

Wood Buffalo Environmental Association  
**Ambient Air Monitoring Station**  
**Site Documentation**

Jackfish 2/3

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## WBEA Monitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include Sulphur Dioxide (SO<sub>2</sub>), Hydrogen Sulfide (H<sub>2</sub>S), Total Reduced Sulphur (TRS), Ozone (O<sub>3</sub>), Total Oxides of Nitrogen (NO<sub>x</sub>), Nitric Oxide (NO), Nitrogen Dioxide (NO<sub>2</sub>), Ammonia (NH<sub>3</sub>), Carbon Monoxide (CO), Carbon Dioxide (CO<sub>2</sub>), Particulate Matter less than 2.5µm (PM<sub>2.5</sub>), Total Suspended Particulates (TSP), Total Hydrocarbon (THC), Total and Non-Methane Hydrocarbon (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 five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, WS, WD, AT, RH. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. In 2015, the WBEA moved to duplicate sampling for the PM<sub>10</sub> and PM<sub>2.5</sub> 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 here site. These samples are collected every Tuesday at 12:00

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 hydrogen sulphide (H<sub>2</sub>S), total reduced sulphur (TRS), sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), total hydrocarbons (THC), methane (CH<sub>4</sub>), non-methane hydrocarbons (NMHC), ammonia (NH<sub>3</sub>), carbon monoxide (CO), and carbon dioxide (CO<sub>2</sub>). Sites are categorized as industrial or community, based on the setting in which they are located.

WBEA ID	TYPE	STATION NAME	SO <sub>2</sub>	NO <sub>2</sub>	O <sub>3</sub>	PM <sub>2.5</sub>	TRS	H <sub>2</sub> S	THC	NMHC	CO	CO <sub>2</sub>	NH <sub>3</sub>
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/METEOROLOGICAL	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	
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, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness

WBEA ID	TYPE	STATION NAME	Temperature	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/METEOROLOGICAL	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				
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<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10 µm aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

WBEA ID	TYPE	STATION NAME	VOC	PM <sub>2.5</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PAH	PRECIP
					ECOC			
1	COMMUNITY	BERTHA GANTER-FORT MCKAY	X	X	X	X	X	X
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X	
7	COMMUNITY	ATHABASCA VALLEY	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	
17	COMPLIANCE	WAPASU			X			X
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN			X			X
21	COMMUNITY	CONKLIN	X	X		X	X	
22	COMMUNITY	JANVIER	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



