	Yes
ED	Noise sensitive point: User defined (134)	402,010.50	4,961,719.18	122.7	1.5	35.0	5.0	40.0	30.1	36.2	1.2	1,377	Yes
EE	Noise sensitive point: User defined (135)	402,302.85	4,962,513.00	109.9	1.5	35.0	5.0	40.0	30.1	36.2	1.2	1,268	Yes

Distances (m)

	WTG														
NSA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	1381	2305	2751	3302	3706	3398	4706	3123	2784	3086	3133	2175	4406	3288	3291
B	1344	2270	2718	3268	3680	3402	4699	3103	2755	3053	3097	2139	4403	3279	3263
C	1444	2372	2818	3369	3767	3416	4741	3175	2822	3134	3190	2239	4434	3327	3324
D	1460	2392	2840	3390	3792	3435	4763	3200	2822	3139	3201	2255	4456	3351	3323
E	1387	2327	2782	3330	3753	3461	4769	3178	2749	3063	3124	2183	4469	3350	3252
F	1442	2393	2854	3401	3832	3520	4840	3257	2755	3084	3163	2238	4536	3424	3251
G	1373	2331	2797	3342	3791	3538	4839	3232	2689	3014	3092	2169	4543	3418	3188
H	1441	2399	2863	3408	3848	3547	4866	3278	2737	3070	3155	2237	4563	3449	3231
I	1470	2431	2896	3442	3883	3569	4894	3312	2746	3086	3178	2266	4588	3478	3238
J	1484	2445	2910	3455	3895	3571	4899	3321	2756	3098	3191	2280	4593	3485	3247
K	1371	2340	2813	3356	3823	3593	4891	3273	2650	2984	3074	2166	4596	3468	3146
L	1342	2315	2790	3332	3807	3602	4891	3264	2622	2954	3043	2138	4600	3467	3119
M	1353	2325	2800	3342	3815	3603	4895	3271	2630	2963	3053	2148	4603	3471	3126
N	1360	2332	2807	3349	3821	3604	4898	3276	2635	2969	3060	2155	4605	3474	3131
O	1363	2339	2816	3357	3835	3623	4917	3292	2623	2961	3057	2157	4624	3493	3118
P	1361	2339	2817	3358	3839	3632	4925	3298	2616	2955	3053	2155	4632	3500	3110
Q	1389	2368	2846	3387	3865	3640	4940	3320	2633	2977	3078	2184	4645	3517	3125
R	1460	2436	2911	3453	3919	3642	4960	3362	2689	3040	3147	2255	4658	3542	3177
S	1466	2445	2922	3464	3934	3660	4978	3379	2682	3037	3148	2260	4676	3560	3168
T	1437	2417	2895	3436	3912	3659	4970	3362	2658	3010	3119	2231	4671	3550	3147
U	1402	2387	2869	3408	3897	3679	4979	3357	2615	2967	3078	2194	4684	3556	3104
V	1470	2506	3040	3549	4189	4183	5446	3738	2267	2703	2930	2210	5169	4010	2717
W	2778	2194	2276	2023	3342	5839	5994	3942	2243	1572	1059	2024	6110	4850	2359
X	1428	2419	2905	3443	3939	3718	5023	3401	2609	2970	3091	2220	4727	3600	3094
Y	1454	2455	2948	3483	3997	3790	5095	3468	2578	2953	3092	2241	4800	3672	3057
Z	1493	2512	3022	3548	4107	3952	5251	3602	2488	2891	3067	2266	4959	3825	2953
AA	1515	2534	3042	3569	4124	3954	5258	3615	2507	2912	3090	2289	4964	3833	2970

To be continued on next page...

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DECIBEL - Main Result

Calculation: 2023 09 13 - Noise Model (35.0dBA Ambient Value Included)

...continued from previous page

	WTG														
NSA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
AB	1493	2515	3027	3552	4118	3976	5272	3618	2469	2876	3058	2264	4981	3845	2933
AC	1504	2527	3039	3564	4131	3986	5284	3631	2472	2881	3065	2275	4992	3857	2934
AD	1526	2552	3068	3590	4169	4034	5332	3674	2452	2870	3066	2291	5041	3905	2909
AE	2772	2196	2283	2035	3355	5844	6006	3951	2224	1554	1047	2020	6119	4859	2338
AF	1508	2545	3087	3589	4258	4295	5549	3826	2199	2654	2908	2228	5277	4112	2637
AG	1674	2710	3246	3754	4393	4314	5610	3930	2356	2826	3089	2405	5322	4181	2780
AH	1451	2454	2949	3483	4003	3805	5108	3477	2565	2941	3083	2237	4814	3685	3042
AI	1468	2473	2970	3503	4027	3828	5133	3502	2562	2944	3092	2252	4837	3709	3038
AJ	1481	2493	2994	3525	4060	3874	5178	3542	2539	2929	3088	2263	4884	3754	3010
AK	1508	2522	3026	3556	4097	3909	5217	3581	2536	2934	3102	2287	4921	3793	3003
AL	1492	2507	3012	3541	4087	3913	5216	3574	2518	2915	3083	2269	4922	3791	2986
AM	1438	2457	2968	3493	4058	3936	5222	3560	2451	2847	3017	2212	4935	3793	2921
AN	1614	2642	3161	3681	4264	4102	5414	3767	2480	2915	3130	2374	5117	3989	2926
AO	1573	2602	3124	3643	4234	4104	5405	3745	2438	2871	3085	2331	5113	3978	2887
AP	1460	2493	3021	3535	4155	4118	5387	3692	2317	2742	2953	2210	5108	3954	2772
AQ	1590	2286	2616	3177	3337	2724	4067	2628	3280	3482	3396	2314	3747	2674	3812
AR	1473	2278	2663	3223	3493	3017	4346	2839	3062	3306	3275	2238	4034	2941	3585
AS	1401	2232	2632	3190	3498	3098	4408	2867	2968	3218	3198	2173	4104	2996	3490
AT	1375	2249	2670	3226	3577	3225	4531	2968	2882	3152	3159	2160	4230	3116	3399
AU	1523	2407	2827	3383	3719	3257	4606	3090	2974	3268	3296	2311	4289	3202	3482
AV	1515	2405	2828	3384	3727	3276	4623	3102	2958	3254	3286	2304	4307	3218	3465
AW	2963	2917	3264	3233	4578	6584	7070	4954	1411	1026	1412	2488	7085	5771	1159
AX	2955	2914	3263	3235	4579	6579	7068	4952	1398	1017	1410	2483	7081	5768	1144
AY	3437	3559	3955	3968	5304	7150	7739	5623	1629	1545	2106	3086	7722	6403	1147
AZ	3672	3701	4056	4018	5365	7345	7862	5745	1930	1740	2203	3256	7870	6555	1485
BA	3794	3778	4111	4046	5396	7443	7921	5807	2089	1855	2266	3348	7943	6631	1663
BB	4309	4476	4873	4873	6215	8043	8657	6541	2445	2455	3021	3998	8636	7316	1907
BC	4342	4513	4911	4912	6253	8077	8694	6578	2476	2492	3059	4034	8672	7353	1937
BD	4378	4559	4960	4965	6305	8115	8740	6625	2507	2535	3109	4078	8716	7396	1966
BE	3688	3718	4073	4034	5381	7362	7878	5762	1944	1757	2220	3273	7887	6572	1498
BF	3475	3603	4002	4016	5352	7190	7784	5668	1659	1588	2152	3130	7766	6447	1170
BG	4432	4624	5029	5037	6376	8173	8807	6692	2557	2599	3179	4141	8779	7460	2013
BH	4442	4630	5033	5039	6379	8182	8812	6697	2569	2606	3183	4148	8786	7467	2025
BI	4467	4664	5070	5079	6418	8209	8846	6732	2590	2638	3221	4180	8818	7498	2045
BJ	4400	4631	5050	5077	6411	8147	8813	6701	2515	2602	3209	4139	8775	7455	1965
BK	3934	3904	4227	4150	5500	7576	8039	5926	2234	1994	2389	3480	8066	6755	1804
BL	3137	3968	4547	4888	5934	6522	7670	5762	2023	2685	3359	3460	7450	6219	1946
BM	4342	4624	5062	5115	6439	8093	8802	6695	2452	2598	3236	4122	8749	7430	1899
BN	4480	4690	5101	5116	6453	8225	8873	6759	2600	2663	3254	4203	8841	7521	2052
BO	4390	4682	5123	5179	6502	8142	8859	6752	2500	2657	3300	4178	8803	7484	1947
BP	3878	3887	4229	4172	5521	7543	8038	5923	2142	1943	2381	3450	8055	6741	1692
BQ	3794	3838	4196	4158	5505	7476	8000	5884	2030	1868	2342	3389	8007	6691	1567
BR	3935	3938	4276	4214	5563	7597	8085	5971	2201	1999	2429	3503	8105	6791	1751
BS	4443	4742	5185	5242	6565	8195	8918	6812	2554	2718	3363	4237	8860	7542	2001
BT	3085	2700	2882	2694	4030	6403	6656	4577	2064	1443	1279	2415	6745	5464	2012
BU	3069	2689	2876	2692	4029	6394	6652	4571	2042	1421	1264	2401	6739	5457	1990
BV	3933	3948	4291	4235	5584	7602	8100	5985	2187	2000	2443	3510	8116	6802	1730
BW	3743	3845	4228	4218	5561	7451	8021	5904	1934	1843	2373	3380	8012	6694	1440
BX	3755	3853	4233	4221	5564	7461	8027	5910	1949	1852	2378	3389	8020	6702	1457
BY	2700	3613	4197	4588	5542	5937	7138	5290	1981	2647	3242	3136	6895	5690	2078
BZ	3648	3824	4235	4262	5595	7380	8007	5892	1795	1798	2392	3340	7978	6659	1271
CA	4185	4149	4465	4376	5725	7825	8277	6166	2472	2245	2632	3729	8310	7000	2027
CB	4010	4035	4381	4327	5676	7685	8190	6074	2250	2080	2532	3594	8204	6889	1781
CC	4464	4762	5205	5262	6584	8215	8938	6833	2574	2738	3382	4257	8880	7562	2021
CD	1939	2927	3504	3948	4787	5056	6268	4462	1868	2455	2891	2506	6017	4823	2188
CE	2743	3655	4239	4629	5585	5979	7182	5334	2008	2675	3274	3177	6938	5734	2095
CF	4089	4099	4438	4374	5723	7756	8248	6133	2337	2155	2591	3663	8267	6953	1872
CG	4099	4110	4449	4384	5734	7767	8259	6144	2346	2166	2602	3674	8278	6964	1880
CH	2714	3605	4189	4568	5547	6009	7188	5319	1898	2567	3179	3119	6954	5739	1970
CI	3789	3953	4358	4374	5710	7519	8135	6020	1938	1931	2510	3473	8111	6792	1414
CJ	3855	3992	4385	4387	5727	7577	8171	6055	2018	1977	2533	3519	8155	6836	1502
CK	3855	3995	4390	4393	5733	7578	8175	6059	2016	1979	2538	3521	8158	6839	1499
CL	2780	3671	4254	4632	5612	6068	7252	5384	1947	2617	3234	3184	7016	5802	2004
CM	4271	4257	4581	4498	5848	7925	8392	6280	2532	2334	2743	3830	8420	7109	2070
CN	1545	2581	3129	3625	4314	4376	5626	3893	2157	2627	2901	2251	5356	4188	2586

To be continued on next page...

