Appendix A

Atmospheric Environment Baseline Study

APPENDIX A
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List of Acronyms & Abbreviations

Acronym	Definition
µg	microgram
µm	micron
AAQM	ambient air quality monitoring
APCR	Air Pollution Control Regulations, 2022
BV	Bureau Veritas
CAAQS	Canadian Ambient Air Quality Standards
CCME	Canadian Council of Ministers of the Environment
CHE	Committee on Health and the Environment
CO	carbon monoxide
Cu	copper
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
dioxin	polychlorinated dibenzo-p-dioxins
ECCC	Environment and Climate Change Canada
FPT	Federal-Provincial-Territorial
GHD	GHD Limited
H_2S	hydrogen sulfide
hr	hour
Hz	hertz
IMN	industrial monitoring network
kg	kilogram
km	kilometre
km/h	kilometre per hour
LAA	Local Assessment Area
L_{Aeq}	A-weighted noise level
L_d	daytime sound equivalent level
L_{dn}	day-night average sound level

L_{eq}	equivalent sound level
LFN	low frequency noise
L_n	nighttime sound equivalent level
m	metre
m^3	cubic metre
MW	megawatt
NAPS	National Air Pollution Surveillance
ND	not detected
NH_3	ammonia
Ni	nickel
NL	Newfoundland and Labrador
NL AQS	Newfoundland and Labrador Air Quality Standards
NLDECC	Newfoundland and Labrador Department of Environment and Climate Change
NLH	Newfoundland and Labrador Hydro
NO_2	nitrogen dioxide
NPRI	National Pollutant Release Inventory
O_3	ozone
PASS	Passive Air Sampling System
Pattern	Pattern
Pb	lead
PCB	polychlorinated biphenyl
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
POA	Port of Argentia
ppb	parts per billion
RAA	Regional Assessment Area
RDL	reportable detection limit
SEM	Sikumiut Environmental Management Ltd.
SO_2	sulfur dioxide
t	metric tonne
tpd	metric tonnes per day
TSP	total suspended particulate
V	vanadium
Vale	Vale Newfoundland and Labrador
WHO	World Health Organization
Zn	zinc

1.0 Introduction

Argentia Renewables Wind Limited Partnership ("Argentia Renewables") is planning to develop the Argentia Renewables Project (the "Project") which consists of a renewable energy powered green hydrogen and ammonia production and export facility at the Port of Argentia (POA). The Argentia Green Fuels Facility will utilize energy generated by the associated Argentia Wind Facility, comprising approximately 300 megawatts (MW) of installed capacity from up to 46 wind turbines located throughout private lands owned by the POA. A nominal power of 6.8 MW and a hub height of 119 m for each wind turbine was conservatively assumed for this assessment. The Project is expected to produce up to 400 metric tonnes per day (tpd) of green ammonia, (approximately 135,000-150,000 t annually), requiring 1,185 cubic metres (m^3) of freshwater per day. Liquified ammonia will be stored in an above-ground tank with sufficient capacity to align with a once per 30 days shipping schedule. Maritime traffic during operation will therefore be limited to one vessel per month. The Project will encompass all standard components required to operate a renewable energy project of this kind, including civil works and associated infrastructure. Electrical infrastructure will be needed to transport energy from the wind turbines to the Argentia Green Fuels Facility, and a transmission line will connect to the provincial electricity system at the Long Harbour Terminal Station.

1.1 Objectives

Argentia Renewables retained Sikumiut Environmental Management Ltd. (SEM) to conduct an atmospheric environment baseline study to characterize existing (i.e., baseline) conditions of air quality and noise in the study area (defined in Section 1.2). Existing conditions were characterized through a combination of desktop exercises and field studies, and results compared to regulatory guidelines and standards, where available.

This study has been prepared in accordance with the Newfoundland and Labrador (NL) **Environmental Protection Act** and the **Environmental Assessment Regulations**. The format of this submission is consistent with the "Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects".

1.2 Study Area

The atmospheric environment baseline study considered three spatial boundaries:

1. **Project Area:** defined as "the area in which Project infrastructure components and activity (e.g., construction, operation, decommissioning) will occur, and within the boundaries of which direct environmental interactions with the Project will likely occur". Specifically, the Project Area encompassed the collective spatial footprint of the Argentia Wind Facility, the Argentia Green

Fuels Facility, ammonia storage infrastructure, electrical substation(s) and power lines, and all the associated roads for those various elements of the Project.

2. **Local Assessment Area (LAA):** defined as “the area in which environmental interactions are detectable (and measurable) beyond the boundaries of the Project Area”. A one kilometre (km) buffer was added to the Argentia Backlands and the Argentia Peninsula Project Area, while the 250 m buffer along the Project Interconnect Line remained unchanged, to define the boundary of the LAA.

3. **Regional Assessment Area (RAA):** defined as “the spatial extent of potential indirect and cumulative environmental effects which may reach beyond the limits of the LAA”. The RAA therefore extended an additional 15 km beyond the radius of the localities of Argentia, Dunnville, Fox Harbour, Freshwater, Iona, Little Barasway, Placentia, Point Verde, Jerseyside, Ferndale, and Ship Harbour.

Baseline conditions of air quality and noise were assessed within the RAA. The RAA includes the area within which most cumulative effects would occur, such as additive industrialization to other local industrial installments, projects, or infrastructure.

2.0 Air Quality

The baseline assessment was conducted to characterize existing ambient air quality in the RAA. This study focused on characterizing the following air contaminants:

- Particulate matter less than 2.5 microns (µm) ($PM_{2.5}$; also known as fine particulate matter);
- Particulate matter less than 10 µm (PM_{10}; also known as coarse particulate matter);
- Total suspended particulate (TSP);
- Heavy metals;
- Ammonia (NH_3);
- Nitrogen dioxide (NO_2);
- Sulfur dioxide (SO_2);
- Carbon monoxide (CO); and
- Ozone (O_3).

2.1 Regulatory Context

The release of air contaminants is regulated at the provincial and federal level. The Province of Newfoundland and Labrador (NL) has legislated **Air Pollution Control Regulations, 2022** (APCR) under the **Environmental Protection Act**. These regulations establish maximum permissible concentrations or levels of air contaminants and prescribe measures to control the release of air pollutants in the atmosphere from emission sources (Air Pollution Control Regulations, 2022). Guidelines as per the APCR, known as the Newfoundland and Labrador Air Quality Standards (NL AQS), are presented in units of parts per billion (ppb) and micrograms per cubic metre (µg/m^3) in Table A-2.1-1.

Table A-2.1-1 Newfoundland and Labrador Air Quality Standards (NL AQS).

Contaminant	Units of Concentration	Concentration	Period of Time
Ammonia	ppb	144	24 hour
Arsenic	µg/m^3	0.3	24 hour
Cadmium	µg/m^3	2	24 hour
Carbon monoxide	ppb	30,582	1 hour
		13,107	8 hour
Copper	µg/m^3	50	24 hour
Lead	µg/m^3	2	24 hour
Mercury	µg/m^3	2	24 hour
Nickel	µg/m^3	2	24 hour
Nitrogen dioxide	ppb	213	1 hour
		106	24 hour

Contaminant	Units of Concentration	Concentration	Period of Time
		53	1 year
Ozone	ppb	82	1 hour
		44	8 hour
Particulate matter < 2.5 µm	µg/m^3	25	24 hour
		8.8	1 year
Particulate matter < 10 µm	µg/m^3	50	24 hour
Total suspended particulate	µg/m^3	120	24 hour
		60	1 year
Sulfur dioxide	ppb	344	1 hour
		229	3 hour
		115	24 hour
		23	1 year
Vanadium	µg/m^3	2	24 hour
Zinc	µg/m^3	120	24 hour
NOTES < = less than; ppb = parts per billion, µg/m^3= micrograms per cubic metre			

In addition to the air contaminants outlined in Table A-2.1-1, the NL AQS regulates the emission of hydrogen sulfide (H_2S), asbestos, polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs), and polychlorinated dibenzo furans (PCDFs). These air contaminants are not considered to be primary emissions of the proposed Project, and thus releases, if any, were assumed to be negligible. Such air contaminants were not considered further in this assessment.

Federal regulation of air contaminant (also referred to interchangeably as air pollutant) releases is governed by the Canadian Council of Ministers of the Environment (CCME). The CCME has established Canadian Ambient Air Quality Standards (CAAQS) for $PM_{2.5}$, O_3, SO_2, and NO_2. CAAQS were created to promote continuous improvements in Canadian air quality as a crucial component of the Air Quality Management System, and implemented to reduce emissions and ambient concentrations of various air pollutants (Canadian Council of Ministers of the Environment, 2023). CAAQS for federally regulated air pollutants are outlined in Table A-2.1-2.

Table A-2.1-2 Canadian Ambient Air Quality Standards (CAAQS).

Air Pollutant	Units of Concentration	Averaging Time	Numerical Value		Statistical Form
			2020-2024	2025	
Particulate matter < 2.5 µm	µg/m^3	24-hour	27	-	The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations
	µg/m^3	1-year	8.8	-	The 3-year average of the annual average of the daily 24-hour average concentrations
Ozone	ppb	8-hour	62	60	The 3-year average of the annual 4th highest of the daily maximum 8-hour average ozone concentrations
Nitrogen dioxide	ppb	1-hour	60	42	The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations
	ppb	1-year	17.0	12.0	The average over a single calendar year of all 1-hour average concentrations
Sulfur dioxide	ppb	1-hour	70	65	The 3-year average of the annual 99th percentile of the SO_2 daily maximum 1-hour average concentrations
	ppb	1-year	5.0	4.0	The average over a single calendar year of all 1-hour average SO_2 concentrations
NOTES < = less than; µm = microns; ppb = parts per billion, µg/m^3= micrograms per cubic metre					

Regulatory compliance is continuously monitored via the National Air Pollutant Surveillance (NAPS) Program, managed by Environment and Climate Change Canada (ECCC) in conjunction with the NL Department of Environment and Climate Change (NL DECC). In addition to the network of six NAPS stations in the province, there is an industrial monitoring network (IMN) for which major industrial operations in NL monitor air quality near their operations for select pollutants. Ambient air quality data collected at the NAPS stations and industrial monitoring networks are summarized by the NL DECC in annual reports.

2.2 Methodology

Existing ambient air quality conditions within the RAA were characterized by analyzing ambient air quality data as well as results from a field survey conducted in the summer of 2023.

2.2.1 Desktop Study

Existing air quality conditions were assessed using data collected from NAPS and IMN stations, as well as air contaminant release information from the National Pollutant Release Inventory (NPRI). The closest IMN ambient air quality monitoring (AAQM) stations are in Long Harbour (approximately 20 km northeast of the Project Area). Since regional air quality does not vary significantly in the province, the NAPS monitoring station in Mount Pearl, located approximately 90 km northeast of the Project, was used to supplement the desktop assessment of air quality. To allow for comparison to CAAQS, NAPS data from 2020 to 2022 were processed to the statistical metrics required by the CAAQS; 2023 data were not available at the time of reporting. Despite the lack of regional variability in the province, air quality conditions in Mount Pearl are not directly comparable to those in the RAA.

2.2.2 Field Survey

Baseline ambient air quality was assessed via a field survey conducted at two locations in the RAA: (1) Port Authority in Argentia; and (2) Power Street in Dunville (Figure A-2.2.2-1). Monitoring locations were selected in consideration of proximity to sensitive receptors as well as Project infrastructure. It was assumed that ambient conditions at the two monitoring locations would be representative of those throughout the RAA as ambient air quality does not vary significantly in the region.

The Port Authority site is near the Port Authority main office, which is occupied by POA employees, the Argentia Sunset RV Park which is operational between April 1 and October 1, and the proposed location of the Argentia Green Fuels Facility. The Power Street site is situated in a residential area within 200 metres (m) of St. Anne's Academy, the local elementary school, and is near the proposed array of wind turbines in Dunville. The field survey consisted of measuring ambient concentrations of $PM_{2.5}$, TSP, metals, NH_3, NO_2, and SO_2. $PM_{2.5}$ was prioritized over PM_{10} in the field study as it is more relevant to potential human health effects; PM_{10} contributes more to regional air quality and aesthetics (e.g., smog events).

Ambient concentrations of $PM_{2.5}$, TSP, and metals were determined using portable ambient air samplers (BGI PQ100). The BQI PQ100 pulls ambient air through a size-selective sampling head using the integrated pump and particulate in the resulting airflow is collected on a pre-weighed Teflon filter via impaction. Two BGI PQ100 units were deployed in tandem at each monitoring location for two 72-hour periods in July 2023, which allowed for simultaneous collection of $PM_{2.5}$ and TSP. BGI PQ100 units were programmed to turn off after 72-hour run times, ensuring that sampling times for each unit and deployment period remained consistent throughout the field survey. Sampling periods of 72 hours were selected to maximize the occurrence of detectable concentrations throughout the survey. Post-collection filter weights and particle concentrations were determined by Bureau Veritas (BV) in Mississauga, ON. The TSP filters were further analyzed via atomic spectroscopy to determine concentrations of particle-bound metals.



