Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Mannix

LAST UPDATED: 02-02-2023

Table of Contents

Tables and Figures

WBEA Monitoring Network

Vision

Empower all stakeholders and rights holders with environmental data to make informed decisions.

Mission

A multi-stakeholder, consensus-based organization providing world-class environmental monitoring and reporting.

The Region

From north-central Alberta to the borders of Saskatchewan and the Northwest Territories, the Regional Municipality of Wood Buffalo (www.woodbuffalo.ab.ca) covers 68,454 square kilometres, making it the second largest municipality in Canada. It was established in 1995 through an amalgamation of the City of Fort McMurray and Improvement District No. 143. The Athabasca Oil Sands Region (AOSR) is within the municipality, and includes both traditional bitumen mining operations and in situ oil production. The region also encompasses the communities of Fort McMurray, Fort Chipewyan, Fort McKay, Anzac, Janvier, and Conklin.

The Network

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 28 permanent continuous monitoring locations, each measuring various air quality parameters. The continuously measured air quality parameters include Sulphur Dioxide (SO_2), Hydrogen Sulfide (H_2S), Total Reduced Sulphur (TRS), Ozone (O_3), Total Oxides of Nitrogen (NO_X), Nitric Oxide (NO), Nitrogen Dioxide (NO_2), Ammonia (NH_3), Carbon Monoxide (CO), Carbon Dioxide (CO_2,) Particulate Matter less than 2.5µm ($PM_{2.5}$), Total Suspended Particulates (TSP), Total Hydrocarbon (THC), Methane and Non-Methane Hydrocarbons (NMHC). All sites also measure ambient air temperature (AT), wind speed (WS), wind direction (WD), and relative humidity (RH). Selected sites measure barometric pressure (BP), global radiation (GR), precipitation (PC), leaf wetness (LW), vertical wind speed (VWS), vertical temperature gradient VTG) and Present Weather Detector (PWD). The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1.
The WBEA also maintains and operates six portable monitoring stations. Five of these stations are used for compliance monitoring at sites that require less than 12 months per year. One portable is set up for gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Time Integrated Sampling

Since 1998 WBEA has maintained time-integrated sampling for $PM_{2.5}$, PM_{10}, VOC and PAH at permanent monitoring sites. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods.

In 2012, the WBEA moved to Hivol PUF sampling for PAH compounds from the previous low volume method. This was done to achieve a lower detection limit for the target analytes. In 2015, the WBEA moved to duplicate sampling for the PM_{10} and $PM_{2.5}$ time integrated parameters for 2 reasons; (1) to have duplicate mass measurements for QA purposes, (2) to have separate filters for subsequent metals and ion analysis. Elemental and Organic Carbon (ECOC) sampling began on August 7, 2012 at the Bertha Ganter site. ECOC was added and the Wapasu and Stony Mountain sites on May 1, 2018. All time-integrated samples in the WBEA ambient air monitoring network are collected on the National Air Pollution Surveillance (NAPS) schedule every 6 days for a 24-hour period.

The WBEA also collects precipitation samples for chemistry analysis through the National Atmospheric Deposition Program (NADP) at three sites; Bertha Ganter, Wapasu and Stony Mountain. These samples are collected every Tuesday at 12:00.

In 2022, the WBEA added a dustfall sampling network to better understand the larger size settleable particulate in the region. These sites are currently located at the community sites and are collected on a monthly frequency.

The time-integrated parameters for each station are summarized in Table 1.2.

Table 1.0 provides a listing of stations with their names and corresponding WBEA identification number and the air quality parameters measured by continuous methods at each site. Parameters measured include; sulphur dioxide (SO_2), nitrogen dioxide (NO_2), Ozone (O_3), particulate matter less than 2.5µm ($PM_{2.5}$), total reduced sulphur (TRS), hydrogen sulphide (H_2S), total hydrocarbons (THC), non-methane hydrocarbons (NMHC), carbon monoxide (CO), carbon dioxide (CO_2), ammonia (NH_3). Sites are categorized by their station type based on the monitoring objectives for the site.

WBEA ID	TYPE	STATION NAME	SO_2	NO_2	O_3	$PM_{2.5}$	TRS	H_2S	THC	NMHC	CO	CO_2	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY	X	X	X	X	X	X	X	X	X	X	X
2	COMPLIANCE	MILDRED LAKE	X					X	X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER											
4	COMPLIANCE	BUFFALO VIEWPOINT	X	X	X	X		X	X	X			
5	COMPLIANCE/ METEORLOGICAL	MANNIX	X					X	X	X			
6	COMMUNITY	PATRICIA MCINNES	X	X	X	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X	X	X	X		X	X	X		
8	COMMUNITY/ COMPLIANCE	FORT CHIPEWYAN	X	X	X	X	X				X	X	
9	ATTRIBUTION	BARGE LANDING	X	X		X	X		X	X			
11	COMPLIANCE	LOWER CAMP	X					X	X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X	X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X			
17	COMPLIANCE	WAPASU	X	X	X	X		X	X				
18	BACKGROUND	STONY MOUNTAIN	X	X	X	X	X		X	X	X	X	
19	COMPLIANCE	FIREBAG	X	X				X	X				
20	COMPLIANCE	MACKAY RIVER	X	X				X	X				
21	COMMUNITY	CONKLIN	X	X	X	X	X		X	X			
22	COMMUNITY	JANVIER	X	X	X	X	X		X	X			
23	COMPLIANCE	FORT HILLS	X	X		X	X		X	X			
25	EMERGENCY RESPONSE	WASKOW OHCI PIMATISIWIN	X					X					
26	COMPLIANCE	CHRISTINA LAKE	X	X				X					
27	COMPLIANCE	JACKFISH 2/3	X	X				X					
29	COMPLIANCE	SURMONT 2	X	X		X		X	X				
30	COMPLIANCE	ELLS RIVER	X	X		X	X		X	X			
501	COMPLIANCE	LEISMER	X	X				X					
505	COMPLIANCE	SAWBONES BAY	X	X				X					
506	COMPLIANCE	JACKFISH 1	X	X				X					
507	COMPLIANCE	KIRBY SOUTH	X	X				X	X				
508	COMPLIANCE	KIRBY NORTH	X	X				X	X				

Table 1.0 - Pollutant parameters monitored in the WBEA network

Table 1.1 provides a listing of stations and meteorological parameters measured by continuous methods. Parameters measured include ambient temperature (AT), relative humidity (RH), barometric pressure (BP), wind speed (WS), wind direction (WD), vertical wind speed (VWS), global radiation (GR), total precipitation (PC), and leaf wetness (LW). Sites are categorized by their station type based on the monitoring objectives for the site.