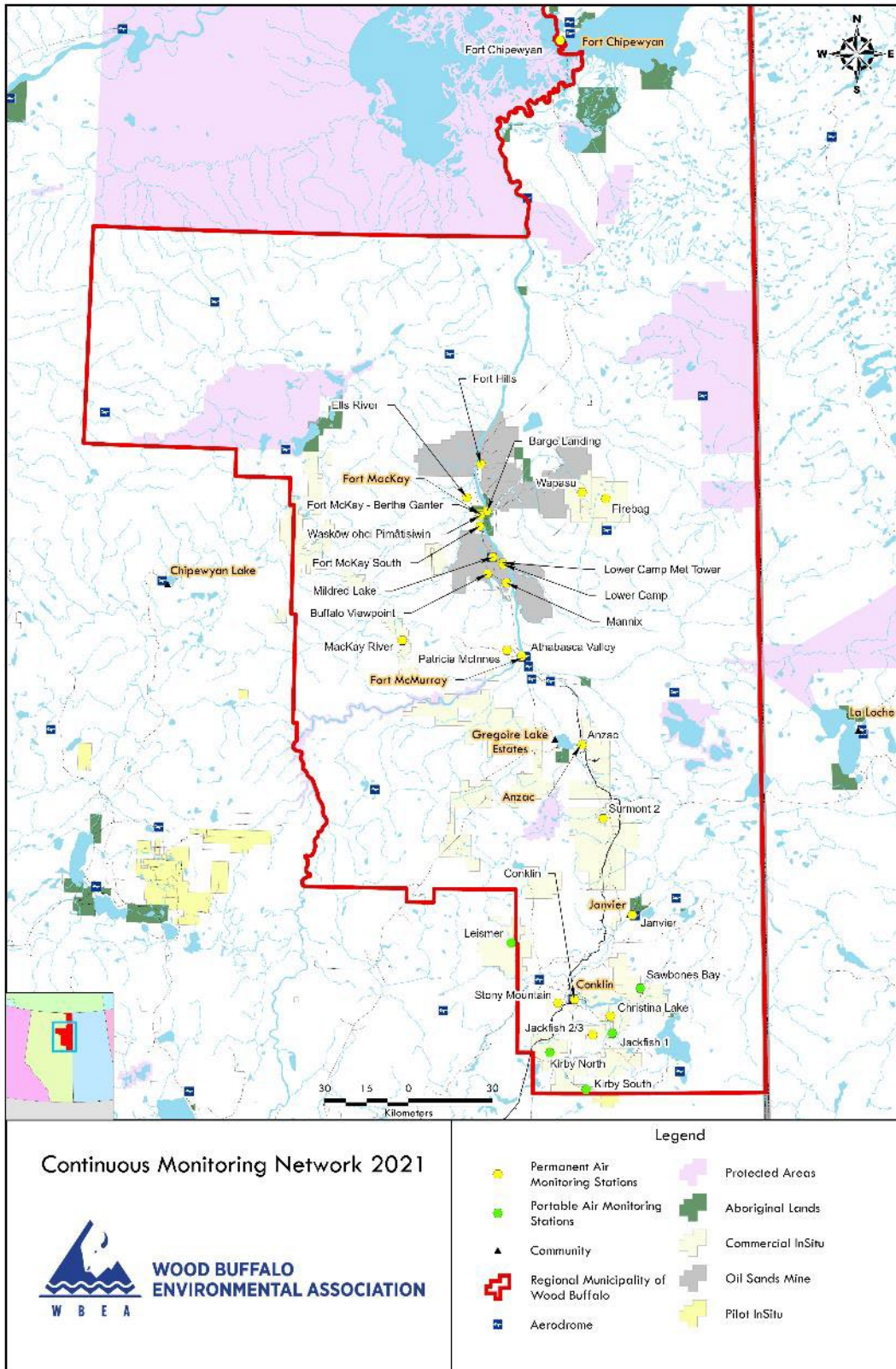


Figure 1.0 – WBEA Network Monitoring Sites





## General Site Information

### Station

Station ID	AMS 27
Station name	Jackfish 2/3
Date station established	Sep 15, 2018

### Location

Station street address	Located SE of CNRL Jackfish Lodge, left side of the road right after CNRL Energy Plant
Legal land description	15-23-75-7-W4
Airshed Zone	Wood Buffalo Environmental Association
Latitude	55.51870937
Longitude	-110.9759839
UTM East	501516
UTM North	6152516
Elevation	679
Nearest community	Conklin
Community population	154
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	Canadian Natural Resources Limited
Approval number	224816-00-00
Contact Name	Lauri Louis - Environment EHS Supervisor
Address	2100, 855 - 2 Street S.W. Calgary, AB T2P 4J8
Phone number	403-693-1622
Email address	Lauri.Louie@cnrl.com

### Site Description

Land use by sector	0 – 90 degrees	SAGD Operations
	91 – 180 degrees	SAGD Operations
	181 – 270 degrees	SAGD Operations
	271 – 360 degrees	SAGD Operations
Site elevation (m) (above sea level)	670 m	
Angle of elevation to nearby buildings	Greatest angle	23 degrees
	Building direction	South
Airflow restrictions	North	None



	East	None
	South	None
	West	None
Distance to nearest trees (m)	North	40
	East	45
	West	45
	South	45
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
Meteorological Sensors	Type	Cup and vane
	Height above ground (m)	10 m
	Distance from station (m)	0 m

### Site Influences

#### Localized Sources (within 20 metres of station)

Type	Distance (m)	Description

### Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Dirt/Gravel	Medium	100	Used by site workers

### Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Devon Energy	SAGD Plant		1	NW
Devon Energy	SAGD Plant		2	E



## Station Equipment

Equipment Owner: Canadian Natural Resources Ltd.