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Strum Consulting
1355 Bedford Highway
CA-BEDFORD B4A1C5
902.835.5560 (24/7)
Eric Johnson / ejohnson@strum.com
Calculated:
2023-09-13 2:38 PM/3.5.552

DECIBEL - Main Result

Calculation: 2023 09 13 - Noise Model (35.0dBA Ambient Value Included)

...continued from previous page

	WTG														
NSA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO	3355	3014	3206	3018	4352	6721	6981	4902	2186	1613	1562	2710	7070	5788	2051
CP	2793	3680	4263	4639	5624	6090	7270	5399	1942	2612	3232	3191	7036	5821	1992
CQ	2843	3733	4317	4694	5676	6123	7311	5446	1997	2668	3289	3246	7074	5862	2042
CR	2852	3743	4327	4704	5685	6129	7319	5455	2008	2678	3300	3256	7081	5870	2052
CS	1576	2611	3162	3654	4353	4422	5673	3937	2144	2623	2908	2275	5402	4234	2566
CT	1577	2611	3162	3654	4357	4434	5683	3944	2131	2612	2900	2272	5413	4244	2553
CU	1607	2641	3193	3684	4390	4465	5717	3978	2133	2620	2916	2299	5446	4278	2549
CV	1620	2654	3206	3697	4402	4469	5723	3988	2144	2634	2931	2313	5451	4284	2559
CW	2142	3123	3701	4140	4991	5239	6468	4668	1946	2558	3030	2693	6211	5023	2220
CX	3336	3011	3213	3033	4370	6720	6993	4911	2144	1578	1549	2699	7078	5793	2002
CY	2155	3133	3711	4147	5005	5267	6491	4687	1931	2546	3025	2700	6236	5046	2199
CZ	3939	4089	4485	4490	5829	7666	8269	6153	2092	2071	2634	3613	8250	6931	1568
DA	3841	4045	4463	4495	5826	7581	8228	6114	1970	2017	2623	3556	8194	6874	1431
DB	2877	3754	4337	4705	5702	6188	7364	5488	1969	2640	3273	3261	7132	5915	1992
DC	1696	2729	3283	3771	4484	4543	5804	4072	2154	2659	2975	2380	5530	4366	2556
DD	1998	2893	3476	3868	4829	5394	6510	4611	1432	2065	2590	2415	6297	5060	1689
DE	2925	3797	4380	4745	5748	6241	7416	5537	1991	2661	3300	3303	7185	5967	1999
DF	2896	3754	4336	4694	5710	6250	7408	5515	1912	2581	3227	3255	7183	5958	1909
DG	2893	3744	4326	4681	5703	6259	7411	5513	1889	2558	3207	3244	7188	5961	1881
DH	2945	3813	4396	4759	5766	6268	7441	5559	1992	2662	3305	3317	7210	5991	1993
DI	4021	4181	4580	4587	5926	7751	8362	6247	2166	2161	2730	3703	8341	7022	1636
DJ	1780	2811	3368	3852	4575	4630	5897	4167	2164	2685	3022	2453	5622	4460	2550
DK	3490	3529	3893	3867	5212	7167	7694	5578	1753	1560	2038	3079	7698	6382	1322
DL	3517	3555	3917	3889	5235	7193	7719	5603	1779	1586	2062	3106	7724	6408	1346
DM	2939	3787	4368	4721	5747	6307	7459	5560	1915	2583	3237	3285	7237	6009	1894
DN	4110	4265	4661	4662	6002	7839	8445	6329	2255	2246	2809	3789	8426	7107	1724
DO	1810	2839	3397	3880	4607	4659	5929	4199	2169	2696	3039	2479	5653	4492	2549
DP	3106	2631	2760	2527	3847	6310	6498	4438	2247	1600	1306	2396	6607	5340	2242
DQ	2282	3227	3810	4225	5132	5490	6689	4852	1834	2474	3000	2771	6444	5241	2050
DR	2295	3238	3820	4233	5145	5509	6707	4868	1829	2471	3001	2780	6463	5259	2039
DS	3489	3552	3925	3910	5253	7178	7723	5606	1729	1567	2070	3096	7721	6404	1282
DT	3007	3865	4447	4805	5822	6345	7512	5624	2009	2677	3330	3366	7284	6062	1987
DU	4361	4457	4825	4791	6138	8071	8626	6509	2533	2462	2970	3997	8625	7308	2017
DV	4207	4370	4768	4769	6110	7939	8551	6435	2347	2350	2916	3893	8531	7211	1812
DW	2337	3283	3865	4280	5187	5531	6737	4905	1875	2518	3049	2826	6490	5290	2079
DX	2406	3363	3945	4366	5257	5544	6771	4958	1985	2627	3155	2913	6516	5325	2185
DY	2365	3310	3893	4307	5215	5555	6763	4932	1892	2537	3072	2853	6516	5316	2090
DZ	3025	3883	4465	4821	5840	6362	7530	5642	2022	2690	3344	3383	7302	6080	1996
EA	3522	3592	3967	3953	5296	7214	7764	5647	1753	1604	2112	3134	7761	6443	1297
EB	4260	4427	4825	4827	6168	7994	8608	6492	2397	2406	2973	3949	8587	7267	1860
EC	1905	2933	3493	3972	4708	4752	6030	4302	2191	2734	3098	2565	5751	4594	2553
ED	1924	2951	3512	3990	4729	4775	6053	4326	2190	2738	3106	2581	5775	4618	2548
EE	2365	3306	3889	4300	5215	5572	6774	4938	1869	2516	3055	2847	6529	5327	2062

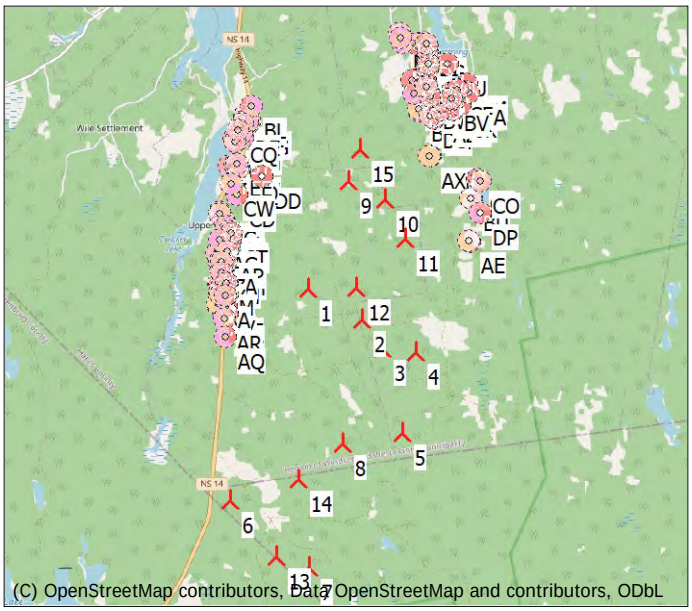
Licensed user:
Strum Consulting
1355 Bedford Highway
CA-BEDFORD B4A1C5
902.835.5560 (24/7)
Eric Johnson / ejohnson@strum.com
Calculated:
2023-10-04 10:22 AM/3.5.552

DECIBEL - Main Result

Calculation: Bear Lake - Finland Low Frequency - EA - October 2023

Noise calculation model:
Finland Low frequency
Wind speed (in 10 m height):
Highest noise value at receptor
Spectral distribution:
From 20.0 Hz to 200.0 Hz
Meteorological coefficient, C0:
0.0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure tone penalty is subtracted from demand
Model: 5.0 dB(A)
Height above ground level, when no value in NSA object:
4.0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0.0 dB; Uncertainty margin in NSA has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0.0 dB(A)

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



All coordinates are in
UTM (north)-NAD83(NSRS/CSRS) (US+CA GPS meas. at curr. year), GRS80 Zone: 20
New WTG
Scale 1:125,000
Noise sensitive area

WTGs

	Easting	Northing	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	First wind speed	LwaRef	Last wind speed	LwaRef	
			[m]					[kW]	[m]	[m]			[m/s]	[dB(A)]	[m/s]	[dB(A)]	
1	403,454.25	4,960,446.73	238.9	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
2	404,341.25	4,959,909.73	259.5	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
3	404,672.25	4,959,428.73	255.8	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
4	405,230.25	4,959,362.73	241.5	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
5	404,978.25	4,958,036.73	198.8	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
6	402,108.25	4,956,944.73	213.1	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
7	403,414.25	4,955,830.73	230.3	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
8	403,983.25	4,957,869.73	224.6	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
9	404,146.25	4,962,205.73	239.2	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
10	404,742.25	4,961,898.73	258.6	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
11	405,079.25	4,961,238.73	244.5	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
12	404,250.25	4,960,436.73	263.0	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
13	402,869.25	4,956,008.73	239.1	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
14	403,252.25	4,957,271.73	241.1	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f
15	404,354.95	4,962,718.13	223.0	NORDEX N163/5.9 5900 ...	Yes	NORDEX	N163/5.9-5,900	5,900	163.0	125.0	USER	LF-Mode-Nordex N163 5.9	3.0	88.9	12.0	98.2	f

f) From other hub height

Calculation Results

Sound level

Noise sensitive area					Most critical demand		Predicted sound level
No.	Name	Easting	Northing	Z	Immission height	Frequency	Noise	WTG noise
				[m]	[m]	[Hz]	[dB]	[dB]
A	Noise sensitive point: User defined (136)	402,077.21	4,960,343.00	166.4	4.0	100.0	19.1	27.9
B	Noise sensitive point: User defined (137)	402,113.54	4,960,346.59	168.6	4.0	100.0	19.1	28.0
C	Noise sensitive point: User defined (138)	402,012.44	4,960,359.37	162.1	4.0	100.0	19.1	27.7
D	Noise sensitive point: User defined (139)	401,995.84	4,960,377.94	160.8	4.0	100.0	19.1	27.6
E	Noise sensitive point: User defined (140)	402,067.92	4,960,405.81	165.1	4.0	100.0	19.1	27.8
F	Noise sensitive point: User defined (141)	402,012.65	4,960,463.16	162.0	4.0	100.0	19.1	27.6
G	Noise sensitive point: User defined (142)	402,081.54	4,960,482.66	165.1	4.0	100.0	19.1	27.9
H	Noise sensitive point: User defined (143)	402,013.90	4,960,490.60	162.0	4.0	100.0	19.1	27.6
I	Noise sensitive point: User defined (144)	401,985.86	4,960,511.36	160.1	4.0	100.0	19.1	27.5
J	Noise sensitive point: User defined (145)	401,971.89	4,960,512.90	158.9	4.0	100.0	19.1	27.5
K	Noise sensitive point: User defined (146)	402,086.69	4,960,537.84	164.0	4.0	100.0	19.1	27.9
L	Noise sensitive point: User defined (147)	402,115.53	4,960,546.63	164.4	4.0	100.0	19.1	28.0

To be continued on next page...