WBEA ID	TYPE	STATION NAME	AT	RH	BP	WS	WD	VWS	GR	PC	LW
1	COMMUNITY	BERTHA GANTER-FORT MCKAY	X	X		X	X		X	X	X
2	COMPLIANCE	MILDRED LAKE	X	X		X	X				
3	METEOROLOGICAL	LOWER CAMP MET TOWER	X	X		X	X	X			
4	COMPLIANCE	BUFFALO VIEWPOINT	X	X		X	X				
5	COMPLIANCE/ METEORLOGICAL	MANNIX	X	X		X	X	X			
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X				
7	COMMUNITY	ATHABASCA VALLEY	X	X	X	X	X				
8	COMMUNITY/ COMPLIANCE	FORT CHIPEWYAN	X	X		X	X		X		X
9	ATTRIBUTION	BARGE LANDING	X	X	X	X	X				
11	COMPLIANCE	LOWER CAMP	X	X	X	X	X				
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X		X	X				
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X				X
17	COMPLIANCE	WAPASU	X	X		X	X			X	
18	BACKGROUND	STONY MOUNTAIN	X	X		X	X		X	X	X
19	COMPLIANCE	FIREBAG	X	X		X	X				
20	COMPLIANCE	MACKAY RIVER	X	X		X	X			X	
21	COMMUNITY	CONKLIN	X	X		X	X				
22	COMMUNITY	JANVIER	X	X		X	X				
23	COMPLIANCE	FORT HILLS	X	X		X	X				
25	EMERGENCY RESPONSE	WASKOW OHCI PIMATISIWIN	X	X		X	X				
26	COMPLIANCE	CHRISTINA LAKE	X	X		X	X				
27	COMPLIANCE	JACKFISH 2/3	X	X		X	X				
29	COMPLIANCE	SURMONT 2	X	X		X	X				
30	COMPLIANCE	ELLS RIVER	X	X		X	X		X		
501	COMPLIANCE	LEISMER	X	X		X	X				
505	COMPLIANCE	SAWBONES BAY	X	X		X	X				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				
507	COMPLIANCE	KIRBY SOUTH	X	X		X	X				
508	COMPLIANCE	KIRBY NORTH	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

Table 1.2 provides a listing of stations and air quality parameters measured by time integrated methods. Parameters measured include volatile organic compounds (VOC), particulate matter less than 2.5 µm aerodynamic diameter ($PM_{2.5}$) and associated metals and ions, particulate matter less than 10 µm aerodynamic diameter (PM_{10}) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), precipitation chemistry (PRECIP), and dustfall (DUSTFALL) samples.

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$	$PM_{2.5}$ ECOC	PM_{10}	PAH	PRECIP	DUSTFALL
1	COMMUNITY	BERTHA GANTER-FORT MCKAY	X	X	X	X	X	X	X
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X		X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X		X
8	COMPLIANCE/COMMUNITY	FORT CHIPEWYAN	X	X		X	X		
9	ATTRIBUTION	BARGE LANDING	X						
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X			X			
14	COMPLIANCE/COMMUNITY	ANZAC	X	X		X	X		X
17	COMPLIANCE	WAPASU			X			X	
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN			X			X	
21	COMMUNITY	CONKLIN	X	X		X	X		X
22	COMMUNITY	JANVIER	X	X		X	X		X
23	COMPLIANCE	FORT HILLS	X			X			
30	COMPLIANCE	ELLS RIVER	X			X			