Pattern | Argentia Renewables	FIGURE NUMBER: A - 2.2.2 - 1	COORDINATE SYSTEM: NAD 1983 CSRS UTM Zone 22N	PREPARED BY: J. Crocker	DATE: 24/07/25
	FIGURE TITLE: Ambient Air Quality Monitoring Locations	NOTES:	REVIEWED BY:	
	PROJECT TITLE: Argentia Renewables		APPROVED BY:	sem

SEM MAP ID: 238-005-GIS-101-Rev1

Ambient concentrations of NH_3, NO_2, and SO_2 were determined using BV's proprietary all-weather Passive Air Sampling System (PASS), allowing ambient gases and vapours to be collected via a permeative or diffusive process. A PASS unit was deployed at each monitoring location for a 1-month exposure period between July and August 2023. A 1-month exposure period was selected to ensure that ultra-low detection limits could be achieved, as it was predicted that ambient concentrations of NH_3, NO_2, and SO_2 would be low. PASS units were outfitted with three passive samplers: one each for NH_3, NO_2, and SO_2. Trip blanks (i.e., passive samplers without exposure) were also submitted for each monitoring location to ensure sample integrity. Post-exposure concentrations collected on passive samplers were determined by BV in Edmonton, Alberta.

2.3 Results

2.3.1 Desktop Study

Information from the NPRI, provincial air reports, and measured concentrations at the Mount Pearl NAPS and two Long Harbour IMN stations were distilled to characterize existing air quality in the RAA. Based on review of NPRI reporting data, there are no large industrial emission sources in the Project Area or LAA. The nearest large industrial facility, and hence emission source, to the Project is operated by Vale Newfoundland and Labrador (Vale) in Long Harbour, NL. Vale operates the Long Harbour Hydromet Nickel Processing Facility (Hydromet Facility) approximately 20 km northeast of the Project Area, which is within the RAA.

Vale operates two AAQM stations under the IMN; AM1 near the community centre in Long Harbour, and AM3 near the access road to the Hydromet Facility. Air contaminants monitored at the Long Harbour Hydromet Nickel Processing Facility include oxides of nitrogen (NO_x), NO_2, $PM_{2.5}$ and PM_{10}. While the Vale-operated AAQM stations are within the RAA, they do not monitor sufficient parameters (i.e., air contaminants) to develop a full set of baseline conditions for this study. As such, data from the Mount Pearl NAPS AAQM station (also known as "NAPS station") were used to supplement data collected from AM1 and AM3. The Mount Pearl NAPS station is located approximately 90 km northeast of the Project Area and monitors NO_2, SO_2, O_3, CO, $PM_{2.5}$, and PM_{10}. A summary of ambient air monitoring data collected at the Mount Pearl and Long Harbour stations, as presented in the 2020 and 2022 Ambient Air Monitoring Reports, are provided in Table A-2.3-1.

Table A-2.3-1 NL Ambient Air Monitoring Results.

Air Pollutant	Units of Concentration	Averaging Time	NAPS Data - Mount Pearl			IMN Data - Vale Long Harbour						NL AAQS
						Community Centre (AM1)			Access Road (AM3)			
			2020	2021	2022	2020	2021	2022	2020	2021	2022	
SO_2	ppb	1-hour	8.7	3.8	5.0	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	344
		3-hour	6.6	2.6	1.9	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	229
		24-hour	2.2	0.6	0.5	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	115
		1-year	0.3	0.2	0.1	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	23
NO_2	ppb	1-hour	40.3	23.5	13.5	14.3	9.6	7.1	5.8 [2]	9.3 [2]	6.8 [2]	213
		24-hour	11.7	5.6	3.6	4.3	3.0	3.5	0.9 [2]	2.8 [2]	1.9 [2]	106
		1-year	1.1	0.9	0.9	1.1	1.0	--[3]	--[3]	--[3]	--[3]	53
O_3	ppb	1-hour	50.1	54.3	48.7	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	82
		8-hour	44.6	49.0	43.1	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	44
CO	ppb	1-hour	696	1,700	700	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	30,582
		8-hour	435	500	300	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	13,107
$PM_{2.5}$	µg/m³	24-hour	11.5	16.0	11.5	22.3	25.0	11.6	23.7	18.0	11.8	25
		1-year	5.1	4.8	4.6	5.3	4.6	4.2	5.0	4.8	4.0	8.8*
PM_{10}	µg/m³	24-hour	--[1]	28.2	27.5	--[1]	29.9	27.6	--[1]	27.3	29.2	50

NOTES

ppb = parts per billion; $\mu g \cdot m^{-3}$ = micrograms per cubic metre

1-hour, 3-hour, and 24-hour results provided as maximum while annual results are provided as an average.

*Three-year annual average.

[1] Parameter not measured.

[2] Based on limited data.

[3] Insufficient data to calculate annual average.

Ambient air monitoring data collected at the Mount Pearl and Long Harbour stations were comparable; with notable differences for $PM_{2.5}$ and NO_2. Concentrations of $PM_{2.5}$ were generally higher in Long Harbour compared to Mount Pearl from 2020 through 2021, but concentrations in 2022 have seemingly stabilized to levels comparable to those measured in Mount Pearl. Elevated $PM_{2.5}$ at the Long Harbour stations may be a result of Vale Hydromet Facility operations. Concentrations of NO_2 are higher in Mount Pearl compared to those measured in Long Harbour, likely a result of the fact Mount Pearl is a more urban setting than Long Harbour, and thus more sources of NO_2 (e.g., fossil fuel combustion) exist in Mount Pearl. Average measured concentrations across respective averaging periods did not exceed NL AQS at the Long Harbour stations. Findings from the provincial ambient air monitoring reports indicate O_3 at the Mount Pearl NAPS station was the only air pollutant with NL AQS exceedances between 2019 and 2022. The 8-hour average NL AQS for O_3 was exceeded once in April 2020, and 13 times in March, April and June 2021 (NLDECC, 2021, 2023).

Due to significant data limitations including data gaps and lack of parameters monitored, only data from the Mount Pearl NAPS station (2020-2022) were processed to the statistical metrics required by the CAAQS (Table A-2.3-2). Data in Table A-2.3-2 are compared to NL AQS and CAAQS for the present (2020-2024) and future (2025+) periods (ECCC, 2022). PM_{10} data was not available between January 1, 2020, and September 3, 2020, nor for 2021.

Table A-2.3-2 NAPS Monitoring Results – Mount Pearl.

Averaging Period/Parameter		Measured Concentration	NL AQS	CAAQS	
				2020-2024	2025+
SO_2 (ppb)					
Maximum hourly		8.7	344	-	-
Hourly concentrations	98th percentile	1.0	-	-	-
	90th percentile	0.3	-	-	-
3-hour rolling average 90th percentile hourly concentrations		0.3			
Maximum 24-hour average	all hourly values	2.2	115 [1]	-	-
	excl. values >90th percentile	0.2			
3-year average of 99th percentile of daily maximum hour		4.6	-	70	65
Maximum annual average		0.3	23 [2]	5.0	4.0
NO_2 (ppb)					
Maximum hourly		40	213	-	-
Hourly concentrations	98th percentile	6	-	-	-
	90th percentile	2	-	-	-
Maximum 24-hour average	all hourly values	12	106 [1]	-	-
	excl. values >90th percentile	1			
3-year average of 99th percentile of daily maximum hour		16	-	60	42
Maximum annual average		1	53 [2]	17.0	12.0
O_3 (ppb)					
Maximum hourly		54	82	-	-
Hourly concentrations	98th percentile	42	-	-	-

Averaging Period/Parameter		Measured Concentration	NL AQS	CAAQS	
				2020-2024	2025+
	90th percentile	38	-	-	-
Maximum 24-hour average	all hourly values	46	-	-	-
	excl. values >90th percentile	25			
Maximum 8-hour rolling average		49	44	-	-
Maximum annual average		28	-	-	-
CO (ppb)					
Maximum hourly		1,690	30,582	-	-
Hourly concentrations	98th percentile	280	-	-	-
	90th percentile	230	-	-	-
Maximum 8-hour rolling average		528	13,107	-	-
8- hour rolling average (excluding hourly values >90th percentile of 3-hour rolling average)		220			
$PM_{2.5}$ (µg/m³)					
Maximum hourly		113	-	-	-
Hourly concentrations	98th percentile	13	-	-	-
	90th percentile	9	-	-	-
Maximum 24-hour average	all hourly values	16	25 [1]	-	-
	excl. values >90th percentile	8			
3-year average of annual average of the daily 24-hour average concentrations		5	-	27	27
Maximum annual average		5	53 [2]	8.8	8.8
PM_{10} (µg/m³)					
Maximum hourly		83	-	-	-
Hourly concentrations	98th percentile	27	-	-	-
	90th percentile	17	-	-	-
Maximum 24-hour average	all hourly values	28	50 [1]	-	-
	excl. values >90th percentile	16	-	-	-
Maximum annual average		11	-	-	-

NOTES
[1] 24-hour averaging period; [2] Annual averaging period;
Measured concentrations obtained from ECCC 2023 unless otherwise stated

Measured concentrations at the Mount Pearl NAPS station did not exceed neither NL AQS nor CAAQS between 2020 and 2021. For the most part, measured concentrations were significantly lower than provincial and federal guidelines.

2.3.2 Field Study

Concentrations of $PM_{2.5}$, TSP and speciated metals collected during the baseline ambient air quality survey are provided in Table A-2.3-3. Metal parameters were excluded from Table A-2.3-3 if NL AQS did not exist and/or concentrations were below the reportable detection limit (RDL) in all samples. Certificates of analysis and results from all metals parameters are provided in Appendix A-1. To facilitate comparison

with NL AQS, 72-hour concentrations were converted to 24-hour concentrations using methodology set out in the Air Dispersion Modelling Guideline for Ontario (Ontario Ministry of the Environment and Climate Change, 2017).

Table A-2.3-3 Ambient Air Quality 2024 Survey Results for $PM_{2.5}$, TSP and Metals.

Sampling Details			Monitoring Results (µg/m³)						
			Particulate Matter		Total Metals				
Averaging Period	Site [1]	Date	$PM_{2.5}$	TSP	Copper (Cu)	Lead (Pb)	Nickel (Ni)	Vanadium (V)	Zinc (Zn)
72-hour concentrations	Dunville	July 14-17	2.73	28.2	0.001	ND	0.0025	0.00063	0.0084
		July 17-20	3.73	11.5	0.00099	ND	0.00084	0.00057	0.012
	Argentia	July 20-23	1.85	6.96	0.0012	ND	0.0012	0.00043	ND
		July 23-26	3.2	11.9	0.0033	0.00049	0.0073	0.00057	0.0086
24-hour concentrations [2]	Dunville	July 14-17	3.71	38.4	0.0014	ND	0.0034	0.00086	0.011
		July 17-20	5.07	15.6	0.0013	ND	0.0011	0.00078	0.016
	Argentia	July 20-23	2.52	9.47	0.0016	ND	0.0016	0.00058	ND
		July 23-26	4.35	16.2	0.0045	0.00067	0.0099	0.00078	0.012
NL AQS			25	120	50	2	2	2	120

NOTES:
µg/m³=micrograms per cubic metre; ND=not detected
[1] Dunville=Power Street; Argentia=Port Authority
[2] Results converted to 24-hour exposure for guideline comparison

Measured concentrations of $PM_{2.5}$, TSP and metals were below NL AQS when converted to 24-hour concentrations. Concentrations of $PM_{2.5}$ ranged from 2.52 to 5.07 µg/m³ while concentrations of TSP ranged from 9.47 to 38.4 µg/m³ over a 24-hour period. The discrepancy between $PM_{2.5}$ and TSP suggests that the majority of suspended particulate are greater than 2.5 µm. This observation is consistent with NL ambient air quality results from Mount Pearl and Long Harbour (Table A-2.3-1), and based on PM_{10} data, it is possible that the majority of TSP is comprised of PM_{10}. The dominance of coarse particulate was anticipated in the RAA, as well as at monitoring stations in NL. A significant contributor to coarse particulate is mechanical ocean wave breaking, which often far outweighs contributions of fine particulate; fine particulate is generally formed through secondary processes such as fossil fuel combustion.

Concentrations of NH_3, NO_2, and SO_2 collected during the baseline ambient air quality survey are provided in Table A-2.3-4. Certificates of analysis and results from BV are provided in Appendix A-2. To facilitate comparison with NL AQS, 1-month exposure concentrations were converted to 24-hour concentrations using methodology set out in the Air Dispersion Modelling Guideline for Ontario (Ontario Ministry of the Environment and Climate Change, 2017).

Table A-2.3-4 Ambient Air Quality Survey Results for NH_3, NO_2 and SO_2.