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2023-10-04 10:22 AM/3.5.552

DECIBEL - Main Result

Calculation: Bear Lake - Finland Low Frequency - EA - October 2023

...continued from previous page

Noise sensitive area						Most critical demand		Predicted sound level
No.	Name	Easting	Northing	Z	Immission height	Frequency	Noise	WTG noise
				[m]	[m]	[Hz]	[dB]	[dB]
M	Noise sensitive point: User defined (148)	402,105.39	4,960,547.60	164.2	4.0	100.0	19.1	27.9
N	Noise sensitive point: User defined (149)	402,098.08	4,960,548.37	164.0	4.0	100.0	19.1	27.9
O	Noise sensitive point: User defined (150)	402,096.98	4,960,567.81	163.4	4.0	100.0	19.1	27.9
P	Noise sensitive point: User defined (151)	402,099.41	4,960,576.54	163.2	4.0	100.0	19.1	27.9
Q	Noise sensitive point: User defined (152)	402,071.65	4,960,584.35	162.9	4.0	100.0	19.1	27.8
R	Noise sensitive point: User defined (153)	402,000.57	4,960,585.34	160.8	4.0	100.0	19.1	27.5
S	Noise sensitive point: User defined (154)	401,996.20	4,960,602.59	160.0	4.0	100.0	19.1	27.5
T	Noise sensitive point: User defined (155)	402,025.70	4,960,602.70	161.7	4.0	100.0	19.1	27.6
U	Noise sensitive point: User defined (156)	402,063.72	4,960,623.45	161.8	4.0	100.0	19.1	27.7
V	Noise sensitive point: User defined (157)	402,151.60	4,961,128.00	139.7	4.0	100.0	19.1	27.6
W	Noise sensitive point: User defined (158)	406,136.30	4,961,171.50	179.4	4.0	100.0	19.1	29.7
X	Noise sensitive point: User defined (159)	402,042.24	4,960,662.47	160.1	4.0	100.0	19.1	27.6
Y	Noise sensitive point: User defined (160)	402,028.92	4,960,734.18	159.0	4.0	100.0	19.1	27.5
Z	Noise sensitive point: User defined (161)	402,030.95	4,960,896.38	154.3	4.0	100.0	19.1	27.4
AA	Noise sensitive point: User defined (162)	402,008.06	4,960,897.37	154.4	4.0	100.0	19.1	27.4
AB	Noise sensitive point: User defined (163)	402,038.09	4,960,919.97	153.2	4.0	100.0	19.1	27.4
AC	Noise sensitive point: User defined (164)	402,029.46	4,960,929.69	153.1	4.0	100.0	19.1	27.4
AD	Noise sensitive point: User defined (165)	402,024.16	4,960,978.15	151.7	4.0	100.0	19.1	27.3
AE	Noise sensitive point: User defined (166)	406,125.01	4,961,189.96	178.6	4.0	100.0	19.1	29.7
AF	Noise sensitive point: User defined (167)	402,171.32	4,961,239.09	136.6	4.0	100.0	19.1	27.6
AG	Noise sensitive point: User defined (168)	401,989.86	4,961,257.23	140.7	4.0	100.0	19.1	27.0
AH	Noise sensitive point: User defined (169)	402,035.28	4,960,749.51	158.9	4.0	100.0	19.1	27.6
AI	Noise sensitive point: User defined (170)	402,022.92	4,960,771.47	158.3	4.0	100.0	19.1	27.5
AJ	Noise sensitive point: User defined (171)	402,020.02	4,960,817.92	157.8	4.0	100.0	19.1	27.5
AK	Noise sensitive point: User defined (172)	402,001.54	4,960,852.35	156.0	4.0	100.0	19.1	27.4
AL	Noise sensitive point: User defined (173)	402,020.11	4,960,856.70	156.3	4.0	100.0	19.1	27.4
AM	Noise sensitive point: User defined (174)	402,083.75	4,960,880.65	153.3	4.0	100.0	19.1	27.6
AN	Noise sensitive point: User defined (175)	401,955.07	4,961,043.91	151.2	4.0	100.0	19.1	27.1
AO	Noise sensitive point: User defined (176)	402,000.65	4,961,047.27	150.5	4.0	100.0	19.1	27.2
AP	Noise sensitive point: User defined (177)	402,131.05	4,961,063.04	137.6	4.0	100.0	19.1	27.6
AQ	Noise sensitive point: User defined (178)	402,067.70	4,959,668.60	164.1	4.0	100.0	19.1	27.8
AR	Noise sensitive point: User defined (179)	402,063.36	4,959,961.63	164.8	4.0	100.0	19.1	27.8
AS	Noise sensitive point: User defined (180)	402,113.14	4,960,042.77	168.8	4.0	100.0	19.1	28.0
AT	Noise sensitive point: User defined (181)	402,107.05	4,960,169.25	168.4	4.0	100.0	19.1	28.0
AU	Noise sensitive point: User defined (182)	401,951.95	4,960,198.08	156.6	4.0	100.0	19.1	27.5
AV	Noise sensitive point: User defined (183)	401,956.34	4,960,217.46	157.3	4.0	100.0	19.1	27.5
AW	Noise sensitive point: User defined (184)	405,505.90	4,962,584.32	169.0	4.0	100.0	19.1	30.4
AX	Noise sensitive point: User defined (185)	405,491.36	4,962,586.87	168.2	4.0	100.0	19.1	30.4
AY	Noise sensitive point: User defined (186)	405,325.44	4,963,329.80	166.3	4.0	100.0	19.1	28.6
AZ	Noise sensitive point: User defined (187)	405,697.55	4,963,353.42	161.6	4.0	100.0	19.1	27.3
BA	Noise sensitive point: User defined (188)	405,891.03	4,963,354.83	164.0	4.0	100.0	19.1	26.7
BB	Noise sensitive point: User defined (189)	405,520.31	4,964,227.58	165.2	4.0	100.0	19.1	25.0
BC	Noise sensitive point: User defined (190)	405,517.91	4,964,266.61	167.4	4.0	100.0	19.1	24.9
BD	Noise sensitive point: User defined (191)	405,493.50	4,964,320.30	173.7	4.0	100.0	19.1	24.8
BE	Noise sensitive point: User defined (192)	405,704.06	4,963,368.96	162.1	4.0	100.0	19.1	27.2
BF	Noise sensitive point: User defined (193)	405,321.00	4,963,377.43	167.8	4.0	100.0	19.1	28.4
BG	Noise sensitive point: User defined (194)	405,469.08	4,964,394.24	172.6	4.0	100.0	19.1	24.6
BH	Noise sensitive point: User defined (195)	405,488.78	4,964,395.52	169.2	4.0	100.0	19.1	24.5
BI	Noise sensitive point: User defined (196)	405,462.60	4,964,436.80	169.6	4.0	100.0	19.1	24.5
BJ	Noise sensitive point: User defined (197)	405,302.60	4,964,439.50	186.1	4.0	100.0	19.1	24.6
BK	Noise sensitive point: User defined (198)	406,008.68	4,963,439.22	166.6	4.0	100.0	19.1	26.2
BL	Noise sensitive point: User defined (199)	402,552.30	4,963,451.70	121.9	4.0	100.0	19.1	25.5
BM	Noise sensitive point: User defined (200)	405,074.67	4,964,474.95	187.6	4.0	100.0	19.1	24.8
BN	Noise sensitive point: User defined (201)	405,415.59	4,964,475.05	175.2	4.0	100.0	19.1	24.4
BO	Noise sensitive point: User defined (202)	405,045.37	4,964,538.14	188.5	4.0	100.0	19.1	24.6
BP	Noise sensitive point: User defined (203)	405,862.90	4,963,486.60	162.6	4.0	100.0	19.1	26.4
BQ	Noise sensitive point: User defined (204)	405,717.20	4,963,492.20	161.2	4.0	100.0	19.1	26.8
BR	Noise sensitive point: User defined (205)	405,911.04	4,963,521.00	164.7	4.0	100.0	19.1	26.2
BS	Noise sensitive point: User defined (206)	405,030.79	4,964,601.13	188.7	4.0	100.0	19.1	24.4
BT	Noise sensitive point: User defined (207)	406,185.10	4,961,882.10	159.9	4.0	100.0	19.1	28.8
BU	Noise sensitive point: User defined (208)	406,163.45	4,961,887.80	160.5	4.0	100.0	19.1	28.9
BV	Noise sensitive point: User defined (209)	405,872.10	4,963,549.00	162.9	4.0	100.0	19.1	26.3
BW	Noise sensitive point: User defined (210)	405,515.10	4,963,571.40	159.3	4.0	100.0	19.1	27.1
BX	Noise sensitive point: User defined (211)	405,535.72	4,963,572.39	159.2	4.0	100.0	19.1	27.1
BY	Noise sensitive point: User defined (212)	402,283.03	4,962,878.99	107.4	4.0	100.0	19.1	25.9

To be continued on next page...