Table 1.2 – Time-Integrated Parameters monitored in the WBEA network

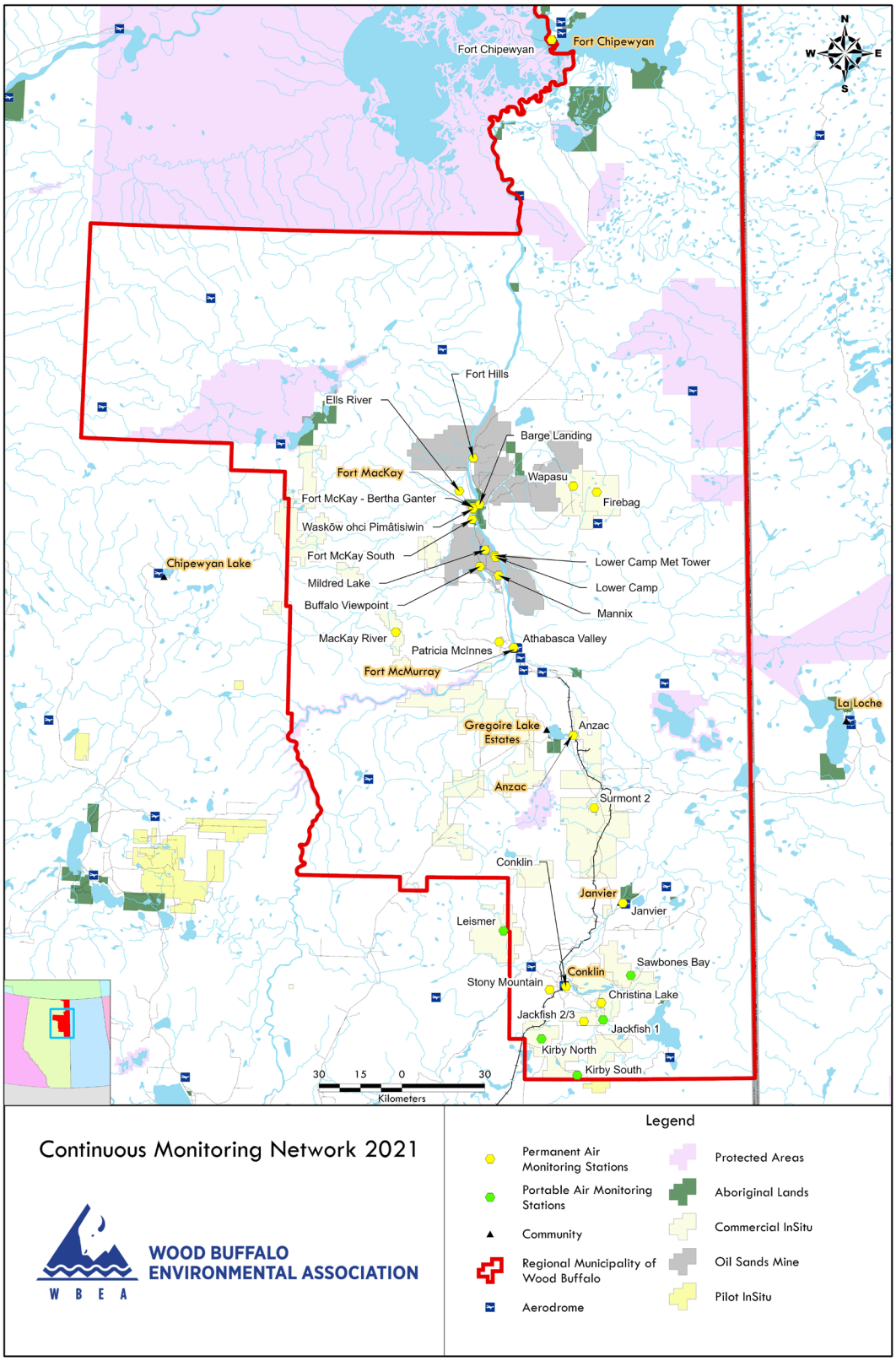

Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 05
Station name	Mannix
Date station established	1975

Location

Station street address	On the west side of Range Road 101, approximately 700 meters south of the Base Plant Road intersection
Legal land description	
Airshed Zone	Wood Buffalo Environmental Association
Latitude	56.967964
Longitude	-111.482100
UTM East	470688
UTM North	6313923
Nearest community	Fort McMurray
Community population	76006
Census Year	2021

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Address of Operating Agency	Unit 3, 805 Memorial Drive, Fort McMurray, Alberta T9K 0K4
Name of Approval Holder	Suncor Energy Inc.
Approval number	094-03-00
Contact Name	Nelia Heydenreich
Address	Base Plant Rd, Wood Buffalo, AB
Phone number	780-788-8504
Email address	nheydenreich@suncor.com

Site Description

Land use by sector	0 – 90 degrees	Gravel parking lot, Suncor base plant road.
	91 – 180 degrees	Gravel parking lot, Suncor base plant road.
	181 – 270 degrees	Wooded area.
	271 – 360 degrees	150m met tower, electronics stations.
Site elevation (m) (above sea level)	332	
Angle of elevation to nearby buildings	Greatest angle	N/A
	Building direction	N/A

Airflow restrictions	North	No
	East	No
	South	Trees
	West	Trees
Distance to nearest trees (m)	North	N/A
	East	N/A
	West	45
	South	55
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
Meteorological Sensors	Type	Cup and vane
	Height above ground (m)	20,45,75, and 90
	Distance from station (m)	10

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
None	N/A	N/A

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Range road 101 (Asphalt)	Medium	100	Paved road frequented by heavy equipment, tractor trailers, and pickup trucks.
Highway 63	High	400	Provincial highway frequented by all types of traffic.

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Suncor Base Plant	Oil Sands Plant	194,000 bbls/d	< 5	North
Enbridge	Storage tank complex	NA	0.2	East

Station Equipment

Equipment Owner:

Analytical Equipment

Parameter	Make	Model	Serial Number	Date Installed
SO2	Thermo	43i	1008841399	2012
H2S	Thermo	450i	0815129108	2012
NMHC	Thermo	55i	1152430011	2021

Meteorological Equipment

Parameter	Make	Model	Serial Number	WMO Site Class	Date Installed
AT/RH-2m	Vaisala	HMP155	NA	4	2022
AT/RH-20m	Vaisala	HMP155	G4340067	4	2022
AT/RH-45m	Vaisala	HMP155	NA	4	2022
AT/RH-75m	Vaisala	HMP155	SS3550310	4	2022
AT/RH-90m	Vaisala	HMP155	NA	4	2022
WS-WD-VWS-20m	UVW Ultrasonic	81000	4000	4	2022
WS-WD-VWS-20m	UVW Ultrasonic	81000	3960	4	2022
WS-WD-VWS-20m	UVW Ultrasonic	81000	3998	4	2022
WS-WD-VWS-20m	UVW Ultrasonic	81000	3999	4	2022

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	2580
Gas Dilution Calibrator	Dynamic dilution calibrator	Teledyne/API	T700	621
Zero air generator	Zero Air Generator	Teledyne/API	701	832
HVAC	Heating and air conditioning system	BARD	W12A2-A05EPXXXJ	330C132993376-01
Shelter / Building	Air monitoring shelter	C&V	8 x 16 wood	SAA81407