Sampling Details		Monitoring Results (ppb)		
Exposure Period	**Site [1]**	**Ammonia (NH_3)**	**Nitrogen dioxide (NO_2)**	**Sulfur dioxide (SO_2)**
1-month exposure	Power Street	0.3	0.2	ND
	Port Authority	ND	0.1	0.1
24-hour exposure [2]	Power Street	0.8	0.5	0.3
	Port Authority	0.3	0.3	0.3
NL AQS		144	106	115

NOTES
ppb=parts per billion; <=less than
[1] Dunville=Power Street; Argentia=Port Authority
[2] Results converted to 24-hour exposure for guideline comparison

Measured concentrations of NH_3, NO_2, and SO_2 did not exceed NL AQS when converted to 24-hour concentrations. Concentrations of NO_2 were below those measured at the Mount Pearl and Long Harbour monitoring stations while concentrations of SO_2 were comparable to those measured in Mount Pearl in 2021 and 2022. A comparison could not be made for NH_3 since it is not monitored at the Mount Pearl and Long Harbour monitoring stations.

3.0 Noise

Noise is defined as any sound that is unwanted or causes a disturbance. Existing noise conditions within the RAA were characterized by conducting a field acoustic assessment in the summer of 2023. This study was conducted in collaboration with GHD Limited (GHD) to characterize the sound environment in terms of A-weighted decibels (dBA) since such units reflect frequencies most audible to the human ear (Health Canada, 2017).

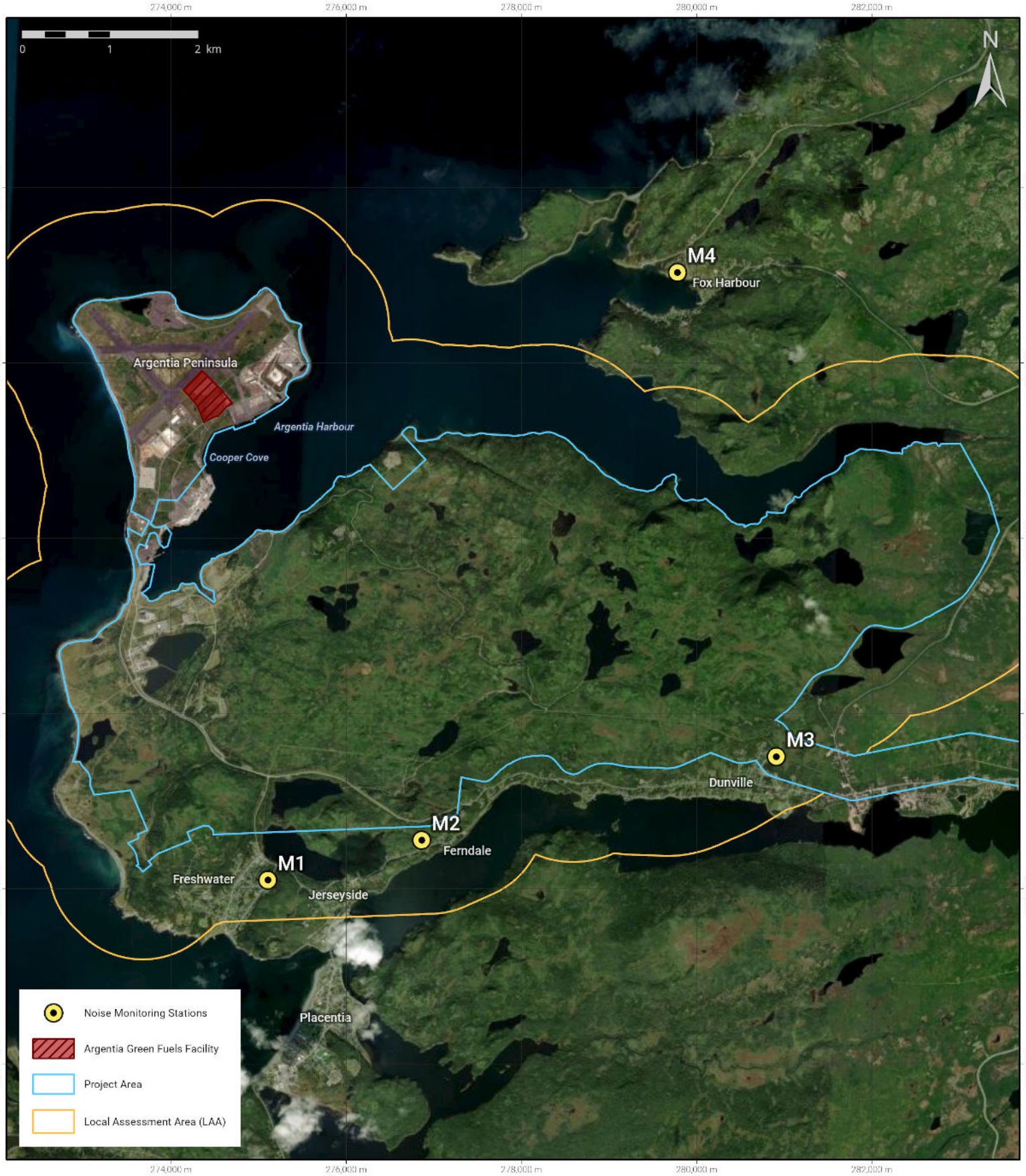
3.1 Regulatory Context

There are currently no regulations regarding noise provincially, thus federal guidance was used to assess baseline noise levels. Such guidance includes Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise* (Health Canada, 2017) as well as Guidelines for Wind Turbine Noise prepared by the Federal-Provincial-Territorial (FPT) Working Group on Wind Turbine Noise, a subcommittee of the FPT Committee on Health and the Environment (CHE) (FPT Committee on Health and the Environment Working Group on Wind Turbine Noise, 2012). Acoustic assessment guidance as outlined Health Canada incorporates aspects of international standards including the Guidelines for Community Noise (1999) and Night Noise Guidelines for Europe (2009) per the World Health Organization (WHO).

3.2 Methodology

3.2.1 Site Selection

Ambient noise levels were measured at four monitoring locations in the RAA: one closest to Project infrastructure in Dunville, and three in the surrounding communities of Freshwater, Ferndale, and Fox Harbour (Figure A-3.2.1-1). Monitoring locations were selected in consideration of sensitive receptors, particularly permanent and temporary residents within the RAA. For selection of the monitoring location in Dunville in particular, a 600 m buffer was applied to each of the proposed wind turbine sites within the Project Area, as per Guidelines for Wind Turbine Noise (FPT Committee on Health and the Environment Working Group on Wind Turbine Noise, 2012). Buffers were compared to the local municipal planning area to determine the extent of overlap, if any, and to assess proximity. Municipal planning areas were used in consideration of current and future receptors in the region. Furthermore, municipal planning areas were used as a metric for sensitive receptors as such receptors would be constrained to municipally zoned areas. The monitoring location in Dunville is within 200 m of St. Anne's Academy, the local elementary school. As outlined in Table A-3.2-1, ambient noise levels were measured across two monitoring campaigns. Ambient noise levels were first measured in Dunville, NL in July 2023.



Pattern | Argentia Renewables	FIGURE NUMBER: A - 3.2.1 - 1	COORDINATE SYSTEM: NAD 1983 CSRS UTM Zone 22N	PREPARED BY: J. Crocker	DATE: 24/07/25
	FIGURE TITLE: Noise Monitoring Locations	NOTES:	REVIEWED BY:	
	PROJECT TITLE: Argentia Renewables		APPROVED BY:	sem

SEM MAP ID: 238-005 GIS-102 Rev1

Upon review of preliminary results, it was determined that further monitoring was required to develop a comprehensive baseline in areas where the Project could cause new or incremental effects to the natural environment (i.e., Freshwater, Ferndale, and Fox Harbour).

Table A-3.2-1 Noise Monitoring Locations.

Monitoring Location ID	Description	Monitoring Period*
M1	Freshwater	December 1-17, 2023
M2	Ferndale	December 1-17, 2023
M3	Dunville	July 20-26, 2023
M4	Fox Harbour	December 1-17, 2023
*Indicates total period; measurements at individual locations spanned two to six days.		

3.2.2 Field Methods

Ambient noise levels were measured at the selected sites using calibrated, precision Class 1 sound level meters equipped with controls to reduce extraneous noise from wind and rain (e.g., wind sock, rain screen, desiccant, etc.). The baseline study was conducted in accordance with ISO 1996-2:2007 “Acoustics – Description, measurement and assessment of environmental noise – Part 2L Determination of environmental noise levels”, as recommended by Health Canada (Health Canada, 2017). The sound level meter collected continuous time-averaged sound pressure levels (also known as equivalent sound level, L_{eq}) in decibels (dB); a single number value that expressed the time varying sound level for the specified period as though it were a constant sound level with the same total sound energy as the time varying level. For this study, L_{eq} values were averaged over a period of one hour. Additionally, digital audio recordings were logged for use in post-processing, particularly to check for data abnormalities. The sound level meter was factory calibrated prior to deployment, and field calibrated prior to and at the end of the monitoring periods at individual locations.

3.2.3 Data Analysis

Measurements of baseline noise were analyzed in consideration of potential nearby sources of sound (both natural and anthropogenic), digital audio recordings, and meteorological conditions during each monitoring period. Meteorological conditions were assessed using historical climate data obtained from nearby climate stations as steady precipitation and wind are considered non-representative conditions unless an appropriate wind screen is used (Health Canada, 2017). Due to the average weather conditions of the surrounding area, noise data that occurs during wind speeds greater 38 km/h (“strong breezes” according to the Beaufort Wind Scale) would have potential to falsely heighten the baseline noise results. Noise levels during periods of non-representative conditions were discarded due to their atypical nature. Audio recordings were reviewed to identify potential data anomalies as well as the detection of nearby sound sources (both natural and anthropogenic). Filtered data was then averaged over the appropriate period to obtain the equivalent continuous A-weighted noise levels (L_{Aeq}). Values were calculated

between 07:00 and 23:00 to obtain the daytime sound pressure level (L_d), while nighttime sound pressure level (L_n) was calculated between 23:00 and 07:00. Day-night average sound pressure level (L_{dn}) was calculated over the 24-hour period (Health Canada, 2017). Additionally, the presence of low frequency noise (LFN), noise with frequency content ranging between 16 and 200 hertz (Hz), was assessed by calculating the difference between concurrent measurements of A- and C-weighted sound pressure levels (i.e., in units of C-weighted decibels (dBC)) (Health Canada, 2017; Nova Scotia Environment and Climate Change, 2023). Calculation details are provided in Appendix A-3.

3.3 Results

Table A-3.3-1 summarizes average values of L_d, L_n, and L_{dn} at each monitoring location. Hourly sound pressure levels collected at each monitoring location are provided in Appendix A-4.

Table A-3.3-1 Baseline Noise Levels.

Monitoring Location		Measured Noise Levels (dBA)		
		Day; L_d	Night; L_n	Day-Night; L_{dn}
M1	Freshwater	37	36	43
M2	Ferndale	42	35	43
M3	Dunville	52	34	50
M4	Fox Harbour	61	51	61

Noise levels were highest at locations close to major roadways or nearer to Dunville (i.e., M3 and M4). More rural areas, including M1 and M2, experienced less noise. The major contributor to sound levels during daytime periods were related to vehicle traffic whereas nighttime sound levels were related to natural sources such as wind and wave noise, and wildlife calls. Sounds from vehicle traffic also contributed to noise during nighttime periods. Baseline values of L_{dn} ranged from 43-61 dBA, which corresponds to a quiet rural (<45 dBA) to urban residential (58-62 dBA) community type (qualitative description) according to Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise* (Health Canada, 2017).

The assessment of LFN was conducted to determine the presence or absence of LFN at each monitoring location. Upon review of monitoring data, the presence of LFN was confirmed at locations M1 through M4. LFN was intermittently detected at each location, indicating that it may be caused by biogenic sources such as wind and wave breaking; both of which are ubiquitous in the RAA (Alberta Energy Regulator, 2023).

4.0 Summary

4.1 Air Quality

A desktop study was conducted to assess regional air quality via data collected at three AAQM stations: two in Long Harbour and one in Mount Pearl. Data from AAQM stations between 2020 and 2022 were reviewed and compared to NL AQS. AAQM station data were supplemented with conclusions from provincial ambient air monitoring reports (NL DECC, 2021, 2023). Of the parameters monitored in Mount Pearl and Long Harbour, the NL AQS was only exceeded for O_3 in Mount Pearl; 2020 (one exceedance) and 2021 (13 exceedances). All other parameters were below NL AQS over the assessment period. Data from the Mount Pearl AAQM station was also processed to the statistical metrics required by the CAAQS; Long Harbour AAQM stations had insufficient data to conduct such computations. Upon comparison, Mount Pearl AAQM station data did not exceed CAAQS; measured concentrations were generally significantly less than CAAQS.

The desktop study was supplemented with a field survey whereby ambient air quality in the RAA was measured at two locations: at the Port Authority building in Argentia and at Power Street in Dunville. Active and passive sampling methods were deployed to measure ambient concentrations of $PM_{2.5}$, TSP, and metals over 72-hours and NH_3, NO_2, and SO_2 over 30 days. Measured concentrations were converted to 24-hour concentration to allow for comparison to NL AQS which did not yield any exceedances.