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2023-10-04 10:22 AM/3.5.552

DECIBEL - Main Result

Calculation: Bear Lake - Finland Low Frequency - EA - October 2023

...continued from previous page

Noise sensitive area						Most critical demand		Predicted sound level
No.	Name	Easting	Northing	Z	Immission height	Frequency	Noise	WTG noise
				[m]	[m]	[Hz]	[dB]	[dB]
BZ	Noise sensitive point: User defined (213)	405,245.27	4,963,625.10	181.1	4.0	100.0	19.1	27.6
CA	Noise sensitive point: User defined (214)	406,160.72	4,963,638.72	169.7	4.0	100.0	19.1	25.3
CB	Noise sensitive point: User defined (215)	405,878.80	4,963,640.70	162.0	4.0	100.0	19.1	26.0
CC	Noise sensitive point: User defined (216)	405,035.73	4,964,620.79	189.4	4.0	100.0	19.1	24.3
CD	Noise sensitive point: User defined (217)	402,289.46	4,961,997.45	160.5	4.0	100.0	19.1	27.1
CE	Noise sensitive point: User defined (218)	402,270.11	4,962,921.17	107.3	4.0	100.0	19.1	25.8
CF	Noise sensitive point: User defined (219)	405,964.18	4,963,674.29	167.2	4.0	100.0	19.1	25.7
CG	Noise sensitive point: User defined (220)	405,967.37	4,963,684.73	167.1	4.0	100.0	19.1	25.7
CH	Noise sensitive point: User defined (221)	402,398.77	4,962,947.00	118.9	4.0	100.0	19.1	26.1
CI	Noise sensitive point: User defined (222)	405,336.30	4,963,735.60	174.5	4.0	100.0	19.1	27.0
CJ	Noise sensitive point: User defined (223)	405,451.80	4,963,744.00	163.1	4.0	100.0	19.1	26.7
CK	Noise sensitive point: User defined (224)	405,440.94	4,963,750.76	163.9	4.0	100.0	19.1	26.7
CL	Noise sensitive point: User defined (225)	402,371.60	4,963,007.00	120.7	4.0	100.0	19.1	25.9
CM	Noise sensitive point: User defined (226)	406,139.14	4,963,768.35	161.8	4.0	100.0	19.1	25.1
CN	Noise sensitive point: User defined (227)	402,179.56	4,961,320.02	137.9	4.0	100.0	19.1	27.5
CO	Noise sensitive point: User defined (228)	406,331.55	4,962,172.45	160.2	4.0	100.0	19.1	27.8
CP	Noise sensitive point: User defined (229)	402,387.30	4,963,027.90	121.4	4.0	100.0	19.1	25.9
CQ	Noise sensitive point: User defined (230)	402,341.99	4,963,062.81	115.9	4.0	100.0	19.1	25.7
CR	Noise sensitive point: User defined (231)	402,333.56	4,963,069.30	114.7	4.0	100.0	19.1	25.7
CS	Noise sensitive point: User defined (232)	402,173.88	4,961,366.17	138.7	4.0	100.0	19.1	27.4
CT	Noise sensitive point: User defined (233)	402,182.30	4,961,378.40	141.0	4.0	100.0	19.1	27.5
CU	Noise sensitive point: User defined (234)	402,167.80	4,961,409.70	139.4	4.0	100.0	19.1	27.4
CV	Noise sensitive point: User defined (235)	402,153.90	4,961,413.00	136.7	4.0	100.0	19.1	27.3
CW	Noise sensitive point: User defined (236)	402,200.07	4,962,183.28	128.3	4.0	100.0	19.1	26.6
CX	Noise sensitive point: User defined (237)	406,289.76	4,962,204.89	159.2	4.0	100.0	19.1	27.9
CY	Noise sensitive point: User defined (238)	402,215.02	4,962,210.30	127.0	4.0	100.0	19.1	26.6
CZ	Noise sensitive point: User defined (239)	405,442.60	4,963,847.50	166.7	4.0	100.0	19.1	26.3
DA	Noise sensitive point: User defined (240)	405,219.79	4,963,857.88	189.8	4.0	100.0	19.1	26.8
DB	Noise sensitive point: User defined (241)	402,405.04	4,963,125.42	116.9	4.0	100.0	19.1	25.8
DC	Noise sensitive point: User defined (242)	402,115.08	4,961,487.44	131.9	4.0	100.0	19.1	27.1
DD	Noise sensitive point: User defined (243)	402,717.83	4,962,303.75	200.1	4.0	100.0	19.1	28.2
DE	Noise sensitive point: User defined (244)	402,409.37	4,963,178.61	113.1	4.0	100.0	19.1	25.7
DF	Noise sensitive point: User defined (245)	402,502.89	4,963,182.51	119.0	4.0	100.0	19.1	26.0
DG	Noise sensitive point: User defined (246)	402,533.70	4,963,188.90	120.7	4.0	100.0	19.1	26.0
DH	Noise sensitive point: User defined (247)	402,422.44	4,963,204.86	112.9	4.0	100.0	19.1	25.7
DI	Noise sensitive point: User defined (248)	405,436.46	4,963,945.00	170.1	4.0	100.0	19.1	26.0
DJ	Noise sensitive point: User defined (249)	402,076.43	4,961,574.31	131.8	4.0	100.0	19.1	26.9
DK	Noise sensitive point: User defined (250)	405,580.84	4,963,213.77	166.2	4.0	100.0	19.1	28.1
DL	Noise sensitive point: User defined (251)	405,597.69	4,963,234.78	164.0	4.0	100.0	19.1	28.0
DM	Noise sensitive point: User defined (252)	402,533.20	4,963,237.70	121.9	4.0	100.0	19.1	25.9
DN	Noise sensitive point: User defined (253)	405,488.60	4,964,017.40	163.4	4.0	100.0	19.1	25.7
DO	Noise sensitive point: User defined (254)	402,062.67	4,961,603.82	131.1	4.0	100.0	19.1	26.8
DP	Noise sensitive point: User defined (255)	406,321.59	4,961,641.81	159.7	4.0	100.0	19.1	28.5
DQ	Noise sensitive point: User defined (256)	402,325.55	4,962,430.22	121.5	4.0	100.0	19.1	26.6
DR	Noise sensitive point: User defined (257)	402,333.36	4,962,449.59	120.5	4.0	100.0	19.1	26.6
DS	Noise sensitive point: User defined (258)	405,515.52	4,963,261.94	163.1	4.0	100.0	19.1	28.2
DT	Noise sensitive point: User defined (259)	402,448.86	4,963,280.29	114.7	4.0	100.0	19.1	25.6
DU	Noise sensitive point: User defined (260)	405,806.40	4,964,118.60	160.9	4.0	100.0	19.1	24.8
DV	Noise sensitive point: User defined (261)	405,498.07	4,964,124.16	165.0	4.0	100.0	19.1	25.3
DW	Noise sensitive point: User defined (262)	402,290.78	4,962,473.13	111.8	4.0	100.0	19.1	26.5
DX	Noise sensitive point: User defined (263)	402,181.90	4,962,488.40	111.6	4.0	100.0	19.1	26.1
DY	Noise sensitive point: User defined (264)	402,276.54	4,962,497.38	108.9	4.0	100.0	19.1	26.4
DZ	Noise sensitive point: User defined (265)	402,445.07	4,963,298.22	114.3	4.0	100.0	19.1	25.6
EA	Noise sensitive point: User defined (266)	405,510.80	4,963,306.15	163.9	4.0	100.0	19.1	28.0
EB	Noise sensitive point: User defined (267)	405,502.32	4,964,181.93	167.0	4.0	100.0	19.1	25.2
EC	Noise sensitive point: User defined (268)	402,015.34	4,961,695.77	123.2	4.0	100.0	19.1	26.6
ED	Noise sensitive point: User defined (269)	402,010.50	4,961,719.18	122.7	4.0	100.0	19.1	26.6
EE	Noise sensitive point: User defined (270)	402,302.85	4,962,513.00	109.9	4.0	100.0	19.1	26.5

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

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Calculated:
2023-10-04 10:22 AM/3.5.552

DECIBEL - Main Result

Calculation: Bear Lake - Finland Low Frequency - EA - October 2023

Distances (m)