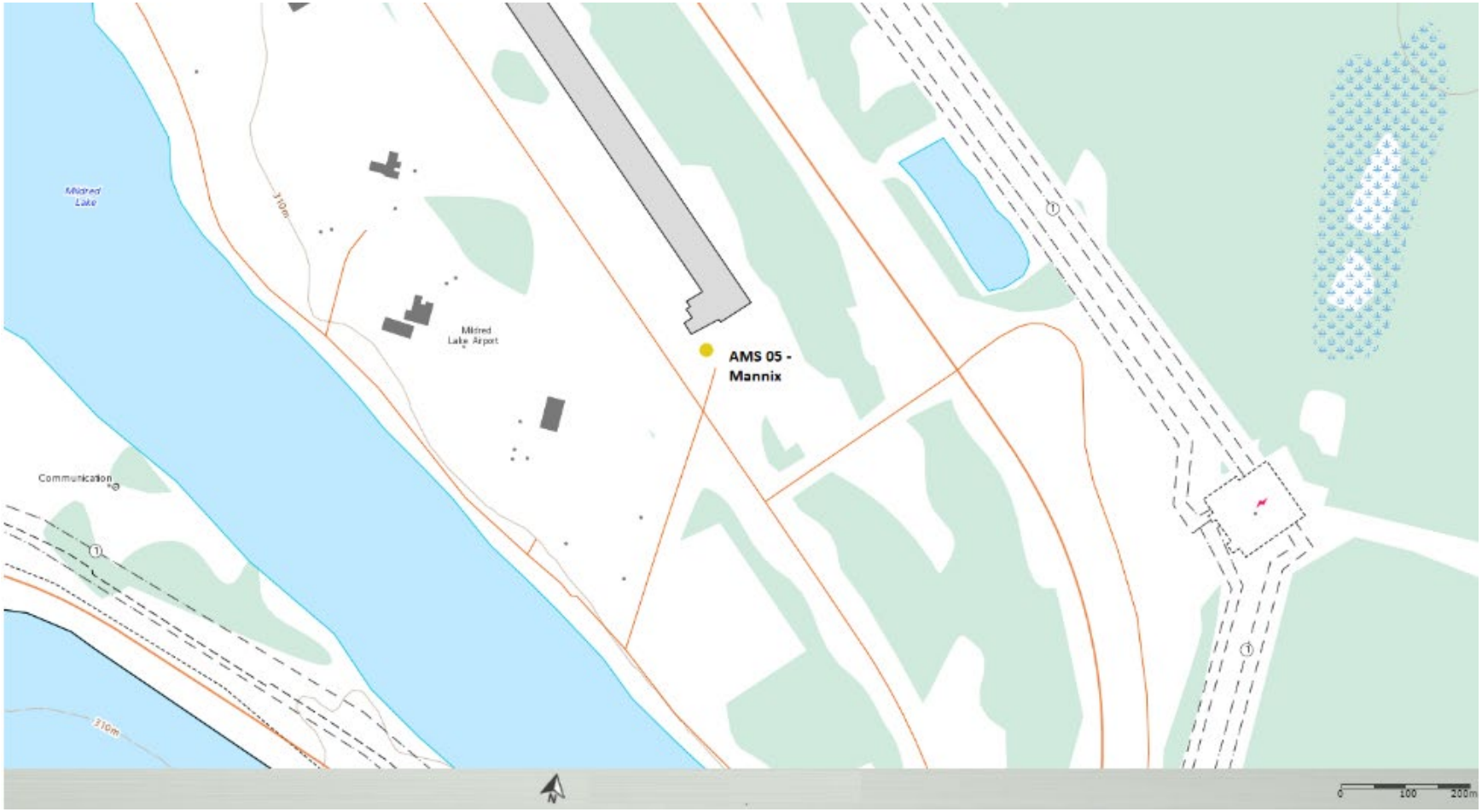

Figure 2.0 – Area topographic map showing AMS 05

Figure 3.0 – Aerial photo showing AMS 05

Figure 4.0 – Plan view sketch for AMS 05 site

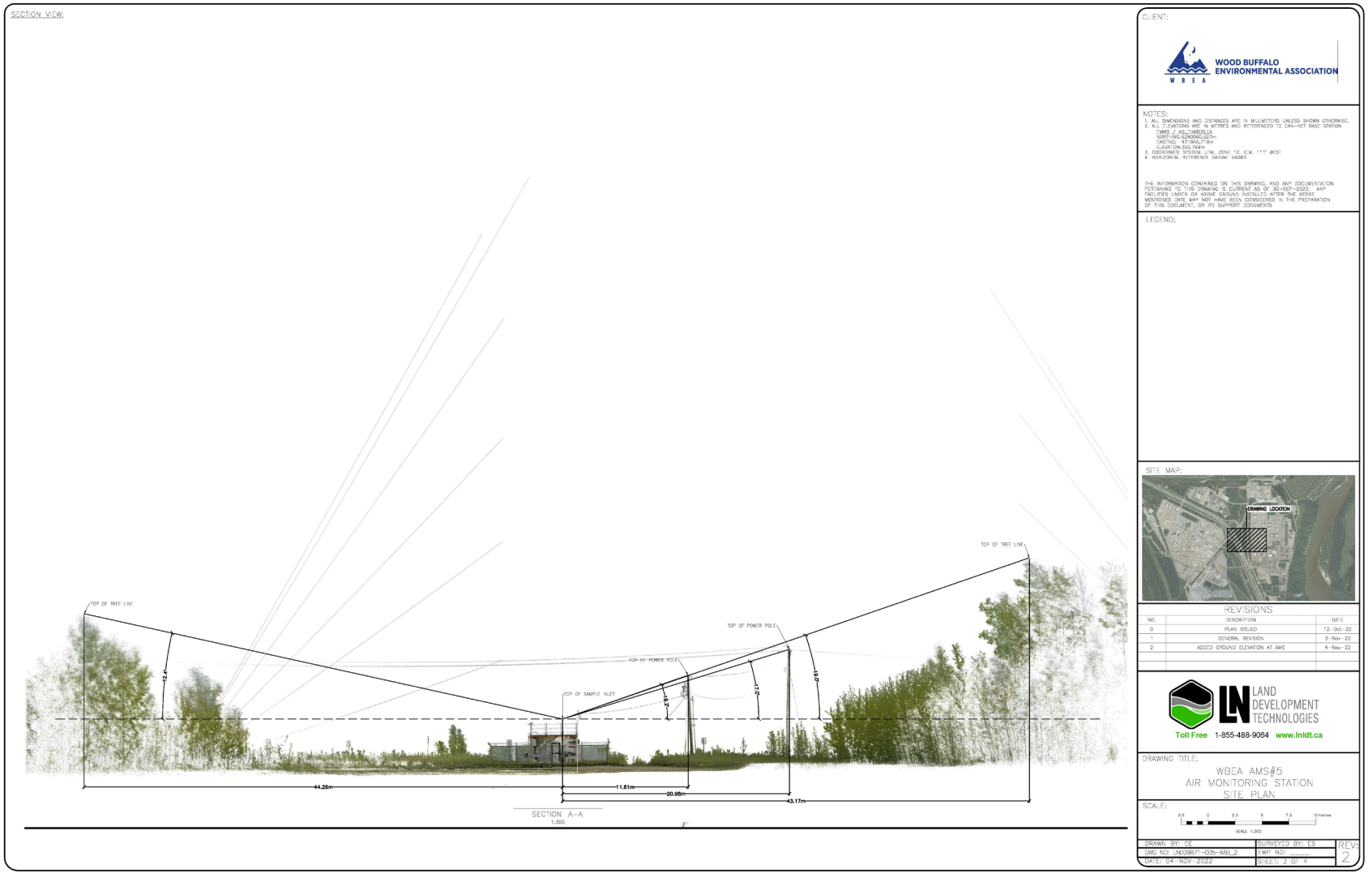

Figure 5.0 – Elevation view sketch for AMS 05 site

Site photos

The following photos show the environment surrounding the monitoring station.

Figure 6.0 – Environment looking North

Figure 6.1 – Environment looking East

Figure 6.2 – Environment looking South

Figure 6.3 – Environment looking West

Figure 6.4 – Meteorological Tower

Station Photos

The following photos show the monitoring station and instrumentation.