4.2 Noise

A field survey was conducted to evaluate ambient noise levels in the RAA. Continuous sound pressure levels were measured at four locations in the RAA: one each in Dunville, Freshwater, Ferndale, and Fox Harbour. Collected data were filtered to remove anomalies, and filtered data were used to calculate metrics (i.e., L_d, L_n, L_{dn}) for comparison to Health Canada guidance. When compared to qualitative descriptions of community type, monitoring locations in the RAA were characterized as quiet rural to urban residential. The presence of LFN, while intermittent, was confirmed in the RAA, but is suspected to be a result of biogenic noise (i.e., originating from wind and wave breaking) rather than anthropogenic.

5.0 References

Alberta Energy Regulator. (2023). *Directive 038: Noise Control* (Issue April, pp. 1–52).

Canadian Council of Ministers of the Environment. (2023). *Canada's Air*. https://ccme.ca/en/air-quality-report

Environment and Climate Change Canada. (2023). *National Air Pollutant Surveillance (NAPS) Program. Ambient Air Quality Data for Mount Pearl 2020-2022.* https://www.canada.ca/en/environment-climate-change/services/air-pollution/monitoring-networks-data/national-air-pollution-program.html

FPT Committee on Health and the Environment Working Group on Wind Turbine Noise. (2012). *Guidelines for Wind Turbine Noise*. Secretariat: Health Canada, Environmental and Radiation Health Sciences Directorate, Healthy Environments and Consumer Safety Branch, Health Canada.

Air Pollution Control Regulations, Pub. L. No. NNLR 11/22 (2022). https://www.assembly.nl.ca/Legislation/sr/regulations/rc220011.htm

Health Canada. (2017). *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise* (pp. 1–50).

Newfoundland and Labrador Department of Environment and Climate Change. (2021). *2020 Ambient Air Monitoring Report* (Issue June).

Newfoundland and Labrador Department of Environment and Climate Change. (2023). *2022 Ambient Air Monitoring Report* (Issue April).

Nova Scotia Environment and Climate Change. (2023). *Guidelines for Environmental Noise Measurement and Assessment* (p. 19). https://2rvpwt3v9gg32uh9vv1lr27s-wpengine.netdna-ssl.com/wp-content/uploads/2021/01/EnvironmentalNoiseMeasurement.pdf

Ontario Ministry of the Environment and Climate Change. (2017). *Air Dispersion Modelling Guideline for Ontario [Guideline A-11]* (p. 158).

Appendix A-1
Laboratory Results – $PM_{2.5}$, TSP, and Metals

Your P.O. #: 238-001
Your Project #: 230-001 (AMBIENT)
Site Location: ATMOS. ENVT STUDIES
Your C.O.C. #: 41291

Attention: Kathryn Dawe

SEM Ltd.
79 Mew's Place
Second Floor
St. John's, NL
CANADA A1B 4N2

Report Date: 2023/08/31
Report #: R7791888
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3N7115
Received: 2023/08/08, 09:22

Sample Matrix: Filter
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Metals on Hi-Vol Filter (6020Amod)	4	2023/08/21	2023/08/31	BRL SOP-00103 / BRL SOP-00102	EPA 6020A m
Total Metals on Small Filter (6020Bmod)	4	2023/08/28	2023/08/29	BRL SOP-00103 / BRL SOP-00102	EPA 6020B m
Particulate Calculation PM 2.5 (IO-2mod)	4	N/A	2023/08/18	BRL SOP-00109	EPA IO-2 m
Total Particulate (PM2.5)	4	N/A	2023/08/15	BRL SOP-00109	EPA 2.12-PM2.5 m
Particulate Calculation	5	N/A	2023/08/18	BRL SOP-00109	EPA IO-2mod
Total Particulate	5	N/A	2023/08/15	BRL SOP-00109	Mthd IO-3-1
Air Volume from LoVol Sampling	9	N/A	2023/08/10		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Your P.O. #: 238-001
Your Project #: 230-001 (AMBIENT)
Site Location: ATMOS. ENVT STUDIES
Your C.O.C. #: 41291

Attention: Kathryn Dawe

SEM Ltd.
79 Mew's Place
Second Floor
St. John's, NL
CANADA A1B 4N2

Report Date: 2023/08/31
Report #: R7791888
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3N7115
Received: 2023/08/08, 09:22

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Cristina (Maria) Bacchus, Project Manager
Email: maria.bacchus@bureauveritas.com
Phone# (905)817-5763

==========

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C3N7115
Report Date: 2023/08/31

SEM Ltd.
Client Project #: 230-001 (AMBIENT)
Site Location: ATMOS. ENVT STUDIES
Your P.O. #: 238-001
Sampler Initials: KD

RESULTS OF ANALYSES OF FILTER

Bureau Veritas ID		WPT011			WPT012	WPT013		
Sampling Date								
COC Number		41291			41291	41291		
	UNITS	WC1487680_PM2.5	RDL	QC Batch	WC1487681_TSP	WC1487684_TSP	RDL	QC Batch
Particulate	ug/m3				28.2	11.5	0.42	8845499
PM 2.5 Particulate	ug/m3	2.73	0.42	8845498				
Particulate Weight on Filter	ug	197	30	8861163	2040	832	30	8858623
Volume	m3	72.25	N/A	ONSITE	72.27	72.24	N/A	ONSITE

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Bureau Veritas ID		WPT014			WPT015			WPT016		
Sampling Date										
COC Number		41291			41291			41291		
	UNITS	WC1487676_PM2.5	RDL	QC Batch	WC1487678_TSP	RDL	QC Batch	WC1487677_PM2.5	RDL	QC Batch
Particulate	ug/m3				6.96	0.42	8845499			
PM 2.5 Particulate	ug/m3	3.73	0.42	8845498				1.85	0.42	8845498
Particulate Weight on Filter	ug	270	30	8861163	503	30	8858623	134	30	8861163
Volume	m3	72.25	N/A	ONSITE	72.24	N/A	ONSITE	72.25	N/A	ONSITE

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Bureau Veritas ID		WPT017			WPT018	WPT019		
Sampling Date								
COC Number		41291			41291	41291		
	UNITS	WC1487682_PM2.5	RDL	QC Batch	WC1487683_TSP	WC1487679_TSP	RDL	QC Batch
Particulate	ug/m3				11.9	0.45	0.42	8845499
PM 2.5 Particulate	ug/m3	3.20	0.42	8845498				
Particulate Weight on Filter	ug	231	30	8861163	858	33	30	8858623
Volume	m3	72.25	N/A	ONSITE	72.24	72.24	N/A	ONSITE

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

ELEMENTS BY ATOMIC SPECTROSCOPY (FILTER)

Bureau Veritas ID		WPT012	WPT013	WPT015	WPT018		
Sampling Date							
COC Number		41291	41291	41291	41291		
	UNITS	WC1487681_TSP	WC1487684_TSP	WC1487678_TSP	WC1487683_TSP	RDL	QC Batch
Metals							
Total Aluminum (Al)	ug	310	55	42	68	2.0	8880514
Total Aluminum (Al)	ug/m3	4.2	0.76	0.58	0.94	0.028	8866079
Total Antimony (Sb)	ug	ND	ND	ND	ND	0.050	8880514
Total Antimony (Sb)	ug/m3	ND	ND	ND	ND	0.00069	8866079
Total Arsenic (As)	ug	ND	ND	ND	ND	0.050	8880514
Total Arsenic (As)	ug/m3	ND	ND	ND	ND	0.00069	8866079
Total Barium (Ba)	ug	0.054	0.078	0.059	0.10	0.050	8880514
Total Barium (Ba)	ug/m3	0.00074	0.0011	0.00082	0.0014	0.00069	8866079
Total Beryllium (Be)	ug	ND	ND	ND	ND	0.030	8880514
Total Beryllium (Be)	ug/m3	ND	ND	ND	ND	0.00042	8866079
Total Bismuth (Bi)	ug	ND	ND	ND	ND	0.050	8880514
Total Bismuth (Bi)	ug/m3	ND	ND	ND	ND	0.00069	8866079
Total Boron (B)	ug	ND	ND	ND	ND	1.0	8880514
Total Boron (B)	ug/m3	ND	ND	ND	ND	0.014	8866079
Total Cadmium (Cd)	ug	ND	ND	ND	ND	0.010	8880514
Total Cadmium (Cd)	ug/m3	ND	ND	ND	ND	0.00014	8866079
Total Calcium (Ca)	ug	7.4	23	ND	11	5.0	8880514
Total Calcium (Ca)	ug/m3	0.10	0.32	ND	0.16	0.069	8866079
Total Chromium (Cr)	ug	0.39	0.068	0.079	0.18	0.050	8880514
Total Chromium (Cr)	ug/m3	0.0054	0.00094	0.0011	0.0024	0.00069	8866079
Total Cobalt (Co)	ug	ND	ND	ND	0.074	0.030	8880514
Total Cobalt (Co)	ug/m3	ND	ND	ND	0.0010	0.00042	8866079
Total Copper (Cu)	ug	0.074	0.071	0.086	0.23	0.030	8880514
Total Copper (Cu)	ug/m3	0.0010	0.00099	0.0012	0.0033	0.00042	8866079
Total Iron (Fe)	ug	7.1	11	ND	6.9	5.0	8880514
Total Iron (Fe)	ug/m3	0.098	0.16	ND	0.096	0.069	8866079
Total Lead (Pb)	ug	ND	ND	ND	0.035	0.030	8880514
Total Lead (Pb)	ug/m3	ND	ND	ND	0.00049	0.00042	8866079
Total Magnesium (Mg)	ug	10	5.0	3.8	6.3	1.0	8880514
Total Magnesium (Mg)	ug/m3	0.14	0.069	0.052	0.087	0.014	8866079
Total Manganese (Mn)	ug	0.24	0.29	0.11	0.19	0.050	8880514
Total Manganese (Mn)	ug/m3	0.0033	0.0040	0.0015	0.0026	0.00069	8866079
Total Molybdenum (Mo)	ug	ND	ND	ND	ND	0.030	8880514

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

ELEMENTS BY ATOMIC SPECTROSCOPY (FILTER)

Bureau Veritas ID		WPT012	WPT013	WPT015	WPT018		
Sampling Date							
COC Number		41291	41291	41291	41291		
	UNITS	WC1487681_TSP	WC1487684_TSP	WC1487678_TSP	WC1487683_TSP	RDL	QC Batch
Total Molybdenum (Mo)	ug/m3	ND	ND	ND	ND	0.00042	8866079
Total Nickel (Ni)	ug	0.18	0.060	0.087	0.53	0.050	8880514
Total Nickel (Ni)	ug/m3	0.0025	0.00084	0.0012	0.0073	0.00069	8866079
Total Phosphorus (P)	ug	ND	ND	ND	ND	5.0	8880514
Total Potassium (K)	ug	7.9	7.6	5.4	6.4	5.0	8880514
Total Potassium (K)	ug/m3	0.11	0.11	0.075	0.089	0.069	8866079
Total Selenium (Se)	ug	ND	ND	ND	ND	0.10	8880514
Total Selenium (Se)	ug/m3	ND	ND	ND	ND	0.0014	8866079
Total Silver (Ag)	ug	ND	ND	ND	ND	0.010	8880514
Total Silver (Ag)	ug/m3	ND	ND	ND	ND	0.00014	8866079
Total Sodium (Na)	ug	79	22	25	28	5.0	8880514
Total Sodium (Na)	ug/m3	1.1	0.31	0.34	0.39	0.069	8866079
Total Strontium (Sr)	ug	0.051	0.068	ND	ND	0.050	8880514
Total Strontium (Sr)	ug/m3	0.00071	0.00094	ND	ND	0.00069	8866079
Total Thallium (Tl)	ug	ND	ND	ND	ND	0.010	8880514
Total Thallium (Tl)	ug/m3	ND	ND	ND	ND	0.00014	8866079
Total Tin (Sn)	ug	ND	ND	ND	ND	0.030	8880514
Total Tin (Sn)	ug/m3	ND	ND	ND	ND	0.00042	8866079
Total Titanium (Ti)	ug	0.53	0.84	0.25	0.30	0.10	8880514
Total Titanium (Ti)	ug/m3	0.0073	0.012	0.0034	0.0042	0.0014	8866079
Total Uranium (U)	ug	ND	ND	ND	ND	0.010	8880514
Total Uranium (U)	ug/m3	ND	ND	ND	ND	0.00014	8866079
Total Vanadium (V)	ug	0.046	0.041	0.031	0.041	0.030	8880514
Total Vanadium (V)	ug/m3	0.00063	0.00057	0.00043	0.00057	0.00042	8866079
Total Zinc (Zn)	ug	0.60	0.86	ND	0.62	0.50	8880514
Total Zinc (Zn)	ug/m3	0.0084	0.012	ND	0.0086	0.0069	8866079