	WTG														
NSA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	1381	2305	2751	3302	3706	3398	4706	3123	2784	3086	3133	2175	4406	3288	3291
B	1344	2270	2718	3268	3680	3402	4699	3103	2755	3053	3097	2139	4403	3279	3263
C	1444	2372	2818	3369	3767	3416	4741	3175	2822	3134	3190	2239	4434	3327	3324
D	1460	2392	2840	3390	3792	3435	4763	3200	2822	3139	3201	2255	4456	3351	3323
E	1387	2327	2782	3330	3753	3461	4769	3178	2749	3063	3124	2183	4469	3350	3252
F	1442	2393	2854	3401	3832	3520	4840	3257	2755	3084	3163	2238	4536	3424	3251
G	1373	2331	2797	3342	3791	3538	4839	3232	2689	3014	3092	2169	4543	3418	3188
H	1441	2399	2863	3408	3848	3547	4866	3278	2737	3070	3155	2237	4563	3449	3231
I	1470	2431	2896	3442	3883	3569	4894	3312	2746	3086	3178	2266	4588	3478	3238
J	1484	2445	2910	3455	3895	3571	4899	3321	2756	3098	3191	2280	4593	3485	3247
K	1371	2340	2813	3356	3823	3593	4891	3273	2650	2984	3074	2166	4596	3468	3146
L	1342	2315	2790	3332	3807	3602	4891	3264	2622	2954	3043	2138	4600	3467	3119
M	1353	2325	2800	3342	3815	3603	4895	3271	2630	2963	3053	2148	4603	3471	3126
N	1360	2332	2807	3349	3821	3604	4898	3276	2635	2969	3060	2155	4605	3474	3131
O	1363	2339	2816	3357	3835	3623	4917	3292	2623	2961	3057	2157	4624	3493	3118
P	1361	2339	2817	3358	3839	3632	4925	3298	2616	2955	3053	2155	4632	3500	3110
Q	1389	2368	2846	3387	3865	3640	4940	3320	2633	2977	3078	2184	4645	3517	3125
R	1460	2436	2911	3453	3919	3642	4960	3362	2689	3040	3147	2255	4658	3542	3177
S	1466	2445	2922	3464	3934	3660	4978	3379	2682	3037	3148	2260	4676	3560	3168
T	1437	2417	2895	3436	3912	3659	4970	3362	2658	3010	3119	2231	4671	3550	3147
U	1402	2387	2869	3408	3897	3679	4979	3357	2615	2967	3078	2194	4684	3556	3104
V	1470	2506	3040	3549	4189	4183	5446	3738	2267	2703	2930	2210	5169	4010	2717
W	2778	2194	2276	2023	3342	5839	5994	3942	2243	1572	1059	2024	6110	4850	2359
X	1428	2419	2905	3443	3939	3718	5023	3401	2609	2970	3091	2220	4727	3600	3094
Y	1454	2455	2948	3483	3997	3790	5095	3468	2578	2953	3092	2241	4800	3672	3057
Z	1493	2512	3022	3548	4107	3952	5251	3602	2488	2891	3067	2266	4959	3825	2953
AA	1515	2534	3042	3569	4124	3954	5258	3615	2507	2912	3090	2289	4964	3833	2970
AB	1493	2515	3027	3552	4118	3976	5272	3618	2469	2876	3058	2264	4981	3845	2933
AC	1504	2527	3039	3564	4131	3986	5284	3631	2472	2881	3065	2275	4992	3857	2934
AD	1526	2552	3068	3590	4169	4034	5332	3674	2452	2870	3066	2291	5041	3905	2909
AE	2772	2196	2283	2035	3355	5844	6006	3951	2224	1554	1047	2020	6119	4859	2338
AF	1508	2545	3087	3589	4258	4295	5549	3826	2199	2654	2908	2228	5277	4112	2637
AG	1674	2710	3246	3754	4393	4314	5610	3930	2356	2826	3089	2405	5322	4181	2780
AH	1451	2454	2949	3483	4003	3805	5108	3477	2565	2941	3083	2237	4814	3685	3042
AI	1468	2473	2970	3503	4027	3828	5133	3502	2562	2944	3092	2252	4837	3709	3038
AJ	1481	2493	2994	3525	4060	3874	5178	3542	2539	2929	3088	2263	4884	3754	3010
AK	1508	2522	3026	3556	4097	3909	5217	3581	2536	2934	3102	2287	4921	3793	3003
AL	1492	2507	3012	3541	4087	3913	5216	3574	2518	2915	3083	2269	4922	3791	2986
AM	1438	2457	2968	3493	4058	3936	5222	3560	2451	2847	3017	2212	4935	3793	2921
AN	1614	2642	3161	3681	4264	4102	5414	3767	2480	2915	3130	2374	5117	3989	2926
AO	1573	2602	3124	3643	4234	4104	5405	3745	2438	2871	3085	2331	5113	3978	2887
AP	1460	2493	3021	3535	4155	4118	5387	3692	2317	2742	2953	2210	5108	3954	2772
AQ	1590	2286	2616	3177	3337	2724	4067	2628	3280	3482	3396	2314	3747	2674	3812
AR	1473	2278	2663	3223	3493	3017	4346	2839	3062	3306	3275	2238	4034	2941	3585
AS	1401	2232	2632	3190	3498	3098	4408	2867	2968	3218	3198	2173	4104	2996	3490
AT	1375	2249	2670	3226	3577	3225	4531	2968	2882	3152	3159	2160	4230	3116	3399
AU	1523	2407	2827	3383	3719	3257	4606	3090	2974	3268	3296	2311	4289	3202	3482
AV	1515	2405	2828	3384	3727	3276	4623	3102	2958	3254	3286	2304	4307	3218	3465
AW	2963	2917	3264	3233	4578	6584	7070	4954	1411	1026	1412	2488	7085	5771	1159
AX	2955	2914	3263	3235	4579	6579	7068	4952	1398	1017	1410	2483	7081	5768	1144
AY	3437	3559	3955	3968	5304	7150	7739	5623	1629	1545	2106	3086	7722	6403	1147
AZ	3672	3701	4056	4018	5365	7345	7862	5745	1930	1740	2203	3256	7870	6555	1485
BA	3794	3778	4111	4046	5396	7443	7921	5807	2089	1855	2266	3348	7943	6631	1663
BB	4309	4476	4873	4873	6215	8043	8657	6541	2445	2455	3021	3998	8636	7316	1907
BC	4342	4513	4911	4912	6253	8077	8694	6578	2476	2492	3059	4034	8672	7353	1937
BD	4378	4559	4960	4965	6305	8115	8740	6625	2507	2535	3109	4078	8716	7396	1966
BE	3688	3718	4073	4034	5381	7362	7878	5762	1944	1757	2220	3273	7887	6572	1498
BF	3475	3603	4002	4016	5352	7190	7784	5668	1659	1588	2152	3130	7766	6447	1170
BG	4432	4624	5029	5037	6376	8173	8807	6692	2557	2599	3179	4141	8779	7460	2013
BH	4442	4630	5033	5039	6379	8182	8812	6697	2569	2606	3183	4148	8786	7467	2025
BI	4467	4664	5070	5079	6418	8209	8846	6732	2590	2638	3221	4180	8818	7498	2045
BJ	4400	4631	5050	5077	6411	8147	8813	6701	2515	2602	3209	4139	8775	7455	1965
BK	3934	3904	4227	4150	5500	7576	8039	5926	2234	1994	2389	3480	8066	6755	1804
BL	3137	3968	4547	4888	5934	6522	7670	5762	2023	2685	3359	3460	7450	6219	1946
BM	4342	4624	5062	5115	6439	8093	8802	6695	2452	2598	3236	4122	8749	7430	1899
BN	4480	4690	5101	5116	6453	8225	8873	6759	2600	2663	3254	4203	8841	7521	2052

To be continued on next page...

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DECIBEL - Main Result

Calculation: Bear Lake - Finland Low Frequency - EA - October 2023

...continued from previous page

	WTG														
NSA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BO	4390	4682	5123	5179	6502	8142	8859	6752	2500	2657	3300	4178	8803	7484	1947
BP	3878	3887	4229	4172	5521	7543	8038	5923	2142	1943	2381	3450	8055	6741	1692
BQ	3794	3838	4196	4158	5505	7476	8000	5884	2030	1868	2342	3389	8007	6691	1567
BR	3935	3938	4276	4214	5563	7597	8085	5971	2201	1999	2429	3503	8105	6791	1751
BS	4443	4742	5185	5242	6565	8195	8918	6812	2554	2718	3363	4237	8860	7542	2001
BT	3085	2700	2882	2694	4030	6403	6656	4577	2064	1443	1279	2415	6745	5464	2012
BU	3069	2689	2876	2692	4029	6394	6652	4571	2042	1421	1264	2401	6739	5457	1990
BV	3933	3948	4291	4235	5584	7602	8100	5985	2187	2000	2443	3510	8116	6802	1730
BW	3743	3845	4228	4218	5561	7451	8021	5904	1934	1843	2373	3380	8012	6694	1440
BX	3755	3853	4233	4221	5564	7461	8027	5910	1949	1852	2378	3389	8020	6702	1457
BY	2700	3613	4197	4588	5542	5937	7138	5290	1981	2647	3242	3136	6895	5690	2078
BZ	3648	3824	4235	4262	5595	7380	8007	5892	1795	1798	2392	3340	7978	6659	1271
CA	4185	4149	4465	4376	5725	7825	8277	6166	2472	2245	2632	3729	8310	7000	2027
CB	4010	4035	4381	4327	5676	7685	8190	6074	2250	2080	2532	3594	8204	6889	1781
CC	4464	4762	5205	5262	6584	8215	8938	6833	2574	2738	3382	4257	8880	7562	2021
CD	1939	2927	3504	3948	4787	5056	6268	4462	1868	2455	2891	2506	6017	4823	2188
CE	2743	3655	4239	4629	5585	5979	7182	5334	2008	2675	3274	3177	6938	5734	2095
CF	4089	4099	4438	4374	5723	7756	8248	6133	2337	2155	2591	3663	8267	6953	1872
CG	4099	4110	4449	4384	5734	7767	8259	6144	2346	2166	2602	3674	8278	6964	1880
CH	2714	3605	4189	4568	5547	6009	7188	5319	1898	2567	3179	3119	6954	5739	1970
CI	3789	3953	4358	4374	5710	7519	8135	6020	1938	1931	2510	3473	8111	6792	1414
CJ	3855	3992	4385	4387	5727	7577	8171	6055	2018	1977	2533	3519	8155	6836	1502
CK	3855	3995	4390	4393	5733	7578	8175	6059	2016	1979	2538	3521	8158	6839	1499
CL	2780	3671	4254	4632	5612	6068	7252	5384	1947	2617	3234	3184	7016	5802	2004
CM	4271	4257	4581	4498	5848	7925	8392	6280	2532	2334	2743	3830	8420	7109	2070
CN	1545	2581	3129	3625	4314	4376	5626	3893	2157	2627	2901	2251	5356	4188	2586
CO	3355	3014	3206	3018	4352	6721	6981	4902	2186	1613	1562	2710	7070	5788	2051
CP	2793	3680	4263	4639	5624	6090	7270	5399	1942	2612	3232	3191	7036	5821	1992
CQ	2843	3733	4317	4694	5676	6123	7311	5446	1997	2668	3289	3246	7074	5862	2042
CR	2852	3743	4327	4704	5685	6129	7319	5455	2008	2678	3300	3256	7081	5870	2052
CS	1576	2611	3162	3654	4353	4422	5673	3937	2144	2623	2908	2275	5402	4234	2566
CT	1577	2611	3162	3654	4357	4434	5683	3944	2131	2612	2900	2272	5413	4244	2553
CU	1607	2641	3193	3684	4390	4465	5717	3978	2133	2620	2916	2299	5446	4278	2549
CV	1620	2654	3206	3697	4402	4469	5723	3988	2144	2634	2931	2313	5451	4284	2559
CW	2142	3123	3701	4140	4991	5239	6468	4668	1946	2558	3030	2693	6211	5023	2220
CX	3336	3011	3213	3033	4370	6720	6993	4911	2144	1578	1549	2699	7078	5793	2002
CY	2155	3133	3711	4147	5005	5267	6491	4687	1931	2546	3025	2700	6236	5046	2199
CZ	3939	4089	4485	4490	5829	7666	8269	6153	2092	2071	2634	3613	8250	6931	1568
DA	3841	4045	4463	4495	5826	7581	8228	6114	1970	2017	2623	3556	8194	6874	1431
DB	2877	3754	4337	4705	5702	6188	7364	5488	1969	2640	3273	3261	7132	5915	1992
DC	1696	2729	3283	3771	4484	4543	5804	4072	2154	2659	2975	2380	5530	4366	2556
DD	1998	2893	3476	3868	4829	5394	6510	4611	1432	2065	2590	2415	6297	5060	1689
DE	2925	3797	4380	4745	5748	6241	7416	5537	1991	2661	3300	3303	7185	5967	1999
DF	2896	3754	4336	4694	5710	6250	7408	5515	1912	2581	3227	3255	7183	5958	1909
DG	2893	3744	4326	4681	5703	6259	7411	5513	1889	2558	3207	3244	7188	5961	1881
DH	2945	3813	4396	4759	5766	6268	7441	5559	1992	2662	3305	3317	7210	5991	1993
DI	4021	4181	4580	4587	5926	7751	8362	6247	2166	2161	2730	3703	8341	7022	1636
DJ	1780	2811	3368	3852	4575	4630	5897	4167	2164	2685	3022	2453	5622	4460	2550
DK	3490	3529	3893	3867	5212	7167	7694	5578	1753	1560	2038	3079	7698	6382	1322
DL	3517	3555	3917	3889	5235	7193	7719	5603	1779	1586	2062	3106	7724	6408	1346
DM	2939	3787	4368	4721	5747	6307	7459	5560	1915	2583	3237	3285	7237	6009	1894
DN	4110	4265	4661	4662	6002	7839	8445	6329	2255	2246	2809	3789	8426	7107	1724
DO	1810	2839	3397	3880	4607	4659	5929	4199	2169	2696	3039	2479	5653	4492	2549
DP	3106	2631	2760	2527	3847	6310	6498	4438	2247	1600	1306	2396	6607	5340	2242
DQ	2282	3227	3810	4225	5132	5490	6689	4852	1834	2474	3000	2771	6444	5241	2050
DR	2295	3238	3820	4233	5145	5509	6707	4868	1829	2471	3001	2780	6463	5259	2039
DS	3489	3552	3925	3910	5253	7178	7723	5606	1729	1567	2070	3096	7721	6404	1282
DT	3007	3865	4447	4805	5822	6345	7512	5624	2009	2677	3330	3366	7284	6062	1987
DU	4361	4457	4825	4791	6138	8071	8626	6509	2533	2462	2970	3997	8625	7308	2017
DV	4207	4370	4768	4769	6110	7939	8551	6435	2347	2350	2916	3893	8531	7211	1812
DW	2337	3283	3865	4280	5187	5531	6737	4905	1875	2518	3049	2826	6490	5290	2079
DX	2406	3363	3945	4366	5257	5544	6771	4958	1985	2627	3155	2913	6516	5325	2185
DY	2365	3310	3893	4307	5215	5555	6763	4932	1892	2537	3072	2853	6516	5316	2090
DZ	3025	3883	4465	4821	5840	6362	7530	5642	2022	2690	3344	3383	7302	6080	1996
EA	3522	3592	3967	3953	5296	7214	7764	5647	1753	1604	2112	3134	7761	6443	1297
EB	4260	4427	4825	4827	6168	7994	8608	6492	2397	2406	2973	3949	8587	7267	1860