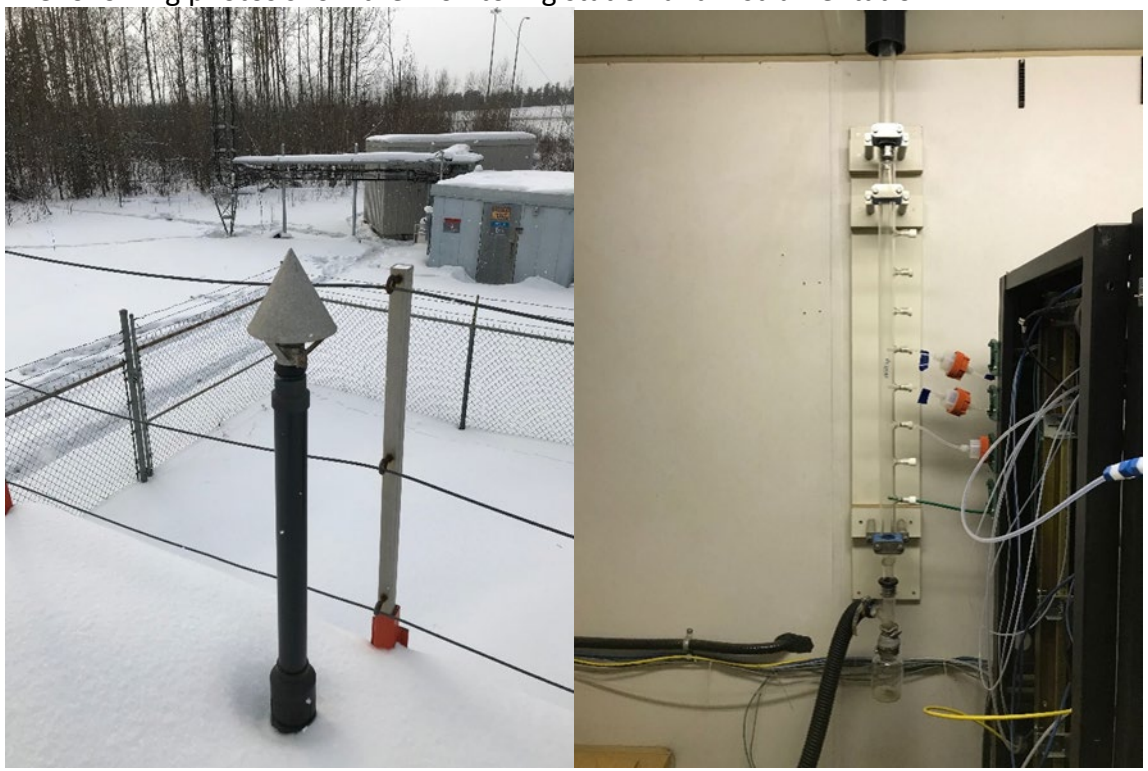

Figure 7.0 – Photo showing the inlet and sample manifold

Figure 7.1 – Curb shot of the monitoring station

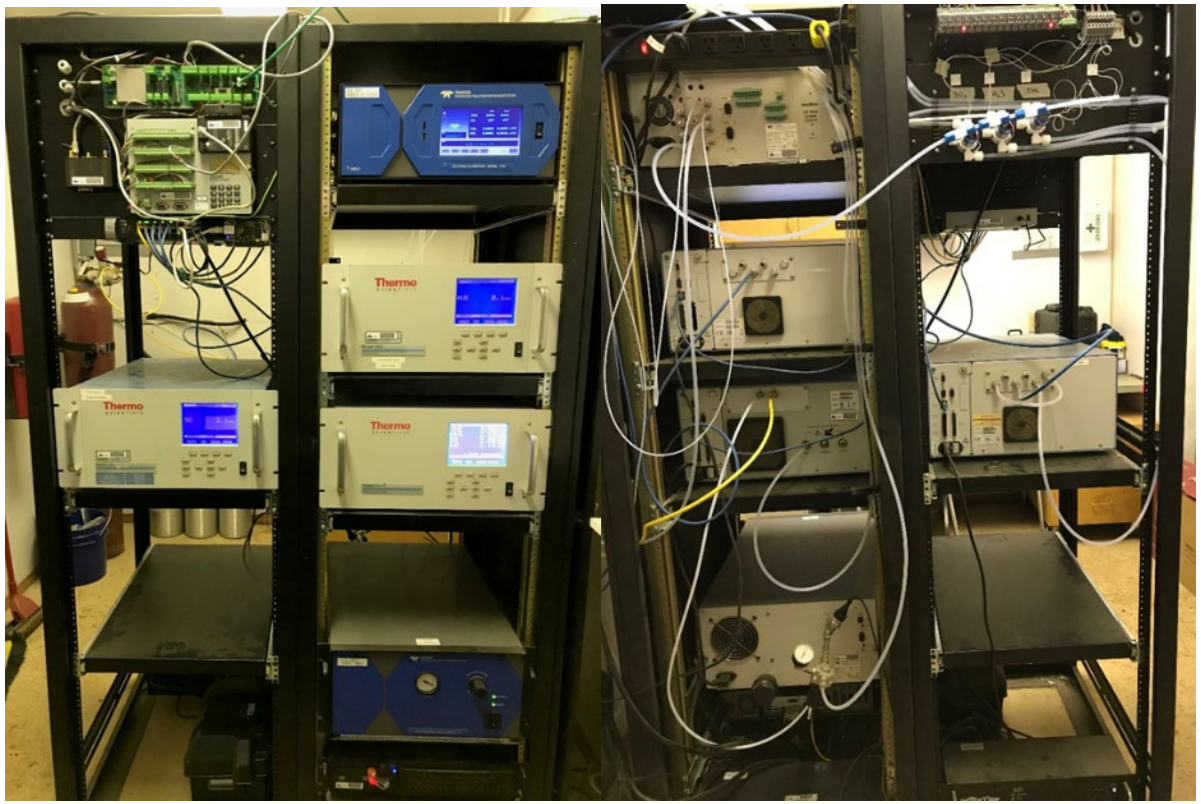