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8880514	ADA	Matrix Spike	Total Aluminum (Al)	2023/08/29		111	%	70 - 130
			Total Antimony (Sb)	2023/08/29		103	%	70 - 130
			Total Arsenic (As)	2023/08/29		99	%	70 - 130
			Total Barium (Ba)	2023/08/29		103	%	70 - 130
			Total Beryllium (Be)	2023/08/29		102	%	70 - 130
			Total Bismuth (Bi)	2023/08/29		98	%	70 - 130
			Total Boron (B)	2023/08/29		100	%	70 - 130
			Total Cadmium (Cd)	2023/08/29		99	%	70 - 130
			Total Calcium (Ca)	2023/08/29		108	%	70 - 130
			Total Chromium (Cr)	2023/08/29		94	%	70 - 130
			Total Cobalt (Co)	2023/08/29		96	%	70 - 130
			Total Copper (Cu)	2023/08/29		105	%	70 - 130
			Total Iron (Fe)	2023/08/29		99	%	70 - 130
			Total Lead (Pb)	2023/08/29		93	%	70 - 130
			Total Magnesium (Mg)	2023/08/29		98	%	70 - 130
			Total Manganese (Mn)	2023/08/29		100	%	70 - 130
			Total Molybdenum (Mo)	2023/08/29		101	%	70 - 130
			Total Nickel (Ni)	2023/08/29		97	%	70 - 130
			Total Phosphorus (P)	2023/08/29		104	%	70 - 130
			Total Potassium (K)	2023/08/29		105	%	70 - 130
			Total Selenium (Se)	2023/08/29		97	%	70 - 130
			Total Silver (Ag)	2023/08/29		100	%	70 - 130
			Total Sodium (Na)	2023/08/29		99	%	70 - 130
			Total Strontium (Sr)	2023/08/29		99	%	70 - 130
			Total Thallium (Tl)	2023/08/29		102	%	70 - 130
			Total Tin (Sn)	2023/08/29		104	%	70 - 130
			Total Titanium (Ti)	2023/08/29		103	%	70 - 130
			Total Uranium (U)	2023/08/29		91	%	70 - 130
			Total Vanadium (V)	2023/08/29		98	%	70 - 130
			Total Zinc (Zn)	2023/08/29		96	%	70 - 130
8880514	ADA	RPD	Total Aluminum (Al)	2023/08/29	2.5		%	20
			Total Antimony (Sb)	2023/08/29	0.32		%	20
			Total Arsenic (As)	2023/08/29	1.6		%	20
			Total Barium (Ba)	2023/08/29	0.72		%	20
			Total Beryllium (Be)	2023/08/29	1.0		%	20
			Total Bismuth (Bi)	2023/08/29	2.2		%	20
			Total Boron (B)	2023/08/29	2.3		%	20
			Total Cadmium (Cd)	2023/08/29	0.80		%	20
			Total Calcium (Ca)	2023/08/29	2.0		%	20
			Total Chromium (Cr)	2023/08/29	1.8		%	20
			Total Cobalt (Co)	2023/08/29	5.3		%	20
			Total Copper (Cu)	2023/08/29	6.6		%	20
			Total Iron (Fe)	2023/08/29	2.8		%	20
			Total Lead (Pb)	2023/08/29	1.7		%	20
			Total Magnesium (Mg)	2023/08/29	1.2		%	20
			Total Manganese (Mn)	2023/08/29	0.20		%	20
			Total Molybdenum (Mo)	2023/08/29	2.6		%	20
			Total Nickel (Ni)	2023/08/29	3.3		%	20
			Total Phosphorus (P)	2023/08/29	0.83		%	20
			Total Potassium (K)	2023/08/29	2.7		%	20

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Selenium (Se)	2023/08/29	0.31		%	20
			Total Silver (Ag)	2023/08/29	1.0		%	20
			Total Sodium (Na)	2023/08/29	2.0		%	20
			Total Strontium (Sr)	2023/08/29	0.30		%	20
			Total Thallium (Tl)	2023/08/29	4.5		%	20
			Total Tin (Sn)	2023/08/29	1.5		%	20
			Total Titanium (Ti)	2023/08/29	1.4		%	20
			Total Uranium (U)	2023/08/29	0.65		%	20
			Total Vanadium (V)	2023/08/29	2.7		%	20
			Total Zinc (Zn)	2023/08/29	1.3		%	20
			Total Aluminum (Al)	2023/08/31	6.1		%	20
			Total Antimony (Sb)	2023/08/31	0.76		%	20
			Total Arsenic (As)	2023/08/31	3.1		%	20
			Total Barium (Ba)	2023/08/31	3.1		%	20
			Total Beryllium (Be)	2023/08/31	6.4		%	20
			Total Bismuth (Bi)	2023/08/31	1.3		%	20
			Total Boron (B)	2023/08/31	0.92		%	20
			Total Cadmium (Cd)	2023/08/31	1.1		%	20
			Total Calcium (Ca)	2023/08/31	5.6		%	20
			Total Chromium (Cr)	2023/08/31	0.066		%	20
			Total Cobalt (Co)	2023/08/31	1.9		%	20
			Total Copper (Cu)	2023/08/31	4.1		%	20
			Total Iron (Fe)	2023/08/31	3.7		%	20
			Total Lead (Pb)	2023/08/31	0.15		%	20
			Total Magnesium (Mg)	2023/08/31	0.86		%	20
			Total Manganese (Mn)	2023/08/31	2.1		%	20
			Total Molybdenum (Mo)	2023/08/31	2.7		%	20
			Total Nickel (Ni)	2023/08/31	0.74		%	20
			Total Phosphorus (P)	2023/08/31	1.6		%	20
			Total Potassium (K)	2023/08/31	6.4		%	20
			Total Selenium (Se)	2023/08/31	0.48		%	20
			Total Silver (Ag)	2023/08/31	0.48		%	20
			Total Sodium (Na)	2023/08/31	0.96		%	20
			Total Strontium (Sr)	2023/08/31	4.9		%	20
			Total Thallium (Tl)	2023/08/31	1.4		%	20
			Total Tin (Sn)	2023/08/31	0.10		%	20
			Total Titanium (Ti)	2023/08/31	3.6		%	20
			Total Uranium (U)	2023/08/31	6.6		%	20
			Total Vanadium (V)	2023/08/31	1.9		%	20
			Total Zinc (Zn)	2023/08/31	1.3		%	20
			Total Aluminum (Al)	2023/08/31	NC		%	20
			Total Antimony (Sb)	2023/08/31	NC		%	20
			Total Arsenic (As)	2023/08/31	NC		%	20
			Total Barium (Ba)	2023/08/31	NC		%	20
			Total Beryllium (Be)	2023/08/31	NC		%	20
			Total Bismuth (Bi)	2023/08/31	NC		%	20
			Total Boron (B)	2023/08/31	NC		%	20
			Total Cadmium (Cd)	2023/08/31	NC		%	20
			Total Calcium (Ca)	2023/08/31	NC		%	20
			Total Chromium (Cr)	2023/08/31	NC		%	20

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Cobalt (Co)	2023/08/31	NC		%	20
			Total Copper (Cu)	2023/08/31	3.7		%	20
			Total Iron (Fe)	2023/08/31	NC		%	20
			Total Lead (Pb)	2023/08/31	NC		%	20
			Total Magnesium (Mg)	2023/08/31	NC		%	20
			Total Manganese (Mn)	2023/08/31	NC		%	20
			Total Molybdenum (Mo)	2023/08/31	NC		%	20
			Total Nickel (Ni)	2023/08/31	NC		%	20
			Total Potassium (K)	2023/08/31	10		%	20
			Total Selenium (Se)	2023/08/31	NC		%	20
			Total Silver (Ag)	2023/08/31	NC		%	20
			Total Sodium (Na)	2023/08/31	NC		%	20
			Total Strontium (Sr)	2023/08/31	NC		%	20
			Total Tin (Sn)	2023/08/31	NC		%	20
			Total Titanium (Ti)	2023/08/31	0.28		%	20
			Total Vanadium (V)	2023/08/31	NC		%	20
			Total Zinc (Zn)	2023/08/31	6.9		%	20
8880514	ADA	Spiked Blank	Total Aluminum (Al)	2023/08/29		96	%	85 - 115
			Total Antimony (Sb)	2023/08/29		94	%	85 - 115
			Total Arsenic (As)	2023/08/29		92	%	85 - 115
			Total Barium (Ba)	2023/08/29		96	%	85 - 115
			Total Beryllium (Be)	2023/08/29		97	%	85 - 115
			Total Bismuth (Bi)	2023/08/29		94	%	85 - 115
			Total Boron (B)	2023/08/29		93	%	85 - 115
			Total Cadmium (Cd)	2023/08/29		91	%	85 - 115
			Total Calcium (Ca)	2023/08/29		99	%	85 - 115
			Total Chromium (Cr)	2023/08/29		87	%	85 - 115
			Total Cobalt (Co)	2023/08/29		89	%	85 - 115
			Total Copper (Cu)	2023/08/29		93	%	85 - 115
			Total Iron (Fe)	2023/08/29		90	%	85 - 115
			Total Lead (Pb)	2023/08/29		89	%	85 - 115
			Total Magnesium (Mg)	2023/08/29		90	%	85 - 115
			Total Manganese (Mn)	2023/08/29		91	%	85 - 115
			Total Molybdenum (Mo)	2023/08/29		91	%	85 - 115
			Total Nickel (Ni)	2023/08/29		89	%	85 - 115
			Total Phosphorus (P)	2023/08/29		100	%	85 - 115
			Total Potassium (K)	2023/08/29		94	%	85 - 115
			Total Selenium (Se)	2023/08/29		90	%	85 - 115
			Total Silver (Ag)	2023/08/29		89	%	85 - 115
			Total Sodium (Na)	2023/08/29		94	%	85 - 115
			Total Strontium (Sr)	2023/08/29		93	%	85 - 115
			Total Thallium (Tl)	2023/08/29		89	%	85 - 115
			Total Tin (Sn)	2023/08/29		94	%	85 - 115
			Total Titanium (Ti)	2023/08/29		94	%	85 - 115
			Total Uranium (U)	2023/08/29		85	%	85 - 115
			Total Vanadium (V)	2023/08/29		89	%	85 - 115
			Total Zinc (Zn)	2023/08/29		89	%	85 - 115
8880514	ADA	Method Blank	Total Aluminum (Al)	2023/08/29	ND, RDL=2.0		ug	

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Antimony (Sb)	2023/08/29	ND, RDL=0.050		ug	
			Total Arsenic (As)	2023/08/29	ND, RDL=0.050		ug	
			Total Barium (Ba)	2023/08/29	ND, RDL=0.050		ug	
			Total Beryllium (Be)	2023/08/29	ND, RDL=0.030		ug	
			Total Bismuth (Bi)	2023/08/29	ND, RDL=0.050		ug	
			Total Boron (B)	2023/08/29	ND, RDL=1.0		ug	
			Total Cadmium (Cd)	2023/08/29	ND, RDL=0.010		ug	
			Total Calcium (Ca)	2023/08/29	ND, RDL=5.0		ug	
			Total Chromium (Cr)	2023/08/29	ND, RDL=0.050		ug	
			Total Cobalt (Co)	2023/08/29	ND, RDL=0.030		ug	
			Total Copper (Cu)	2023/08/29	ND, RDL=0.030		ug	
			Total Iron (Fe)	2023/08/29	ND, RDL=5.0		ug	
			Total Lead (Pb)	2023/08/29	ND, RDL=0.030		ug	
			Total Magnesium (Mg)	2023/08/29	ND, RDL=1.0		ug	
			Total Manganese (Mn)	2023/08/29	ND, RDL=0.050		ug	
			Total Molybdenum (Mo)	2023/08/29	ND, RDL=0.030		ug	
			Total Nickel (Ni)	2023/08/29	ND, RDL=0.050		ug	
			Total Phosphorus (P)	2023/08/29	ND, RDL=5.0		ug	
			Total Potassium (K)	2023/08/29	ND, RDL=5.0		ug	
			Total Selenium (Se)	2023/08/29	ND, RDL=0.10		ug	
			Total Silver (Ag)	2023/08/29	ND, RDL=0.010		ug	
			Total Sodium (Na)	2023/08/29	ND, RDL=5.0		ug	
			Total Strontium (Sr)	2023/08/29	ND, RDL=0.050		ug	
			Total Thallium (Tl)	2023/08/29	ND, RDL=0.010		ug	
			Total Tin (Sn)	2023/08/29	ND, RDL=0.030		ug	
			Total Titanium (Ti)	2023/08/29	ND, RDL=0.10		ug	

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Uranium (U)	2023/08/29	ND, RDL=0.010		ug	
			Total Vanadium (V)	2023/08/29	ND, RDL=0.030		ug	
			Total Zinc (Zn)	2023/08/29	ND, RDL=0.50		ug	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C3N7115
Report Date: 2023/08/31

SEM Ltd.
Client Project #: 230-001 (AMBIENT)
Site Location: ATMOS. ENVT STUDIES
Your P.O. #: 238-001
Sampler Initials: KD

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Appendix A-2
Laboratory Results – NH_3, NO_2, and SO_2

Your Project #: 238-001
Site#: 2023/07/14-2023/08/16
Site Location: Ambient AQ Monitoring

Attention: Kathryn Dawe

SEM Ltd.
79 Mew's Place
Second Floor
St. John's, NL
CANADA A1B 4N2

Report Date: 2023/08/31
Report #: R3388423
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C365422
Received: 2023/08/22, 07:30