To be continued on next page...

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DECIBEL - Main Result

Calculation: Bear Lake - Finland Low Frequency - EA - October 2023

...continued from previous page

	WTG														
NSA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
EC	1905	2933	3493	3972	4708	4752	6030	4302	2191	2734	3098	2565	5751	4594	2553
ED	1924	2951	3512	3990	4729	4775	6053	4326	2190	2738	3106	2581	5775	4618	2548
EE	2365	3306	3889	4300	5215	5572	6774	4938	1869	2516	3055	2847	6529	5327	2062

APPENDIX T
PROJECT TEAM CVS

Shawn Duncan, BSc.
President, Partner
Total Experience: 33 years

PROFESSIONAL ASSOCIATIONS

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

AREAS OF SPECIALIZATION

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

EDUCATION

- BSc., McGill University, Montreal (1990)

TRAINING

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

RELEVANT EXPERIENCE

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

REPRESENTATIVE PROJECTS AND ROLES

Environmental Assessments

Wind Power Environmental Assessments – Senior Review: 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 – 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.

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

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

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

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

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

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

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

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

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

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

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

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

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

Natural Resource Inventories and Surveys

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

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

Fish Habitat Assessments, NS, NB – Program Manager: Coordinated a fish habitat assessment program that assessed over 500 watercourses that intersected a proposed pipeline corridor, in support of the EIA and provincial and federal permitting.
Aerial Moose Survey, NB – Program Manager: Managed and conducted a provincial aerial winter survey for moose, using helicopter.

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

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

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

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

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

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

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

Energy

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

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

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

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

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

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

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

Environmental Management

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

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

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

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

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

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

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

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

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

Melanie Smith, MES
Vice President – Environmental Assessment & Approvals, Partner
Total Experience: 21 years

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

EDUCATION

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

TRAINING

- GBA+ Micro-learning Series (2022)
- Cultural Safety (2021)
- Unconscious Bias (2021)
- Emergency First Aid (2021)
- Management Development Program (2019)
- Advanced Training, *Impact Assessment Act* (2019)
- Introduction to CEAA 2012 (November 2012)
- Water Management & Wetland Restoration Training Course, University of Guelph (2010)

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

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.

Paul Koke, MA, CISEC, LEED AP
Approvals and Permits Specialist
Environmental Assessment & Approvals
Total Experience: 16 years

AREAS OF SPECIALIZATION

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

EDUCATION

- MA, Environmental Policy(International Studies), University of Northern British Columbia (2009)
- Graduate Certificate, Environmental Management and Assessment, Niagara College of Arts and Technology (2006)
- BA (Honours), Environmental Studies, Carleton University (2005)

TRAINING

- Certified Inspector of Sediment and Erosion Control (CISEC)
- Green Building Council (LEED Accredited Professional)
- New Brunswick Watercourse Alteration Certification
- Electrofishing Certification (Crew Supervisor)
- Nova Scotia Watercourse Alteration Certification

RELEVANT EXPERIENCE

Mr. Koke is an environmental assessment and natural resource management specialist and project manager with over 15 years' experience in the environmental and technical services sectors. He specializes in environmental permitting, aquatic and terrestrial effects evaluation, construction phase oversight and QA/QC, project planning and management and environmental feasibility studies for natural resource, industry and government sector clients. He has spent much of the past decade focused on supporting development projects throughout Atlantic Canada, with a particular focus on Nova Scotia.

REPRESENTATIVE PROJECTS AND ROLES

Environmental Assessments, Proposed Wind Energy Development Projects, NS, 2021-2023 – Senior Review and EA Strategist: Regulatory strategist, senior EA, and technical reviewer for multiple proposed wind energy developments located in central Nova Scotia, specifically the Benjamins Mill and Westchester Wind Projects. Provincial EA Approval granted in February 2023 for both of the above noted projects.

Environmental Assessment, Waste Oil Recycling and Water Treatment Facility, NS, 2021-2023 – Project Manager: Preparation of a Nova Scotia Environmental Assessment Registration for a proposed waste oil recycling and water treatment facility in Dartmouth, Nova Scotia. The project involves an assessment of the environmental impacts of the proposed construction and operation of the facility on the Halifax Harbour (water quality), local community and stakeholders, First Nations, species at risk/flora and fauna of special concern; migratory and breeding birds; and surface water quality. Responsible for overall project team management, client and regulatory agency communications, and managing budget and schedule requirements. Provincial EA Approval granted in January 2023.

Dykeland System Upgrades Project, NS, 2020-2023 – Environmental and Regulatory Compliance Consultant: Team Lead role as the Environmental and Regulatory Compliance Consultant for the Dykeland System Upgrades Project, an 8-year, almost $50 million project to upgrade some of the most vulnerable sites in the province. The sites being upgraded include 60 km's of dykeland and approximately 20 aboiteaux in 4 dykeland systems: Cumberland Basin, Cobequid Bay, Southern Bight and the Annapolis River. The upgrades are funded equally by the provincial and federal government through the Disaster Mitigation and Adaptation Fund. As a Team Lead, responsible for project planning; environmental permitting and approvals support, and regulatory compliance oversight; procuring engineering and other consultant services, review of engineering studies and design packages; archaeology oversight, Mi'kmaq communities' consultation support (including leading and presenting at formal consultation meetings; stakeholder engagement support; construction phase oversight; reporting and record keeping; and risk management Significant engagement with DFO and Transport Canada is being carried out as part of the Project.

Cooper Cove Marginal Wharf Expansion Development Project, NL, 2018-2023 – Environmental Permitting Lead: Preparation of environmental feasibility study and permitting roadmap for the proposed infilling and construction of a

new marginal wharf along the perimeter of an area of Cooper Cove, located adjacent the existing Port of Argentia facility in Newfoundland. Project lead for all environmental approvals associated with the proposed project including Department of Fisheries and Oceans, Impact Assessment Agency of Canada, Newfoundland and Labrador Department of Environment and Climate Change, and Transport Canada approvals.

Nova Scotia Environmental Assessment, Highway 107, NS, 2013-2023)– Project Manager: Prepared a provincial EA for an ~8 km new 100-series right-of-way and 1.5 km of road widening. The project assessed the environmental impacts of highway construction and operation on species at risk/flora and fauna of special concern; fish and aquatic habitat; wetlands; riparian areas; migratory birds; surface water; noise; and heritage/archeological resources through respective field habitat studies and biophysical inventory.

Nova Scotia Environmental Assessment for Liquid Asphalt Storage Facility, NS, 2020 – Project Manager: Successfully prepared a Nova Environmental Assessment Registration and Industrial Approval Applications and supporting documents for a proposed Liquid Asphalt Storage Facility. The project assessed the potential environmental impacts associated with proposed construction and operation of the facility, located adjacent the Halifax Harbour. The Project involved considerable grading and earthworks, a transport pipeline, and large storage containment facilities for liquid asphalt received by marine barge. Project granted EA Approval in 2020 and began operations following receipt of Industrial Approval.

Environmental Assessment, Northern Pulp Effluent Treatment Facility Replacement, NS, 2019 – Component Lead: Led the Project Description components of Nova Scotia Environmental Assessment Registration and Focus Report, and also contributed to numerous Valued Environmental Component (VEC) impact assessments and construction and operational mitigation planning. Supported Indigenous and stakeholder consultation activities.

Newfoundland and Labrador Environmental Assessment for Offshore Drill Mud Processing Facility, NL, 2019-2020 – Project Manager: Prepared a provincial EA for a proposed drill mud processing facility and pelletizing plant. The project assessed the environmental impacts of the proposed construction and operation of the facility on residential receptors, species at risk/flora and fauna of special concern; migratory birds; and surface water including the high valued Manuels River watershed. Led Community Information Sessions in support of the Town of Conception Bay South Council.

Environmental Management and Compliance Support, Bow Lake Wind Facility, ON, 2016 – Environmental Specialist: Provided desktop and on-site environmental advisory and support services during the construction phase of a 36 turbine (58 MW) wind facility.

Species at Risk and Migratory Bird Surveys for Wind Project, NS, 2013 – Environmental Specialist: Managed a 10-month baseline bird survey program and at risk species assessment. The project included conducting aquatic and wetland surveys and acoustic monitoring of migratory bats.

Fish Assessment and Fish Habitat Study, NS, 2012 – Project/Lead Field Coordinator: Conducted an extensive fish assessment and fish habitat study in Nova Scotia for the development of the Maritime Link transmission project. The project included surveying existing and proposed power transmission corridors and scoping alternative land-fall options for the client's underwater transmission cable connecting Newfoundland to Cape Breton. The study area included two sections of proposed 500 m wide transmission corridors between Lingan and Woodbine (~90 km).

Baseline Bird Surveys, NS, 2011 – Environmental Specialist: Completed a baseline avian survey program for the potential development of a 34-turbine wind farm. The project boundaries encompassed ~1400 ha of land. Surveys included early spring nocturnal survey routes, migration stop-over transects with point counts, early breeding survey point counts, peak breeding survey point counts, diurnal passage observation and collision risk analysis and standardized area surveys during winter period.