Figure 7.2 –Photo of the front and the back of instrument rack

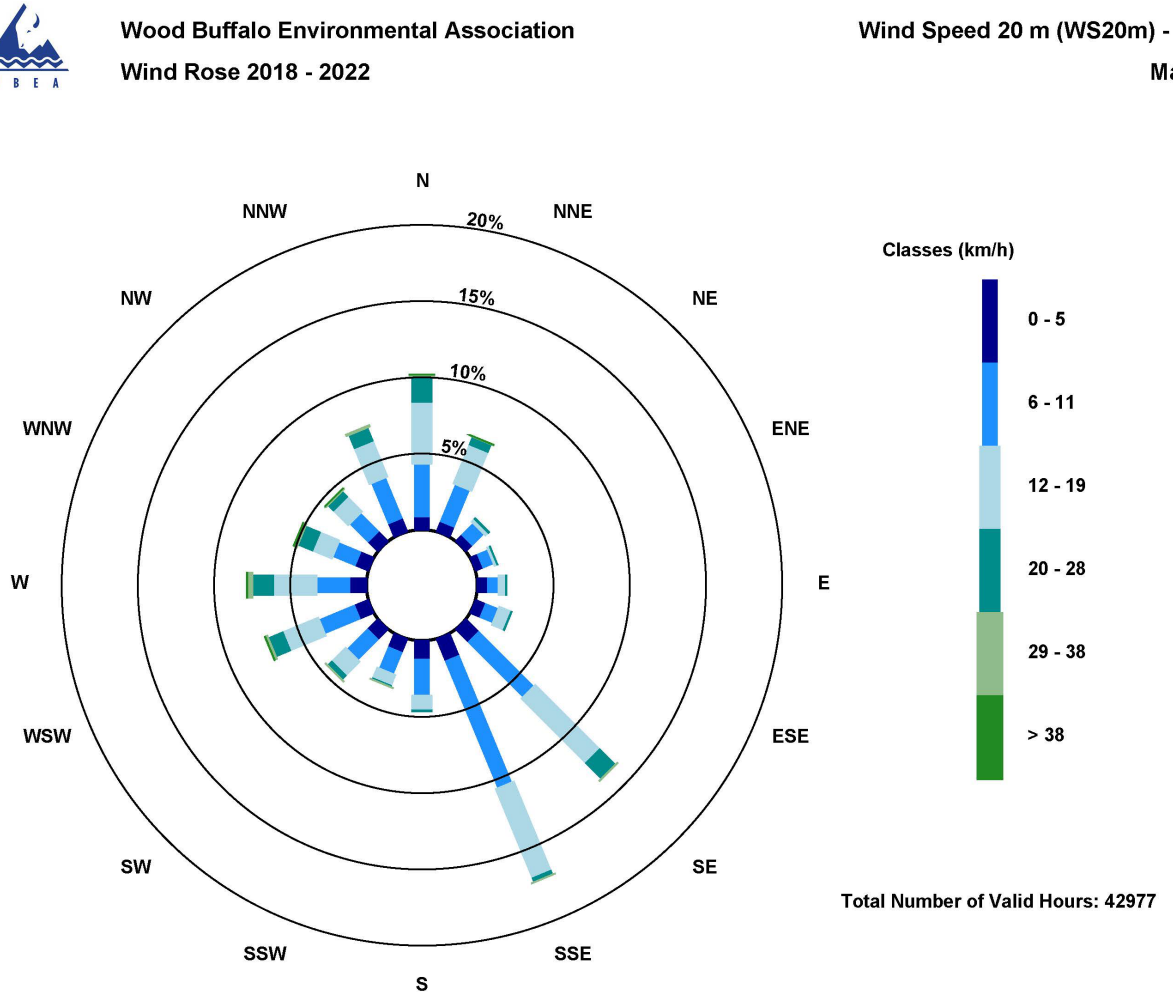

Figure 8.0 – Windrose 20 metres (2018-2022)