Sample Matrix: Air
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
NH3 by Passive Sampler	2	2023/08/29	2023/08/29	PTC SOP-00157	ASTM D6919
NO2 Passive Analysis	2	2023/08/29	2023/08/30	PTC SOP-00148	Passive NO2 in ATM
SO2 Passive Analysis	2	2023/08/28	2023/08/30	PTC SOP-00149	Passive SO2 in ATM

This report shall not be reproduced except in full, without the written approval of the laboratory.
Results relate only to the items tested.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Customer Service Passives,
Email: PassiveAir@bureauveritas.com
Phone# (780) 378-8500

==========

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Bureau Veritas Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C365422
Report Date: 2023/08/31

SEM Ltd.
Client Project #: 238-001
Site Location: Ambient AQ Monitoring
Sampler Initials: KM

RESULTS OF CHEMICAL ANALYSES OF AIR

Bureau Veritas ID		BXJ589	BXJ600		
Sampling Date		2023/07/14 11:20	2023/07/14 12:54		
	UNITS	1-POWER STREET	2-PORT AUTHORITY	RDL	QC Batch
Passive Monitoring					
Ammonia by Passive Sampler	ppb	0.3	ND	0.1	B087971
Calculated NO2	ppb	0.2	0.1	0.1	B081163
Calculated SO2	ppb	ND	0.1	0.1	B086266

RDL = Reportable Detection Limit
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C365422
Report Date: 2023/08/31

SEM Ltd.
Client Project #: 238-001
Site Location: Ambient AQ Monitoring
Sampler Initials: KM

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C365422
Report Date: 2023/08/31

SEM Ltd.
Client Project #: 238-001
Site Location: Ambient AQ Monitoring
Sampler Initials: KM

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
B081163	SDK	Spiked Blank	Calculated NO2			101	%	90 - 110
B081163	SDK	Method Blank	Calculated NO2		ND, RDL=0.1		ppb	
B086266	OZ	Spiked Blank	Calculated SO2			100	%	90 - 110
B086266	OZ	Method Blank	Calculated SO2		ND, RDL=0.1		ppb	
B087971	SDK	Spiked Blank	Ammonia by Passive Sampler			98	%	90 - 110
B087971	SDK	Method Blank	Ammonia by Passive Sampler		ND, RDL=0.1		ppb	

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Bureau Veritas Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Bureau Veritas Job #: C365422
Report Date: 2023/08/31

SEM Ltd.
Client Project #: 238-001
Site Location: Ambient AQ Monitoring
Sampler Initials: KM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Steven Gloux, Senior Analyst

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Bureau Veritas Edmonton: 6744 - 50th Street T6B 3M9 Telephone (780) 378-8500 Fax (780) 378-8699

Appendix A-3
Noise Calculation Details

Equations presented in this appendix follow methodology outlined in Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (2017)* and Nova Scotia Environment and Climate Change's *Guidelines for Environmental Noise Measurement and Assessment (2023)*.

DAYTIME SOUND EQUIVALENT LEVEL [16 HOUR PERIOD]

$$L_d = 10 \log_{10} \left[\frac{\sum_{i=1}^{n} \left(t_i \times 10^{(0.1 \times L_{d,i})} \right)}{16} \right]$$

where: L_d = daytime sound equivalent level
t_i = duration of measurement
$L_{d,i}$ = sound pressure level at t_i

NIGHTTIME SOUND EQUIVALENT LEVEL [8 HOUR PERIOD]

$$L_n = 10 \log_{10} \left[\frac{\sum_{i=1}^{n} \left(t_i \times 10^{(0.1 \times L_{n,i})} \right)}{8} \right]$$

where: L_n = nighttime sound equivalent level
t_i = duration of measurement
$L_{n,i}$ = sound pressure level at t_i

DAY-NIGHT AVERAGE SOUND LEVEL [24 HOUR PERIOD]

$$L_{dn} = 10 \log_{10} \left[\frac{\left(\left(16 \times 10^{(0.1 \times L_d)} \right) + \left(8 \times 10^{(0.1 \times (L_n + 10))} \right) \right)}{24} \right]$$

where: L_{dn} = day-night average sound level
L_d = daytime sound equivalent level
L_n = nighttime sound equivalent level

LOW FREQUENCY NOISE

$$LFN = dBA - dBC \geq 20\ dB$$

where: LFN = low frequency noise
dBA = A-weighted sound level
dBC = C-weighted sound level

Appendix A-4
Hourly Sound Pressure Levels

Table A-4.1

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M1
Pattern Green Renewables Project
Latitude: 47°15'28.01"N, Longitude: 53°58'21.35"W
Freshwater, Newfoundland and Labrador

Date	Time		Leq [(2), (3)]	Wind Spd (km/h) [(1)]	Temperature (°C)	Precipitation (mm)	Weather
2023-12-01	2:14:18 PM		36.7	23	2.5	0	
2023-12-01	3:00:00 PM		37.9	26	3.2	0	
2023-12-01	4:00:00 PM		41.5	30	3.9	0	
2023-12-01	5:00:00 PM		43.3	38	4.4	0	
2023-12-01	6:00:00 PM		41.5	34	4.8	0	
2023-12-01	7:00:00 PM		42.2	38	5	0	
2023-12-01	8:00:00 PM		41.2	40	5.5	0	Discarded - Wind Speed > 38 km/h
2023-12-01	9:00:00 PM		40.8	34	5.7	0	
2023-12-01	10:00:00 PM		48.6	40	6.2	0	Discarded - Wind Speed > 38 km/h
2023-12-01	11:00:00 PM		41.1	34	6.1	0	
2023-12-01	12:00:00 AM		39.8	32	6.3	0	
2023-12-01	1:00:00 AM		36.1	28	6.1	0	
2023-12-01	2:00:00 AM		35.1	25	5.7	0	
2023-12-01	3:00:00 AM		34.4	21	5.6	0	
2023-12-02	4:00:00 AM		33.6	16	5.4	0	
2023-12-02	5:00:00 AM		32.1	13	5.4	0	
2023-12-02	6:00:00 AM		32.7	16	5.2	0	
2023-12-02	7:00:00 AM		32.3	18	4.8	0	
2023-12-02	8:00:00 AM		32.8	15	4.6	0	
2023-12-02	9:00:00 AM		32.9	9	4.8	0	
2023-12-02	10:00:00 AM		31.9	9	4.9	0	
2023-12-02	11:00:00 AM		33.6	7	4.9	0	
2023-12-02	12:00:00 PM		33.4	8	4.7	0	
2023-12-02	1:00:00 PM		33.5	5	4.9	0	
2023-12-02	2:00:00 PM		35.1	3	5.1	0	
2023-12-02	3:00:00 PM		34.4	4	5.1	0	
2023-12-02	4:00:00 PM		34	8	4.7	0	
2023-12-02	5:00:00 PM		31.8	12	4.4	0	
2023-12-02	6:00:00 PM		32.3	12	4.1	0	
2023-12-02	7:00:00 PM		32.3	10	3.9	0	
2023-12-02	8:00:00 PM		29	11	3.5	0	

Table A-4.1

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M1
Pattern Green Renewables Project
Latitude: 47°15'28.01"N, Longitude: 53°58'21.35"W
Freshwater, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-12-02	9:00:00 PM		28.8	14	3.3	0	
2023-12-02	10:00:00 PM		28.4	8	2.5	0	
2023-12-02	11:00:00 PM		28.1	13	2.6	0	
2023-12-03	12:00:00 AM		27.2	19	2.6	0	

	Sound Level (dBA)	# Inclement Weather Hours	Total Hours Recorded	Inclement Weather Hours
Daytime 16h Leq (Ld) (07:00 - 23:00)	**37**	**2**	35	2.0
Nighttime 8h Leq (Ln) (23:00 - 07:00)	**36**	**0**		

	Sound Level (dBA)
Ldn	**43**

	Value (%)
%HA	**0.83**

Notes:

(1) Weather data provided by Environment Canada's Argentia Climate Station.
(2) Measurements recorded during inclement weather (winds speeds greater than 38 km/h and/or rain) were disregarded.
(3) Bolded data represents the lowest measured Leq during the respective monitoring time period.

Legend	
Day Time Hours	
Evening Time Hours	
Night Time Hours	

Table A-4.2

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M2
Pattern Green Renewables Project
Latitude: 47°15'44.90"N, Longitude: 53°56'58.71"W
Ferndale, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-12-04	3:21:24 PM		44.2	25	0.5	0.1	Discarded - Precipitation > 0 mm
2023-12-04	4:00:00 PM		43.3	28	0.8	1.5	Discarded - Precipitation > 0 mm
2023-12-04	5:00:00 PM		40.5	28	0.9	0	
2023-12-04	6:00:00 PM		39.6	33	1.1	0	
2023-12-04	7:00:00 PM		41.2	29	0.8	0	
2023-12-04	8:00:00 PM		41.3	24	0.7	0.2	Discarded - Precipitation > 0 mm
2023-12-04	9:00:00 PM		39.8	25	1	0.4	Discarded - Precipitation > 0 mm
2023-12-04	10:00:00 PM		41.5	22	1	0	
2023-12-04	11:00:00 PM		34.9	19	1	0	
2023-12-04	12:00:00 AM		38.8	27	0.9	0.8	Discarded - Precipitation > 0 mm
2023-12-04	1:00:00 AM		42	25	0.9	0.5	Discarded - Precipitation > 0 mm
2023-12-04	2:00:00 AM		36.9	31	0.6	0	
2023-12-04	3:00:00 AM		40.5	30	0.6	0	
2023-12-04	4:00:00 AM		38.5	29	0.6	0	
2023-12-04	5:00:00 AM		38.5	29	0.4	0	
2023-12-05	6:00:00 AM		41.5	24	0.4	0	
2023-12-05	7:00:00 AM		37.5	21	0.5	0	
2023-12-05	8:00:00 AM		39.5	20	0.6	0	
2023-12-05	9:00:00 AM		39	7	0.6	0	
2023-12-05	10:00:00 AM		40.4	14	1.2	0	
2023-12-05	11:00:00 AM		41.6	13	0.9	0	
2023-12-05	12:00:00 PM		45.1	12	1	0	
2023-12-05	1:00:00 PM		45.9	18	0.7	0	
2023-12-05	2:00:00 PM		39.9	21	0.4	0	
2023-12-05	3:00:00 PM		40.2	22	0.8	0	
2023-12-05	4:00:00 PM		45.9	16	0.5	0	
2023-12-05	5:00:00 PM		38.9	17	0.6	0	
2023-12-05	6:00:00 PM		39	16	0.5	0	
2023-12-05	7:00:00 PM		41.8	16	0.2	0	
2023-12-05	8:00:00 PM		45	12	0.4	0	
2023-12-05	9:00:00 PM		39.4	9	-0.2	0	
2023-12-05	10:00:00 PM		35.5	2	-1.6	0	
2023-12-05	11:00:00 PM		36.1	4	-1.2	0	
2023-12-05	12:00:00 AM		29.2	5	-2	0	
2023-12-05	1:00:00 AM		28.3	6	-2.1	0	
2023-12-05	2:00:00 AM		23.3	11	-2.1	0	

Table A-4.2

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M2
Pattern Green Renewables Project
Latitude: 47°15'44.90"N, Longitude: 53°56'58.71"W
Ferndale, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-12-05	3:00:00 AM		23.2	12	-1.4	0	
2023-12-05	4:00:00 AM		22.3	13	-1.6	1	Discarded - Precipitation > 0 mm
2023-12-05	5:00:00 AM		28.2	34	1.2	1.3	Discarded - Precipitation > 0 mm
2023-12-06	6:00:00 AM		27.7	35	-0.1	0	
2023-12-06	7:00:00 AM		31.5	42	-0.5	0	Discarded - Wind Speed > 38 km/h
2023-12-06	8:00:00 AM		32.3	37	-0.8	0	
2023-12-06	9:00:00 AM		38.4	31	-1	0	
2023-12-06	10:00:00 AM		35.2	30	-1.3	0	
2023-12-06	11:00:00 AM		38.2	27	-1.5	0	
2023-12-06	12:00:00 PM		39.4	22	-1.7	0	
2023-12-06	1:00:00 PM		40.9	22	-1.3	0	
2023-12-06	2:00:00 PM		41.5	27	-1.1	0	
2023-12-06	3:00:00 PM		42.2	21	-1.3	0	
2023-12-06	4:00:00 PM		41.5	22	-0.8	0	
2023-12-06	5:00:00 PM		45.1	26	0	0	
2023-12-06	6:00:00 PM		40	30	0.2	0	
2023-12-06	7:00:00 PM		38.1	24	0.1	0	
2023-12-06	8:00:00 PM		42.1	19	0.1	0	
2023-12-06	9:00:00 PM		42.2	18	0	0	
2023-12-06	10:00:00 PM		41.5	20	0.3	0	
2023-12-06	11:00:00 PM		36.7	22	0.5	0	
2023-12-06	12:00:00 AM		30.9	22	0.2	0	
2023-12-06	1:00:00 AM		28.7	18	-1.4	0	
2023-12-06	2:00:00 AM		27	24	-2	0	
2023-12-06	3:00:00 AM		25.4	20	-2.8	0	
2023-12-06	4:00:00 AM		32.2	22	-2.6	0	
2023-12-06	5:00:00 AM		28.7	23	-2.5	0	
2023-12-07	6:00:00 AM		29.5	25	-2.6	0	
2023-12-07	7:00:00 AM		32.9	30	-2.7	0	
2023-12-07	8:00:00 AM		34	33	-2.9	0	
2023-12-07	9:00:00 AM		32.9	33	-3.5	0	
2023-12-07	10:00:00 AM		35.7	32	-3.1	0	
2023-12-07	11:00:00 AM		37.4	32	-3.1	0	
2023-12-07	12:00:00 PM		38.7	32	-2.7	0	
2023-12-07	1:00:00 PM		39.7	28	-2.7	0	
2023-12-07	2:00:00 PM		41.1	28	-2.7	0	