Natural Resource Inventories, Various MARLANT Properties, NS & NL, 2009-ongoing – Project Scientist and Project Manager: Responsible for natural inventory updates for numerous DND properties including: 9 Wing Gander, CFS Leitrim, 12 Wing Shearwater, CFAD, DCD Fire School, rifle ranges, armoury and antenna sites in Newfoundland and Labrador and Nova Scotia. Work was conducted under a Natural Resources Source List.

Angus Doane, MREM
Environmental Scientist
Environmental Assessments & Approvals
Total Experience: 6 years

AREAS OF SPECIALIZATION

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

RELEVANT EXPERIENCE

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

EDUCATION

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

TRAINING

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

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

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

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, bat, wildlife, flora, and lichen surveys. Prepared, reviewed, and organized field data using several methods of collection. Prepared materials for and participated in public consultation meetings, as well as aiding in the preparation of materials for public outreach. Led regulatory meetings to brief provincial and federal agencies on project activities. Prepared EA related documents, including methodologies, effects assessments, and desktop reviews.

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

Hydroelectric Monitoring, NS, 2021-Present - Project Coordinator/Environmental Scientist: Completed swallow nesting/monitoring surveys during the fall 2021 migration period. Designed, coordinated, and conducted a wetland and wetland fish & fish habitat monitoring program considering wetland fish habitat functions.

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

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.

Transmission Line Project, NS, 2020-2022 – Environmental Scientist/Field Coordinator: Planned, coordinated and completed Wetland and watercourse assessments, wildlife surveys, and rare plant and lichen surveys, along the linear corridor spanning 100 km. These surveys involved preparing desktop and safety tools for field staff, as well as preparing reports respective to each of the surveys.

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

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

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

Strengths and Weaknesses of Avian Radar for Management and Monitoring Applications, 2020 – MREM Final Research Project: As a final project for the Master of Resource and Environmental Management program, an extensive research project on the topic of marine radar for avian applications was undertaken. This included literature research across all jurisdictions for information regarding the use of radar of tracking birds, either for monitoring or other applications. On top of the literature research, there was extensive discussion with industry users on the advantages and disadvantages of the technology, data processing techniques, and overall limitations. The findings of this project were paired directly with Radar Assessments undertaken with Strum Consulting.

Lyndsay Eichinger, BSc., MREM
Environmental Scientist
Environmental Assessment & Approvals
Total Experience: 5 years

AREAS OF SPECIALIZATION

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

EDUCATION

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

TRAINING

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

RELEVANT EXPERIENCE

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

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

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

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

REPRESENTATIVE PROJECTS AND ROLES

Wind Power Environmental Assessments, 2022-Present – **Environmental Scientist:** Providing project coordination and report writing on several 100 MW+ wind farms in Nova Scotia.

Post-Approval Work, EverWind Point Tupper Green Hydrogen/Ammonia Project Phase 1, NS, 2023 – Environmental Scientist: 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 – 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 Assessment Registration and Environmental Protection Plan, NL, 2022 – Junior Environmental Professional: Completed reporting requirements for the submission of an EA Registration Document and associated Environmental Protection Plan for a transmission line decommissioning project located in Newfoundland and Labrador.

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

Watercourse Alteration Approval and Fish Surveys, NS, 2021 – Junior Environmental Professional: Conducted electrofishing / fish salvage for an emergency watercourse alteration along a section of railway. This involved the capture, identification, documentation, and release of fish from the impacted section of the watercourse.

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

Pirate Harbour Wind Farm Project, NS) 2021-Present – Junior Environmental Professional: Participated in field

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

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

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

Darcy Kavanagh, BSc., MREM
Junior Environmental Scientist
Environmental Assessment & Approvals
Total Experience: 4 years

AREAS OF SPECIALIZATION

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

EDUCATION

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

TRAINING

- Nova Scotia Watercourse Alteration for Sizers (2023)
- Nova Scotia Watercourse Alteration for Installers (2023)
- Wetland Ecosystem Services Protocol - Atlantic Canada (WESP-AC) Training – Maritime College of Forest Technology (2022)
- Wetland Delineation Training – Maritime College of Forest Technology (2022)
- Backpack Electrofishing – Canadian Rivers Institute (2022)
- Wilderness First Aid – Saint John Ambulance (2022)
- ATV Training – Canada Safety Council (2022)
- WET-Pro Certification (2018)

RELEVANT EXPERIENCE

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

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

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

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

REPRESENTATIVE PROJECTS AND ROLES

Wind Power Environmental Assessments, 2022-Present– Environmental Scientist/Field Coordinator: Providing coordination and field work on several 100 MW+ wind farms in Nova Scotia. Responsible for conducting field assessments and environmental assessment report writing for multiple prospective wind farm locations in NS. Field

surveys were conducted for terrestrial flora & fauna, herpetofauna, avifauna, fish & fish habitat, wetlands, and watercourses. Other methods of data collection included snowshoe expeditions, ATV driving, and trial camera, acoustic monitor, and ultrasonic monitor deployment. Environmental assessment documentation included field data compilation and interpretation to inform effects assessments, mitigation measures, and monitoring strategies.

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

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

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

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.

Transmission Line, NS (2022) – Environmental Scientist: Participated in wetland and watercourse assessments, wildlife surveys, and rare plant and lichen surveys along the linear corridor spanning 100 km.

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

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

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

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

Dafna Schultz, BSc., MREM, EPt
Junior Environmental Scientist
Environmental Assessment & Approvals
Total Experience: 3 years

AREAS OF SPECIALIZATION

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

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)

RELEVANT EXPERIENCE

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

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

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

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

REPRESENTATIVE PROJECTS AND ROLES

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,

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.

François Gascon, EIT
Environmental Engineer-in-Training
Environmental Assessment & Approvals
Total Experience: 10 years

PROFESSIONAL ASSOCIATIONS

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

AREAS OF SPECIALIZATION

- Industrial Approvals
- Environmental Approvals
- Computer-Aided Design
- Hydrogeology
- Water Treatment
- Climate Change and GHG Assessments
- Dangerous Goods Assessments

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)

RELEVANT EXPERIENCE

Mr. Gascon joined the Strum team in 2021 as an Environmental Engineer-in-Training and is working 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 in potable groundwater supply development, 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 – Environmental Scientist: 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, NS – 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.

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.

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.

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.

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.

Alex Scott, EPt
Junior Environmental Scientist
Environmental Assessment & Approvals
Total Experience: 1 year

PROFESSIONAL ASSOCIATIONS

- Eco Canada (Environmental Professional in-training)

AREAS OF SPECIALIZATION

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

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

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. Additionally, Mr. Scott is experienced in Industrial Approvals related to groundwater monitoring, including groundwater assessments, sampling, 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

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.

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.

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.

Matthew Savelle, BSc. Adv Dipl
Senior Geomatics Technician
Environmental Assessment & Approvals
Total Experience: 14 years

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)

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

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.

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 profileand 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.

Peter Opra, MSc., Adv Dipl
Geomatics Technician
Environmental Assessment & Approvals
Total Experience: 5 years

AREAS OF SPECIALIZATION

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

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)

COMPUTER EXPERIENCE

- Operating Systems: Windows, macOS
- GPS Software: Garmin BaseCamp, Trimble Geospatial
- GIS Software: ArcGIS Suite, QGIS, Global Mapper
- Remote Sensing Data Processing: Trimble Inpho, POSPac MMS, LAStools
- Other Software: 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.

REPRESENTATIVE PROJECTS AND ROLES

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

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

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

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

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

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

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

Petrography of bedrock and ice-rafted granules, Flemish Cap, offshore Newfoundland and Labrador: 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.

Eric Johnson, BSc., Adv Dipl
Geomatics Technician
Environmental Assessment & Approvals
Total Experience: 3 years

AREAS OF SPECIALIZATION

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

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

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.

Courtney Morrison, MREM
Community Engagement Coordinator
Total Experience: 5 years

AREAS OF SPECIALIZATION

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

EDUCATION

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

TRAINING

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

RELEVANT EXPERIENCE

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

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

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

REPRESENTATIVE PROJECTS AND ROLES

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

Ellershouse 3 Wind Project, NS, 2022-Present – Communuity Engagement Coordinator: Supporting client with Electromagnetic Interference and Engagement (Mi'kmaq, Government, Public, and Stakeholder) sections of the EA.

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

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

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

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

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

Sara J. Beanlands
sbeanlands@boreasheritage.ca
902 483-7999

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

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

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

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

EMPLOYMENT HISTORY

Saint Mary's University, Halifax, Nova Scotia

2020 Adjunct Professor, Department of Anthropology

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

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

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

Acadia University, Wolfville, Nova Scotia

2017 Part-time Professor, Department of History and Classics

Boreas Heritage Consulting Inc., Halifax, Nova Scotia

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

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

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

Stantec Consulting, Churchill River, Newfoundland & Labrador

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

Cultural Resource Management Group Limited, Halifax, Nova Scotia

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

Parks Canada, Halifax, Nova Scotia

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

Private Consultant

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

Jacques Whitford Environment Limited, Dartmouth, Nova Scotia

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

Parks Canada, Halifax, Nova Scotia

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

REPRESENTATIVE PROFESSIONAL EXPERIENCE

2021 Project Manager for Gaspereau Lake Reservoir Archaeological Mitigation, for Nova Scotia Power Inc.

Principal Investigator for Archaeological Impact Assessment of Acadia Wharf Extension, for Develop Nova Scotia

Principal Investigator for Archaeological Impact Assessment of Blandford to Tancook Ferry Terminals, for NS Department of Transportation

Principal Investigator for Archaeological Impact Assessment of Peggy's Cove Revitalization, for Develop Nova Scotia

2020 Project Manager for Archaeological Impact Assessment of installation of electric charging stations at Ardgowan National Historic Site, Prince Edward Island, for Parks Canada

Project Manager for Archaeological Impact Assessment of George's Island National Historic Site, for Parks Canada

Project Manager for Geophysical Survey of Shubenacadie Residential School, for Confederacy of Mainland Mi'kmaq

Principal Investigator for Archaeological Assessment of Deep Panuke Jackup Gas Production Field Centre (PFC) Platform, for RJMI Ltd.