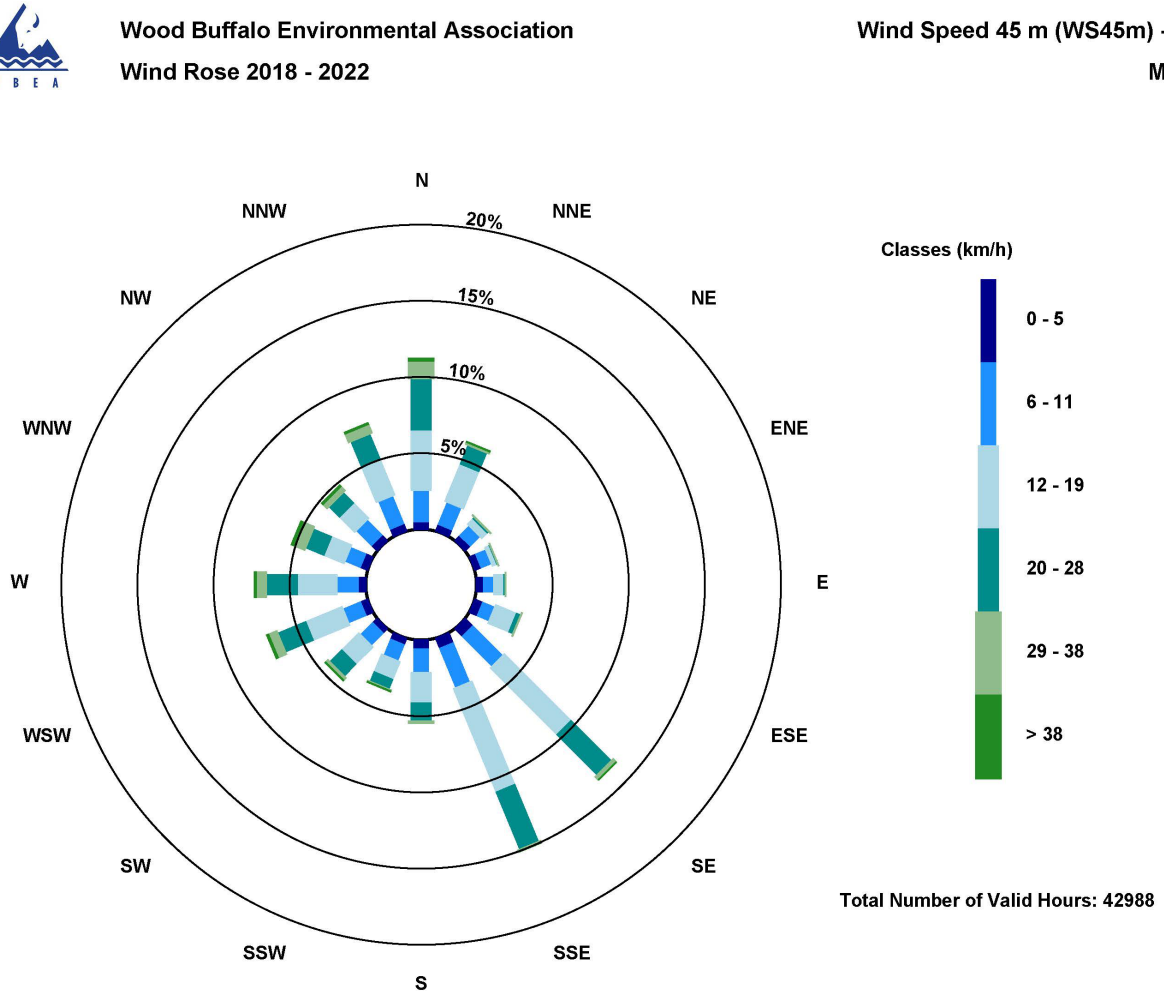

Figure 8.1 – Windrose 45 metres (2018-2022)