Table A-4.2

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M2
Pattern Green Renewables Project
Latitude: 47°15'44.90"N, Longitude: 53°56'58.71"W
Ferndale, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-12-07	3:00:00 PM		44.3	28	-2.7	0	
2023-12-07	4:00:00 PM		42.7	31	-1.9	0	
2023-12-07	5:00:00 PM		38.8	36	-1.1	0	
2023-12-07	6:00:00 PM		42.4	38	-1.1	0	
2023-12-07	7:00:00 PM		39.9	37	-1.3	0	
2023-12-07	8:00:00 PM		39.3	36	-1.2	0	
2023-12-07	9:00:00 PM		40.6	34	-1.6	0	
2023-12-07	10:00:00 PM		49.9	33	-1.3	0	
2023-12-07	11:00:00 PM		37.5	40	-1.2	0	Discarded - Wind Speed > 38 km/h
2023-12-07	12:00:00 AM		32.1	49	-1.6	0	Discarded - Wind Speed > 38 km/h
2023-12-07	1:00:00 AM		30.5	41	-1.9	0	Discarded - Wind Speed > 38 km/h
2023-12-07	2:00:00 AM		31.4	48	-1.5	0	Discarded - Wind Speed > 38 km/h
2023-12-07	3:00:00 AM		30.5	50	-1.2	0	Discarded - Wind Speed > 38 km/h
2023-12-07	4:00:00 AM		40.2	54	-0.4	0	Discarded - Wind Speed > 38 km/h
2023-12-07	5:00:00 AM		34.7	53	0.2	0	Discarded - Wind Speed > 38 km/h
2023-12-08	6:00:00 AM		35.6	55	0.3	0	Discarded - Wind Speed > 38 km/h
2023-12-08	7:00:00 AM		41.7	56	0.5	0	Discarded - Wind Speed > 38 km/h
2023-12-08	8:00:00 AM		49.2	56	0.5	0	Discarded - Wind Speed > 38 km/h
2023-12-08	9:00:00 AM		51.1	54	0.8	0	Discarded - Wind Speed > 38 km/h
2023-12-08	10:00:00 AM		50	52	1.2	0	Discarded - Wind Speed > 38 km/h
2023-12-08	11:00:00 AM		48.3	54	1.3	0	Discarded - Wind Speed > 38 km/h
2023-12-08	12:00:00 PM		44.5	50	1.2	0	Discarded - Wind Speed > 38 km/h
2023-12-08	1:00:00 PM		42	44	1.3	0	Discarded - Wind Speed > 38 km/h
2023-12-08	2:00:00 PM		42.3	42	1.6	0	Discarded - Wind Speed > 38 km/h
2023-12-08	3:00:00 PM		42.1	39	1.6	0	Discarded - Wind Speed > 38 km/h
2023-12-08	4:00:00 PM		41.2	37	1.7	0	
2023-12-08	5:00:00 PM		43.2	36	1.9	0	
2023-12-08	6:00:00 PM		42.2	37	2	0	
2023-12-08	7:00:00 PM		44.1	34	2	0	
2023-12-08	8:00:00 PM		39.1	35	2	0	
2023-12-08	9:00:00 PM		40.6	35	2.3	0	
2023-12-08	10:00:00 PM		39.2	35	2.6	0	
2023-12-08	11:00:00 PM		36.2	32	2.8	0	
2023-12-08	12:00:00 AM		32.3	33	3.1	0	
2023-12-08	1:00:00 AM		30.7	34	3.2	0	
2023-12-08	2:00:00 AM		29.7	35	3.7	0	

Table A-4.2

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M2
Pattern Green Renewables Project
Latitude: 47°15'44.90"N, Longitude: 53°56'58.71"W
Ferndale, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-12-08	3:00:00 AM		26.1	37	3.5	0	
2023-12-08	4:00:00 AM		28.9	42	3.6	0	Discarded - Wind Speed > 38 km/h
2023-12-08	5:00:00 AM		34	41	3.8	0	Discarded - Wind Speed > 38 km/h
2023-12-09	6:00:00 AM		26.6	38	4	0	
2023-12-09	7:00:00 AM		33.9	40	3.7	0	Discarded - Wind Speed > 38 km/h
2023-12-09	8:00:00 AM		42.4	42	4	0	Discarded - Wind Speed > 38 km/h
2023-12-09	9:00:00 AM		50.1	38	4.2	0	
2023-12-09	10:00:00 AM		43.4	35	4.5	0	
2023-12-09	11:00:00 AM		37.3	33	4.8	0	
2023-12-09	12:00:00 PM		39.8	34	5	0	
2023-12-09	1:00:00 PM		42.1	37	4.8	0	
2023-12-09	2:00:00 PM		44.4	39	4.5	0	Discarded - Wind Speed > 38 km/h

	Sound Level (dBA)	# Inclement Weather Hours	Total Hours Recorded	Inclement Weather Hours
Daytime 16h Leq (Ld) (07:00 - 23:00)	**42**	**17**	120	31.0
Nighttime 8h Leq (Ln) (23:00 - 07:00)	**35**	**14**		

	Sound Level (dBA)
Ldn	**43**

	Value (%)
%HA	**0.89**

Notes:

(1) Weather data provided by Environment Canada's Argentia Climate Station.
(2) Measurements recorded during inclement weather (winds speeds greater than 38 km/h and/or rain) were disregarded.
(3) Bolded data represents the lowest measured Leq during the respective monitoring time period.

Legend	
Day Time Hours	
Evening Time Hours	
Night Time Hours	

Table A-4.3

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M3
Pattern Green Renewables Project
Latitude: 47°15'44.90"N, Longitude: 53°56'58.71"W
Dunville, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-07-20	2:00:00 PM		44.2	22	17.6	0	
2023-07-20	3:00:00 PM		43.3	30	19	0	
2023-07-20	4:00:00 PM		40.5	26	18.9	0	
2023-07-20	5:00:00 PM		39.6	6	19.5	0	
2023-07-20	6:00:00 PM		41.2	18	21.9	0	
2023-07-20	7:00:00 PM		41.3	12	22.5	0	
2023-07-20	8:00:00 PM		39.8	18	21.6	0	
2023-07-20	9:00:00 PM		41.5	24	21.5	0	
2023-07-20	10:00:00 PM		34.9	29	20.3	0	
2023-07-20	11:00:00 PM		38.8	26	19.1	0	
2023-07-20	12:00:00 AM		42	35	17.1	0	
2023-07-21	1:00:00 AM		36.9	45	16.5	0	Discarded - Wind Speed > 38 km/h
2023-07-21	2:00:00 AM		40.5	42	15.9	0	Discarded - Wind Speed > 38 km/h
2023-07-21	3:00:00 AM		38.5	43	15.2	0	Discarded - Wind Speed > 38 km/h
2023-07-21	4:00:00 AM		38.5	36	15.1	0	
2023-07-21	5:00:00 AM		41.5	34	15.5	0	
2023-07-21	6:00:00 AM		37.5	29	15.5	0	
2023-07-21	7:00:00 AM		39.5	26	15.5	0	
2023-07-21	8:00:00 AM		39	25	15.8	0	
2023-07-21	9:00:00 AM		40.4	25	15.9	0	
2023-07-21	10:00:00 AM		41.6	24	16.3	0	
2023-07-21	11:00:00 AM		45.1	22	17.3	0	
2023-07-21	12:00:00 PM		45.9	21	17.9	0	
2023-07-21	1:00:00 PM		39.9	14	17.6	0	
2023-07-21	2:00:00 PM		40.2	14	18.2	0	
2023-07-21	3:00:00 PM		45.9	13	16.9	0	
2023-07-21	4:00:00 PM		38.9	7	16.6	0	
2023-07-21	5:00:00 PM		39	9	16.3	0	
2023-07-21	6:00:00 PM		41.8	7	15.8	0	
2023-07-21	7:00:00 PM		45	14	16.2	0	
2023-07-21	8:00:00 PM		39.4	12	16.5	0	
2023-07-21	9:00:00 PM		35.5	5	16.8	0	
2023-07-21	10:00:00 PM		36.1	1	16.8	0	
2023-07-21	11:00:00 PM		29.2	2	16.7	0	

Table A-4.3

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M3
Pattern Green Renewables Project
Latitude: 47°15'44.90"N, Longitude: 53°56'58.71"W
Dunville, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-07-21	12:00:00 AM		28.3	5	17	0	
2023-07-22	1:00:00 AM		23.3	6	17.4	0	
2023-07-22	2:00:00 AM		23.2	8	17.3	0	
2023-07-22	3:00:00 AM		22.3	8	17.5	0	
2023-07-22	4:00:00 AM		28.2	2	17.5	0	
2023-07-22	5:00:00 AM		27.7	4	19.2	0	
2023-07-22	6:00:00 AM		31.5	7	20.2	0	
2023-07-22	7:00:00 AM		32.3	7	20.7	0	
2023-07-22	8:00:00 AM		38.4	7	20.3	0	
2023-07-22	9:00:00 AM		35.2	6	21.7	0	
2023-07-22	10:00:00 AM		38.2	8	21.3	0	
2023-07-22	11:00:00 AM		39.4	18	20.6	0	
2023-07-22	12:00:00 PM		40.9	14	22	0	
2023-07-22	1:00:00 PM		41.5	23	25.6	0	
2023-07-22	2:00:00 PM		42.2	17	20.9	0	
2023-07-22	3:00:00 PM		41.5	10	20.9	0	
2023-07-22	4:00:00 PM		45.1	14	21.8	0	
2023-07-22	5:00:00 PM		40	22	23.6	0	
2023-07-22	6:00:00 PM		38.1	16	22.7	0	
2023-07-22	7:00:00 PM		42.1	16	21	0	
2023-07-22	8:00:00 PM		42.2	21	19.6	0	
2023-07-22	9:00:00 PM		41.5	18	19.9	0	
2023-07-22	10:00:00 PM		36.7	22	20.1	0	
2023-07-22	11:00:00 PM		30.9	18	19.9	0	
2023-07-22	12:00:00 AM		28.7	20	20.2	0	
2023-07-23	1:00:00 AM		27	17	20.2	0	
2023-07-23	2:00:00 AM		25.4	13	19.9	0	
2023-07-23	3:00:00 AM		32.2	7	19.5	0	
2023-07-23	4:00:00 AM		28.7	11	20.3	0	
2023-07-23	5:00:00 AM		29.5	8	20.3	0	
2023-07-23	6:00:00 AM		32.9	4	20.6	0	
2023-07-23	7:00:00 AM		34	6	22.4	0	
2023-07-23	8:00:00 AM		32.9	7	20.2	0	
2023-07-23	9:00:00 AM		35.7	6	19.8	0	

Table A-4.3

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M3
Pattern Green Renewables Project
Latitude: 47°15'44.90"N, Longitude: 53°56'58.71"W
Dunville, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-07-23	10:00:00 AM		37.4	7	20.7	0	
2023-07-23	11:00:00 AM		38.7	5	21.3	0	
2023-07-23	12:00:00 PM		39.7	7	21.6	0.4	Discarded - Precipitation > 0 mm
2023-07-23	1:00:00 PM		41.1	10	21.6	0	
2023-07-23	2:00:00 PM		44.3	28	22.1	0	
2023-07-23	3:00:00 PM		42.7	13	20.2	0	
2023-07-23	4:00:00 PM		38.8	13	19.7	0	
2023-07-23	5:00:00 PM		42.4	11	19.8	0	
2023-07-23	6:00:00 PM		39.9	10	20.6	0	
2023-07-23	7:00:00 PM		39.3	19	21.9	0	
2023-07-23	8:00:00 PM		40.6	20	22.3	0	
2023-07-23	9:00:00 PM		49.9	24	21.8	1.1	Discarded - Precipitation > 0 mm
2023-07-23	10:00:00 PM		37.5	22	21.5	0	
2023-07-23	11:00:00 PM		32.1	23	21.5	0	
2023-07-23	12:00:00 AM		30.5	24	21.5	0.2	Discarded - Precipitation > 0 mm
2023-07-24	1:00:00 AM		31.4	23	21.8	1.9	Discarded - Precipitation > 0 mm
2023-07-24	2:00:00 AM		30.5	24	21.8	1.2	Discarded - Precipitation > 0 mm
2023-07-24	3:00:00 AM		40.2	29	22.1	0	
2023-07-24	4:00:00 AM		34.7	30	21.6	0.3	Discarded - Precipitation > 0 mm
2023-07-24	5:00:00 AM		35.6	48	21.7	3.1	Discarded - Precipitation > 0 mm
2023-07-24	6:00:00 AM		41.7	46	20.4	1.8	Discarded - Precipitation > 0 mm
2023-07-24	7:00:00 AM		49.2	46	18.6	0.9	Discarded - Precipitation > 0 mm
2023-07-24	8:00:00 AM		51.1	38	17.8	0	
2023-07-24	9:00:00 AM		50	33	17.5	0	
2023-07-24	10:00:00 AM		48.3	32	18	0	
2023-07-24	11:00:00 AM		44.5	35	17.8	0	
2023-07-24	12:00:00 PM		42	33	17.6	0	
2023-07-24	1:00:00 PM		42.3	31	17.4	0	
2023-07-24	2:00:00 PM		42.1	33	17.7	0	
2023-07-24	3:00:00 PM		41.2	32	17.8	0	
2023-07-24	4:00:00 PM		43.2	26	17.6	0	
2023-07-24	5:00:00 PM		42.2	30	17.4	0	
2023-07-24	6:00:00 PM		44.1	28	17.1	0	
2023-07-24	7:00:00 PM		39.1	30	16.5	0	