2019 Project Manager and Lead Researcher for Chignecto Isthmus Indigenous Knowledge Study (Archaeology), for Mi'gmawe'l Tplu'taqnn Incorporated

2018 Project Manager for Archaeological Impact Assessment of PEI National Park – Morrison Cottage Infrastructure Removal, for Parks Canada

Principal Investigator for Geophysical Investigation of the Garrison Graveyard at Fort Anne National Historic Site, for Parks Canada

Project Manager/Senior Archaeologist for Geophysical Investigation of Chapel Island at Potlotek First Nation;

for Potlotek First Nation

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2010 Principal Investigator for Archaeological Screening and Reconnaissance of the Donahue Dam Refurbishment project in Guysborough County, for Nova Scotia Power Incorporated

Principal Investigator for Archaeological Screening and Reconnaissance of the Baddeck Landfill Expansion project in Victoria County, for the Municipality of the County of Victoria

Principal Investigator for Archaeological Screening and Reconnaissance of the Ten Mile Lake Dam project in Halifax Regional Municipality, for Nova Scotia Power Incorporated

Principal Investigator for Archaeological Screening and Reconnaissance of the Marshall Falls Dam project in Halifax Regional Municipality, for Nova Scotia Power Incorporated

Principal Investigator for the Archaeological Monitoring of soil sampling at the Halifax Armoury in Halifax, for Defence Construction Canada

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

Principal Investigator for the Archaeological Screening and Reconnaissance of the Stillwater Later Bridge Replacement project, for Halifax Regional Municipality

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

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

Principal Investigator for Archaeological Screening and Reconnaissance of the Nuttby I & II Wind Projects in Colchester County, for Nova Scotia Power Incorporated

2009 Principal Researcher for Archaeological Assessment of proposed Highway 113 alignment in Halifax Regional Municipality, for Nova Scotia Department of Transportation and Infrastructure Renewal

Field Archaeologist and Principal Researcher for Archaeological Assessment of the Ferrona Bridge Replacement Project in Pictou County, for Nova Scotia Department of Transportation and Infrastructure Renewal

Principal Researcher for Archaeological Assessment of the Hawthorne Farm Site within a proposed mine expansion area in Gays River, Nova Scotia, for Acadian Mining

Principal Investigator for the Archaeological Monitoring of subterranean electrical duct installation at CFB Stadacona in Halifax, for Department of National Defence

Field Director for Stage 2 and Stage 3 Archaeological Assessments of Talbot Wind Farm, in Chatham-Kent, Ontario, for Renewable Energy Systems - *Reports on file with Ontario Ministry of Tourism, Culture and Sport*

2008 Principal Investigator for Archaeological Screening and Reconnaissance of the Fifteen Mile Stream Development in Halifax Regional Municipality, for Nova Scotia Power Incorporated

Principal Researcher for Archaeological Assessment of Highway 101 Twinning in Kings County, for Nova Scotia Department of Transportation and Infrastructure Renewal

Field Supervisor and Principal Researcher for Archaeological Screening, Reconnaissance and Testing of Great Barren Dam Safety Remedial Works in Yarmouth County, for Nova Scotia Power Incorporated

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2004 Archaeological Site and Laboratory Assistant for Archaeological Testing of Beaubassin and Fort Lawrence National Historic Sites in Cumberland County, for Parks Canada

Field Archaeologist and Artifact Processor for Archaeological Mitigation of the Maritime Museum Combined Sewage Overflow Chamber in Halifax Regional Municipality, with CRM Group

2003 Field Archaeologist for Archaeological Assessment of Highway 101 structure construction areas in Yarmouth County, with CRM Group

Field Archaeologist for Archaeological Assessment of a proposed quarry expansion area in Colchester County, with CRM Group

1993 Field Technician and Archaeological Assistant for Jacques Whitford Environment Limited, Dartmouth, Nova Scotia

1992 Field Archaeologist and Laboratory Assistant for Archaeological Excavation of Charlesfort site at Fort Anne National Historic Site in Annapolis County, for Parks Canada

PUBLICATIONS AND PRESENTATIONS

Beanlands, Sara	2018	"The Training of the Jewish Legion in Windsor, Nova Scotia, During the First World War," *Journal of the Royal Nova Scotia Historical Society*, Vol. XXI (2018).
Beanlands, Sara	2012	"The Reverend Professor Andrew Brown: An Academic Reassessment," *The University of Edinburgh Journal*, Vol. XLV, No.4 (2012).
Erickson, Paul & Jonathan Fowler, eds.	2010	"Neighbours in Time," in *Underground Nova Scotia: Stories of Archaeology*. Halifax: Nimbus Publishing.
Reid, John G et. al.	2009	"Is There a Canadian Atlantic World?" *International Journal of Maritime History*, Vol. XXI, No. 1 (2009).
MacIntyre, April & Sara Beanlands	2008	"History of Sale: The Treasure Trove Act in Nova Scotia," In *Preprints of the 15th Triennial Meeting, New Delhi, 22-26 September 2008.*
Beanlands, Sara	2006	"The Rev. Dr. Andrew Brown: Nova Scotia's Elusive Historian," *Journal of the Royal Nova Scotia Historical Society*, Vol. IX (2006).

2019 "Merging UAV Data with Subsurface Ground Penetrating Radar for Archaeological Investigations", Nova Scotia Community College AGRG-COGS *Sensors High and Low: Measuring the Reality of Our World Conference*, Middleton, Nova Scotia

"Archaeology and Species at Risk Research in Kespukwitk", with Jeff Purdy, *Kespukwitk Two-Eyed Seeing Gathering*, Bear River First Nation, Nova Scotia

"What Lies Beneath: An Acadian Ancestry Project", Kings Theatre, Annapolis Royal, Nova Scotia

2018 "Sandy Banks (FgCg-01): The Archaeology of a Hudson's Bay Company Fur Trade Post in Central Labrador", with Fred Schwarz et al., *Council for Northeastern Archaeology Confer*ence, Halifax, Nova Scotia

"A Typological analysis of the Stone Pipes of the Isthmus of Chignecto, Eastern Canada", with Eric Tremblay et al., *Council for Northeastern Archaeology Conference*, Halifax, Nova Scotia

"The Elsdale Anomaly: Geophysics and the Search for Fort Luttrell", *Council for Northeastern Archaeology Conference*, Halifax, Nova Scotia

"The Training of the Jewish Legion at Fort Edward", *Royal United Services Institute of Nova Scotia*, Royal Artillery Park, Halifax, Nova Scotia

"The Jewish Legion in Windsor", *Atlantic Mayors Congress*, Windsor, Nova Scotia

"Voices of the Landscape", *Landscape of Cultures Festival*, Grand Pré National Historic Site, Nova Scotia

2017 "Landscape in Memory: What Time is it in Fort Lawrence?", *Nova Scotia Archaeology Society*, Halifax, Nova Scotia

"The Training of the Jewish Legion at Fort Edward during the First World War", *Royal Nova Scotia Historical Society*, Halifax, Nova Scotia

2016 "Unearthing our History", *West Hants Historical Society Heritage Banquet*, Windsor, Nova Scotia

"Thibodeau Village: Community Engagement, Archaeology, and the Discovery of an Acadian Past in a Nova Scotia Planter Landscape", *Genealogical Association of Nova Scotia*, Dartmouth, Nova Scotia

"John Reid's Influence on Historical Archaeology in Nova Scotia", *Practicing History in the 21st Century Symposium*, Saint Mary's University, Halifax, Nova Scotia

2015 "An Early African-Nova Scotian Burial Ground in Hammonds Plains", *Black Canadian Studies Conference*, Dalhousie University, Halifax, Nova Scotia

"Preserving the Memory of Historical Public Space in Halifax Regional Municipality", *Public Space, History and Memory Symposium*, Saint Mary's University, Halifax, Nova Scotia

"Thibodeau Village: Community Engagement, Archaeology, and the Discovery of an Acadian Past in a Nova Scotia Planter Landscape", *Evenings at Government House Lecture Series*, for the Lieutenant Governor of Nova Scotia, Government House, Halifax, Nova Scotia

2013 "Re-layering the Cultural Landscape", *Nova Scotia Heritage Conference*, Liverpool, Nova Scotia

"Unravelling the 3D Cultural Landscape within a Tablet Interface", *European Archaeology Association*, Pilsen, Czech Republic

2012 "Rev. Dr. Andrew Brown and the Removal of the French Inhabitants of Nova Scotia", *Monument-Lefebvre National Historic Site*, Memramcook, New Brunswick

2011 "The Brown Manuscripts: An 18th Century Approach to Understanding Acadia", *Histoire de l'Acadie: New Approaches*, Saint Mary's University, Halifax, Nova Scotia

"Bayonets, Bottles and Beads: An Overview of Archaeological Sites in the Chignecto", *Tantramar Heritage Trust*, Sackville, New Brunswick

2010 "Finding Acadia in Planter Oral Tradition", *Colchester Historical Society*, Truro, Nova Scotia

"An Introduction to Industrial Archaeology", *Industrial Heritage Nova Scotia*, Halifax, Nova Scotia

"The Brown Manuscript: An 18th Century Account of the Acadian Deportation", *Causerie: Grand-Pré*, Place des Arts Père Anselm Chaisson, Cheticamp, Nova Scotia

"Removal of the French Inhabitants of Nova Scotia by Lieut. Governor Lawrence & His Majesty's Council in October 1755", *Tantramar Heritage Trust*, Sackville, New Brunswick

2009 "The Brown Manuscript and the Scottish Enlightenment", *Atlantic Canada Studies Conference*, University of Prince Edward Island, Charlottetown, Prince Edward Island

2008 "New Perspectives on the Idea of a 'Canadian' Atlantic World", *International Workshop on Material Culture Dimensions of the Asia-Atlantic Comparison and on the 'Canadian' Atlantic World*, Halifax, Nova Scotia

2006 "Thibodeau Village", *Confederation of Association of Acadian Families*, Lafayette, Louisiana

"Thibodeau Village", *Acadian Memorial*, St. Martinville, Louisiana

"If the Land Could Speak", *Grand-Pré National Historic Site*, Wolfville, Nova Scotia

"Andrew Brown and the Acadians", *Société Historique Acadienne*, Université de Moncton, Moncton, New Brunswick

2005 "An Enlightened Mind in Nova Scotia: The University of Edinburgh's Andrew Brown - Nova Scotia's First Historian", *University of Edinburgh*, Centre of Canadian Studies, Edinburgh, Scotland

"The Rev. Dr. Andrew Brown: Nova Scotia's Elusive Historian", *Royal Nova Scotia Historical Society*, Halifax, Nova Scotia

SCHOLARSHIPS AND AWARDS

2017 Volunteer Service Award (Municipality of the District of West Hants & the Town of Windsor)

2013 Nova Scotia Museum Research Grant (Cultural History)

2006/2007 Mary Jackson-Hinch and Joseph Hinch Research Award (St. Mary's University)

2006 Honorary Citizenship to the City of Lafayette, Louisiana for contributions to Acadian Society

2005/2006 St. Mary's University Graduate Award Scholarship

St. Mary's University Faculty of Graduate Studies and Research Fellowship

2005 Associated Medical Services Hannah Studentship

TRAINING AND CERTIFICATES

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