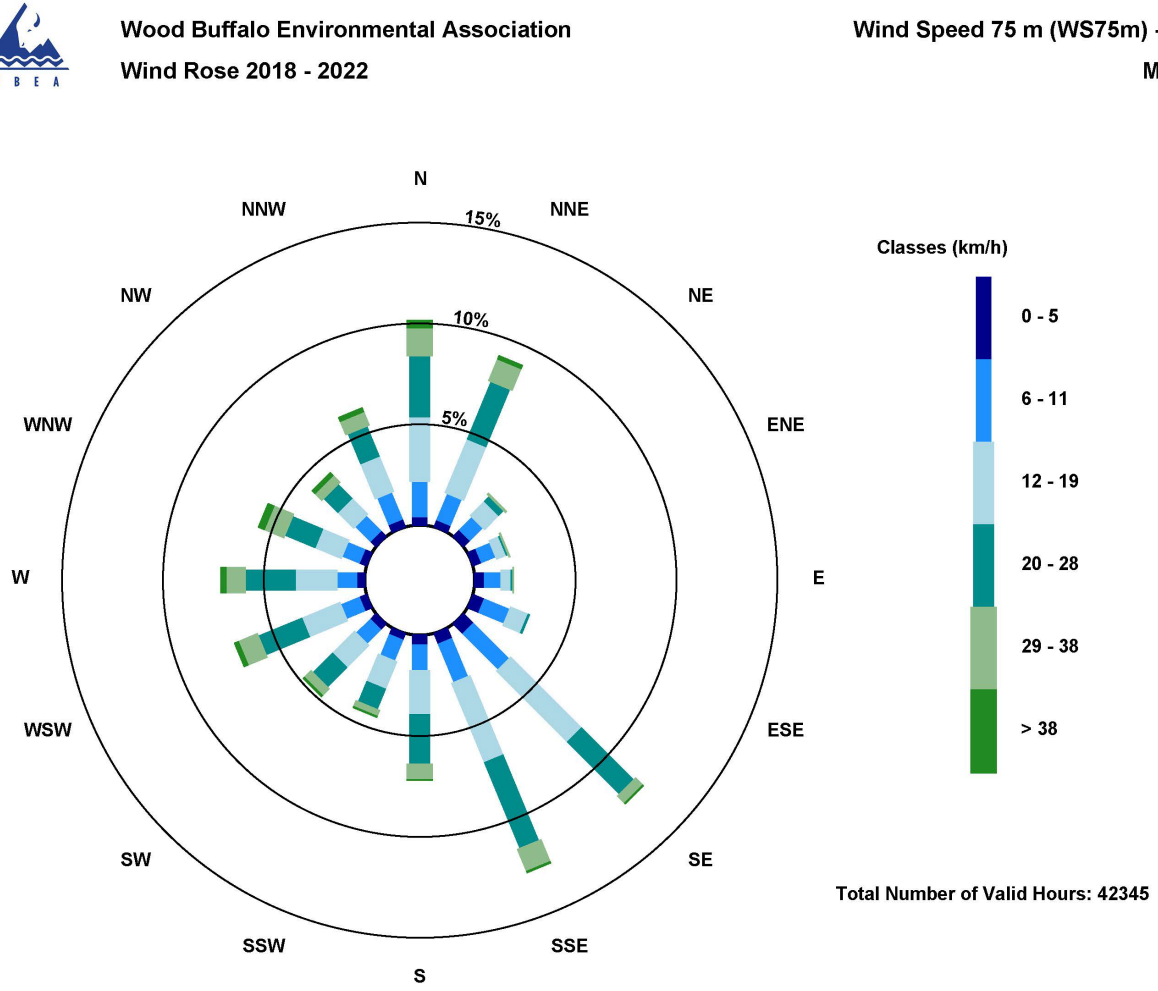

Figure 8.2 – Windrose 75 metres (2018-2022)

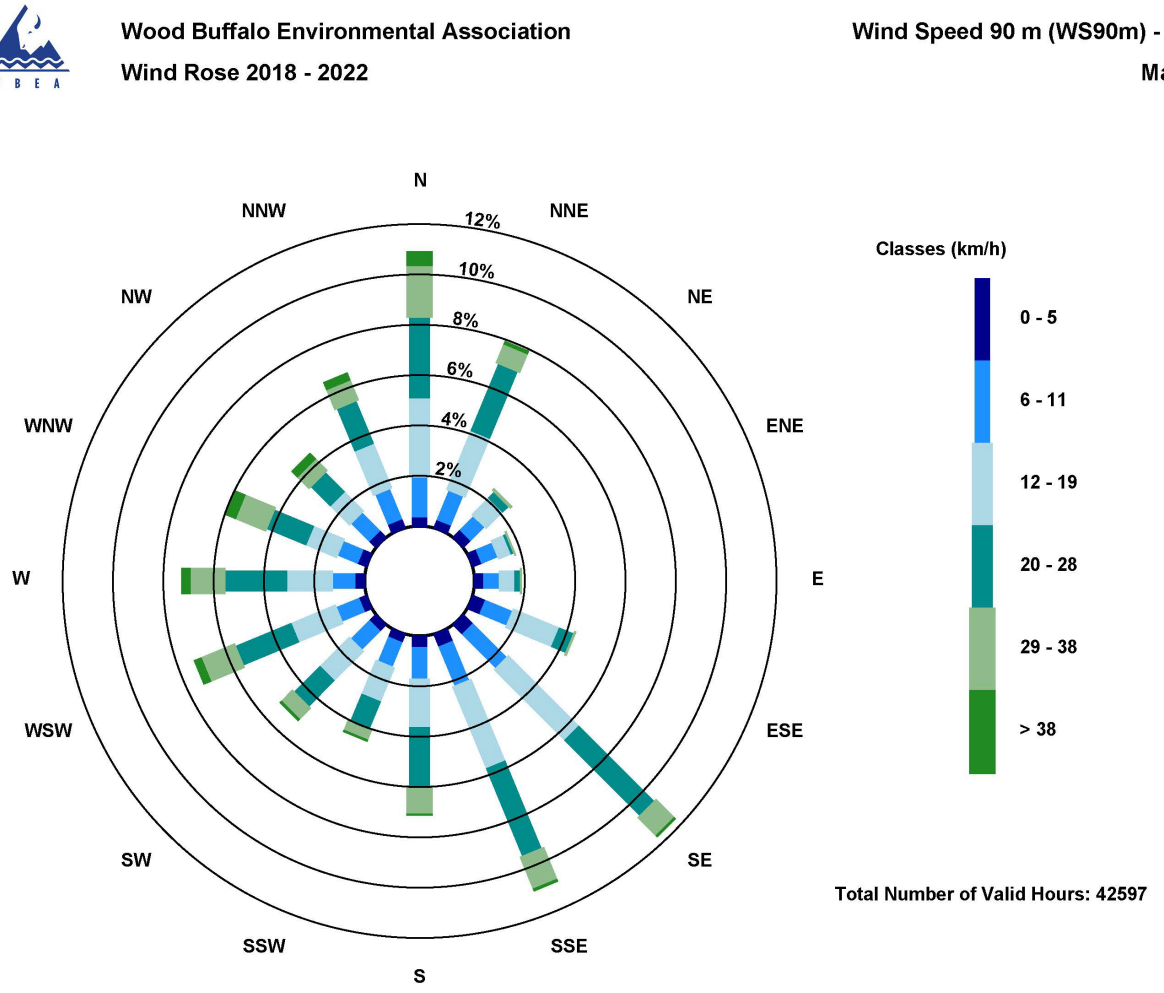

Figure 8.3 – Windrose 90 metres (2018-2022)