Table A-4.3

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M3
Pattern Green Renewables Project
Latitude: 47°15'44.90"N, Longitude: 53°56'58.71"W
Dunville, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-07-24	8:00:00 PM		40.6	30	16.2	0	
2023-07-24	9:00:00 PM		39.2	31	15.9	0	
2023-07-24	10:00:00 PM		36.2	29	15.7	0	
2023-07-24	11:00:00 PM		32.3	25	15.7	0	
2023-07-24	12:00:00 AM		30.7	28	16.1	0	
2023-07-25	1:00:00 AM		29.7	22	16.3	0	
2023-07-25	2:00:00 AM		26.1	21	16.2	0	
2023-07-25	3:00:00 AM		28.9	22	16.1	0	
2023-07-25	4:00:00 AM		34	21	16.1	0	
2023-07-25	5:00:00 AM		26.6	20	16.2	0	
2023-07-25	6:00:00 AM		33.9	22	16.3	0	
2023-07-25	7:00:00 AM		42.4	21	16.3	0	
2023-07-25	8:00:00 AM		50.1	20	16.4	0	
2023-07-25	9:00:00 AM		43.4	18	16.6	0	
2023-07-25	10:00:00 AM		37.3	6	18.7	0	
2023-07-25	11:00:00 AM		39.8	5	19.7	0	
2023-07-25	12:00:00 PM		42.1	3	19.8	0	
2023-07-25	1:00:00 PM		44.4	9	19.4	0	
2023-07-25	2:00:00 PM		63.1	6	19.7	0	
2023-07-25	3:00:00 PM		69.4	29	18.1	0	
2023-07-25	4:00:00 PM		44	27	19.4	0	
2023-07-25	5:00:00 PM		42.7	25	19.2	0	
2023-07-25	6:00:00 PM		44.3	25	18.6	0	
2023-07-25	7:00:00 PM		58.7	18	18	0	
2023-07-25	8:00:00 PM		40	16	17.6	0	
2023-07-25	9:00:00 PM		39.6	16	18.1	0	
2023-07-25	10:00:00 PM		38	16	17.9	0	
2023-07-25	11:00:00 PM		34.7	21	17	0	
2023-07-25	12:00:00 AM		34.3	19	16.9	0	
2023-07-26	1:00:00 AM		32.3	18	16.6	0	
2023-07-26	2:00:00 AM		27.3	25	16	0	
2023-07-26	3:00:00 AM		27.8	24	15.9	0	
2023-07-26	4:00:00 AM		33.6	15	15.6	0	
2023-07-26	5:00:00 AM		29.2	18	15.3	0	

Table A-4.3

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M3
Pattern Green Renewables Project
Latitude: 47°15'44.90"N, Longitude: 53°56'58.71"W
Dunville, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-07-26	6:00:00 AM		35.3	22	15.6	0	
2023-07-26	7:00:00 AM		40.6	22	15.2	0	
2023-07-26	8:00:00 AM		44.2	24	15.4	0	
2023-07-26	9:00:00 AM		37.3	22	15.9	0	
2023-07-26	10:00:00 AM		56.4	19	16.5	0	
2023-07-26	11:00:00 AM		56.1	17	16.5	0	

	Sound Level (dBA)	# Inclement Weather Hours	Total Hours Recorded	Inclement Weather Hours
Daytime 16h Leq (Ld) (07:00 - 23:00)	**52**	**3**	142	12.0
Nighttime 8h Leq (Ln) (23:00 - 07:00)	**34**	**9**		

	Sound Level (dBA)
Ldn	**50**

	Value (%)
%HA	**2.25**

Notes:

(1) Weather data provided by Environment Canada's Argentia Climate Station.
(2) Measurements recorded during inclement weather (winds speeds greater than 38 km/h and/or rain) were disregarded.
(3) Bolded data represents the lowest measured Leq during the respective monitoring time period.

Legend	
Day Time Hours	
Evening Time Hours	
Night Time Hours	

Table A-4.4

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M4
Pattern Green Renewables Project
Latitude: 47°19'18.05"N, Longitude: 53°54'51.42"W
Fox Harbour, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-12-14	11:00:00 AM		58.5	30	-2.8	0	
2023-12-14	12:00:00 PM		61.9	30	-3	0	
2023-12-14	1:00:00 PM		68	29	-1.9	0	
2023-12-14	2:00:00 PM		62.5	40	-1.6	0	Discarded - Wind Speed > 38 km/h
2023-12-14	3:00:00 PM		64.8	40	-1.8	0	Discarded - Wind Speed > 38 km/h
2023-12-14	4:00:00 PM		64.4	35	-2.1	0	
2023-12-14	5:00:00 PM		67.1	37	-2.3	0	
2023-12-14	6:00:00 PM		63.5	37	-2.5	0	
2023-12-14	7:01:00 PM		64.1	37	-3	0	
2023-12-14	8:00:00 PM		64.3	33	-3.3	0	
2023-12-14	9:00:00 PM		59	33	-3.6	0	
2023-12-14	10:00:00 PM		57	29	-3.9	0	
2023-12-14	11:00:00 PM		54.2	26	-4	0	
2023-12-14	12:00:00 AM		51.3	23	-4.3	0	
2023-12-15	1:00:00 AM		54.4	23	-4.5	0	
2023-12-15	2:00:00 AM		52.9	24	-3.9	0	
2023-12-15	3:00:00 AM		48.5	32	-3.4	0	
2023-12-15	4:00:00 AM		45.9	33	-2.9	0	
2023-12-15	5:00:00 AM		52.6	28	-3.1	0	
2023-12-15	6:00:00 AM		49.5	29	-2.6	0	
2023-12-15	7:00:00 AM		52.3	27	-2.2	0	
2023-12-15	8:00:00 AM		52.8	25	-1.3	0	
2023-12-15	9:00:00 AM		55.2	38	-0.3	0	
2023-12-15	10:00:00 AM		61.4	44	0.4	0	Discarded - Wind Speed > 38 km/h
2023-12-15	11:00:00 AM		61.6	49	0.9	0	Discarded - Wind Speed > 38 km/h
2023-12-15	12:00:00 PM		60.4	57	1.2	0	Discarded - Wind Speed > 38 km/h
2023-12-15	1:00:00 PM		60	59	1.7	0	Discarded - Wind Speed > 38 km/h
2023-12-15	2:00:00 PM		60	62	2.1	0	Discarded - Wind Speed > 38 km/h
2023-12-15	3:00:00 PM		59	64	2.4	0	Discarded - Wind Speed > 38 km/h
2023-12-15	4:00:00 PM		57.9	74	2.9	0	Discarded - Wind Speed > 38 km/h
2023-12-15	5:00:00 PM		58.7	65	3.2	0	Discarded - Wind Speed > 38 km/h

Table A-4.4

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M4
Pattern Green Renewables Project
Latitude: 47°19'18.05"N, Longitude: 53°54'51.42"W
Fox Harbour, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-12-15	6:00:00 PM		62.5	62	3.5	0	Discarded - Wind Speed > 38 km/h
2023-12-15	7:01:00 PM		64	58	3.5	0	Discarded - Wind Speed > 38 km/h
2023-12-15	8:00:00 PM		63.1	53	2.9	0	Discarded - Wind Speed > 38 km/h
2023-12-15	9:00:00 PM		57.9	50	3.6	0	Discarded - Wind Speed > 38 km/h
2023-12-15	10:00:00 PM		59.6	52	4	0	Discarded - Wind Speed > 38 km/h
2023-12-15	11:00:00 PM		61.6	39	3.2	0	Discarded - Wind Speed > 38 km/h
2023-12-15	12:00:00 AM		53.1	35	3.3	0	
2023-12-16	1:00:00 AM		52.3	35	2.8	0	
2023-12-16	2:00:00 AM		53	39	2.8	0	Discarded - Wind Speed > 38 km/h
2023-12-16	3:00:00 AM		51.9	33	2.7	0	
2023-12-16	4:00:00 AM		56.2	34	2.9	0	
2023-12-16	5:00:00 AM		49.8	36	3	0	
2023-12-16	6:00:00 AM		42.5	35	3.2	0	
2023-12-16	7:00:00 AM		46.9	36	3.5	0	
2023-12-16	8:00:00 AM		38.4	41	3.5	0	Discarded - Wind Speed > 38 km/h
2023-12-16	9:00:00 AM		49.8	38	3.6	0	
2023-12-16	10:00:00 AM		43.5	43	3.8	0	Discarded - Wind Speed > 38 km/h
2023-12-16	11:00:00 AM		45.4	35	3.6	0	
2023-12-16	12:00:00 PM		46.8	40	3.7	0	Discarded - Wind Speed > 38 km/h
2023-12-16	1:00:00 PM		46.1	41	3.2	0	Discarded - Wind Speed > 38 km/h
2023-12-16	2:00:00 PM		47.8	29	1.9	0	
2023-12-16	3:00:00 PM		51.1	39	1.1	0	Discarded - Wind Speed > 38 km/h
2023-12-16	4:00:00 PM		50.5	36	0.4	0	
2023-12-16	5:00:00 PM		50.6	46	-0.2	0	Discarded - Wind Speed > 38 km/h
2023-12-16	6:00:00 PM		52.3	43	-0.7	0	Discarded - Wind Speed > 38 km/h
2023-12-16	7:01:00 PM		50.6	42	-2.3	0	Discarded - Wind Speed > 38 km/h
2023-12-16	8:00:00 PM		49.9	40	-2.9	0	Discarded - Wind Speed > 38 km/h
2023-12-16	9:00:00 PM		49.4	43	-3.2	0	Discarded - Wind Speed > 38 km/h
2023-12-16	10:00:00 PM		47	42	-3.5	0	Discarded - Wind Speed > 38 km/h
2023-12-16	11:00:00 PM		49.6	44	-4	0	Discarded - Wind Speed > 38 km/h
2023-12-16	12:00:00 AM		49.9	45	-4.5	0	Discarded - Wind Speed > 38 km/h

Table A-4.4

Environmental Sound Level Measurements, LEQ - Ambient Background Baseline Measurements - M4
Pattern Green Renewables Project
Latitude: 47°19'18.05"N, Longitude: 53°54'51.42"W
Fox Harbour, Newfoundland and Labrador

Date	Time		Leq [2], [3]	Wind Spd (km/h) [1]	Temperature (°C)	Precipitation (mm)	Weather
2023-12-17	1:00:00 AM		47.1	43	-4.6	0	Discarded - Wind Speed > 38 km/h
2023-12-17	2:00:00 AM		43.9	34	-5.1	0	
2023-12-17	3:00:00 AM		44	32	-5.2	0	
2023-12-17	4:00:00 AM		40.2	30	-5.2	0	
2023-12-17	5:00:00 AM		38.4	26	-5	0	
2023-12-17	6:00:00 AM		38.9	23	-4.9	0	
2023-12-17	7:00:00 AM		46.3	22	-4.9	0	
2023-12-17	8:00:00 AM		46.7	11	-4.2	0	
2023-12-17	9:00:00 AM		48	16	-2.5	0	
2023-12-17	10:00:00 AM		45.7	23	-1.8	0	
2023-12-17	11:00:00 AM		53.7	25	-0.9	0	
2023-12-17	12:00:00 PM		65.7	30	-0.2	0	

	Sound Level (dBA)	# Inclement Weather Hours	Total Hours Recorded	Inclement Weather Hours
Daytime 16h Leq (Ld) (07:00 - 23:00)	**61**	**26**	74	31.0
Nighttime 8h Leq (Ln) (23:00 - 07:00)	**51**	**5**		

	Sound Level (dBA)
Ldn	**61**

	Value (%)
%HA	**8.74**

Notes:

(1) Weather data provided by Environment Canada's Argentia Climate Station.
(2) Measurements recorded during inclement weather (winds speeds greater than 38 km/h and/or rain) were disregarded.
(3) Bolded data represents the lowest measured Leq during the respective monitoring time period.

Legend

Day Time Hours	
Evening Time Hours	
Night Time Hours	