### Analytical Equipment

Parameter	Make	Model	Serial Number	Year Installed
SO <sub>2</sub>	Teledyne/API	43iQ-ANN	12124313138	2022
H <sub>2</sub> S	Teledyne/API	T101	621	2018
NO <sub>2</sub>	Teledyne/API	T200	4460	2018

### Meteorological Equipment

Parameter	Make	Model	Serial Number	WMO Site Class	Year Installed
AT/RH	Vaisala	HMP155	N2910512	Class 3	2018
WS	Met One	010C-1	X16480	Class 4	2018
WD	Met One	020C-1	X16496	Class 4	2018

### Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	12310
Gas Dilution Calibrator	Dynamic dilution calibrator	Teledyne/API	T700	3811
Zero air generator	Zero Air Generator	Teledyne/API	701	364
Shelter / Building	Air monitoring portable	ITB	ITB-18-17684	17684-1
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	NA



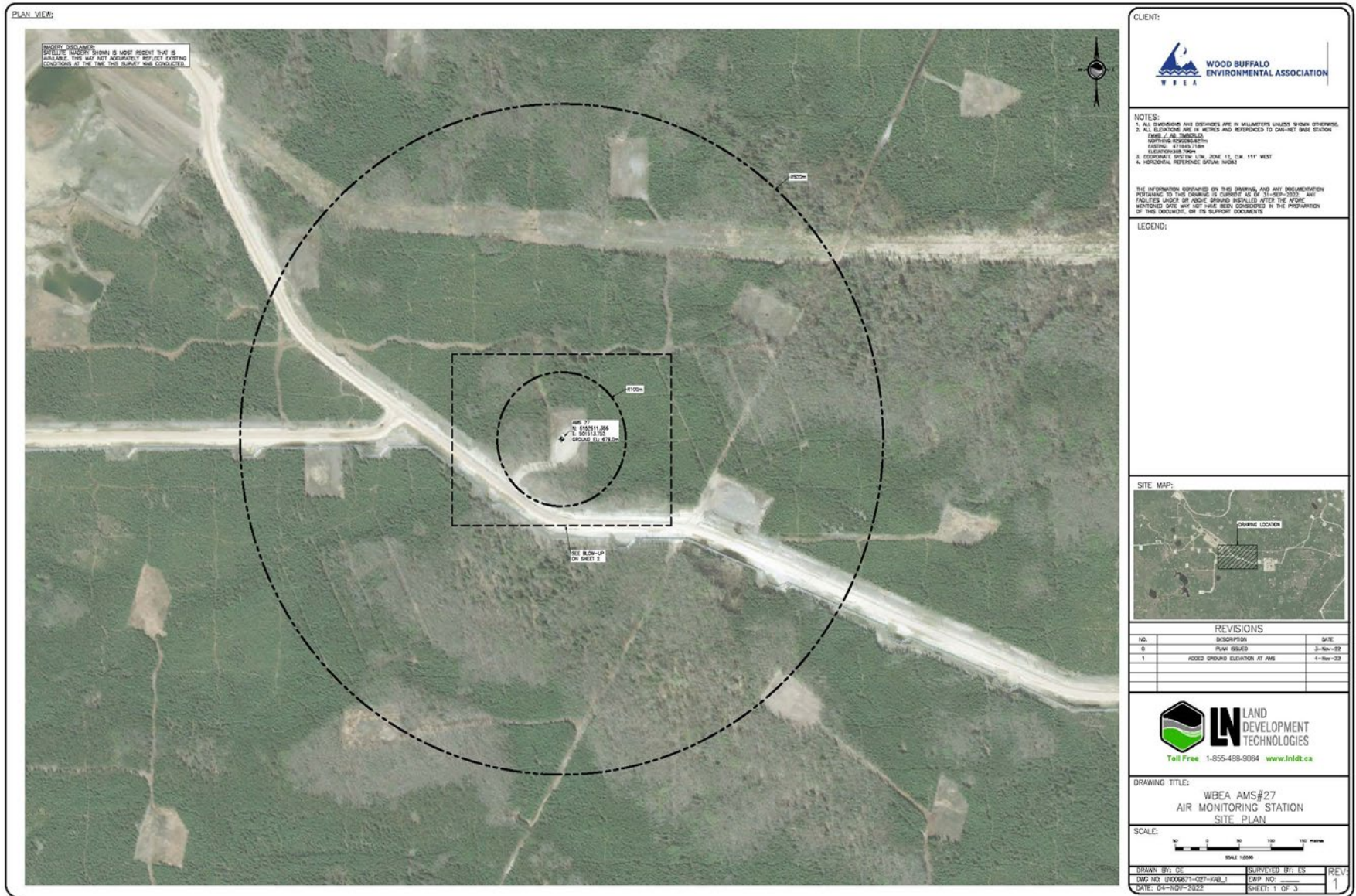


Figure 2.0 – Area Topographic map showing AMS 27



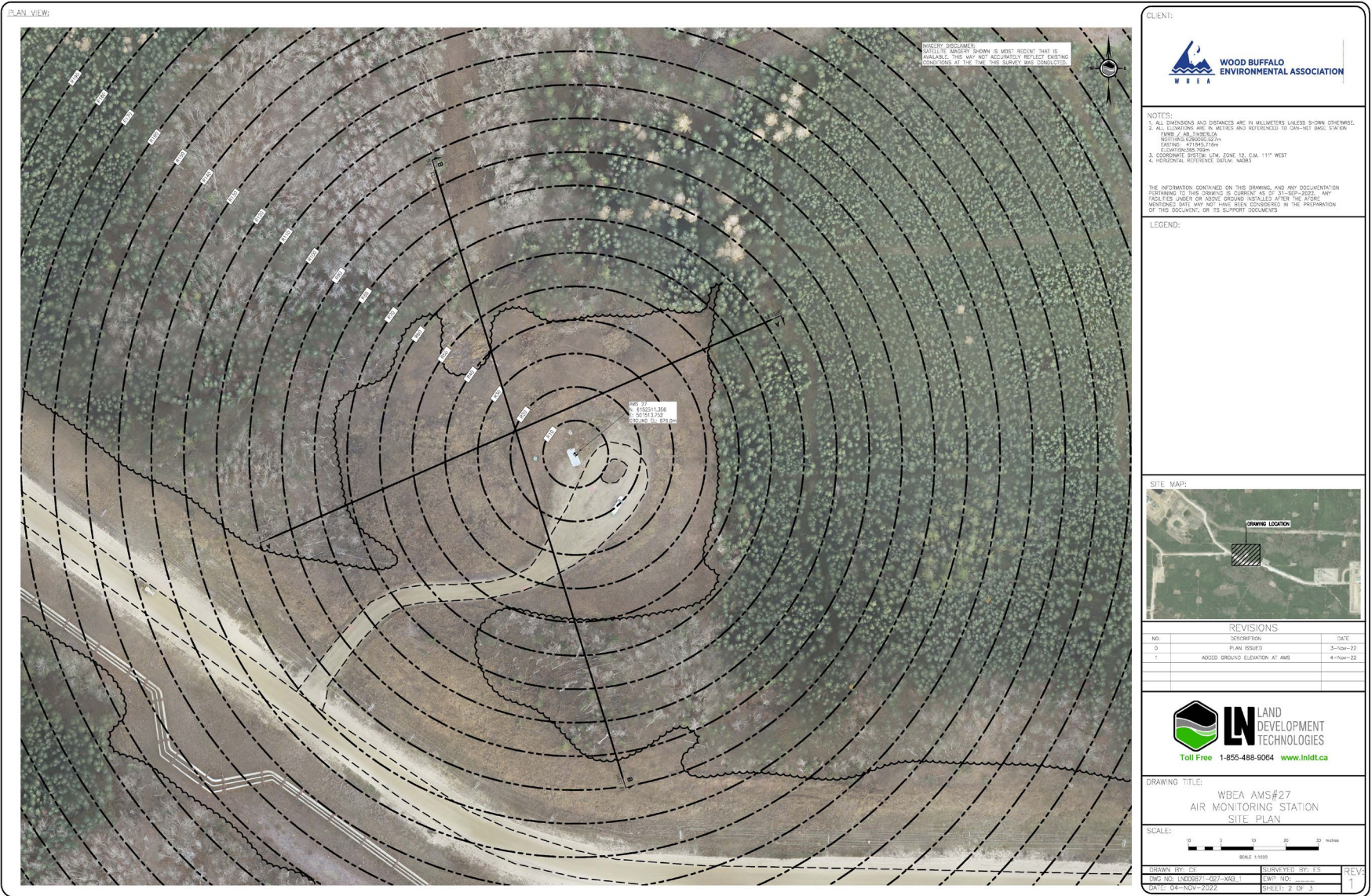


Figure 3.0 – Aerial photo showing AMS 27



Station Name: AMS 27 - Jackfish 2/3

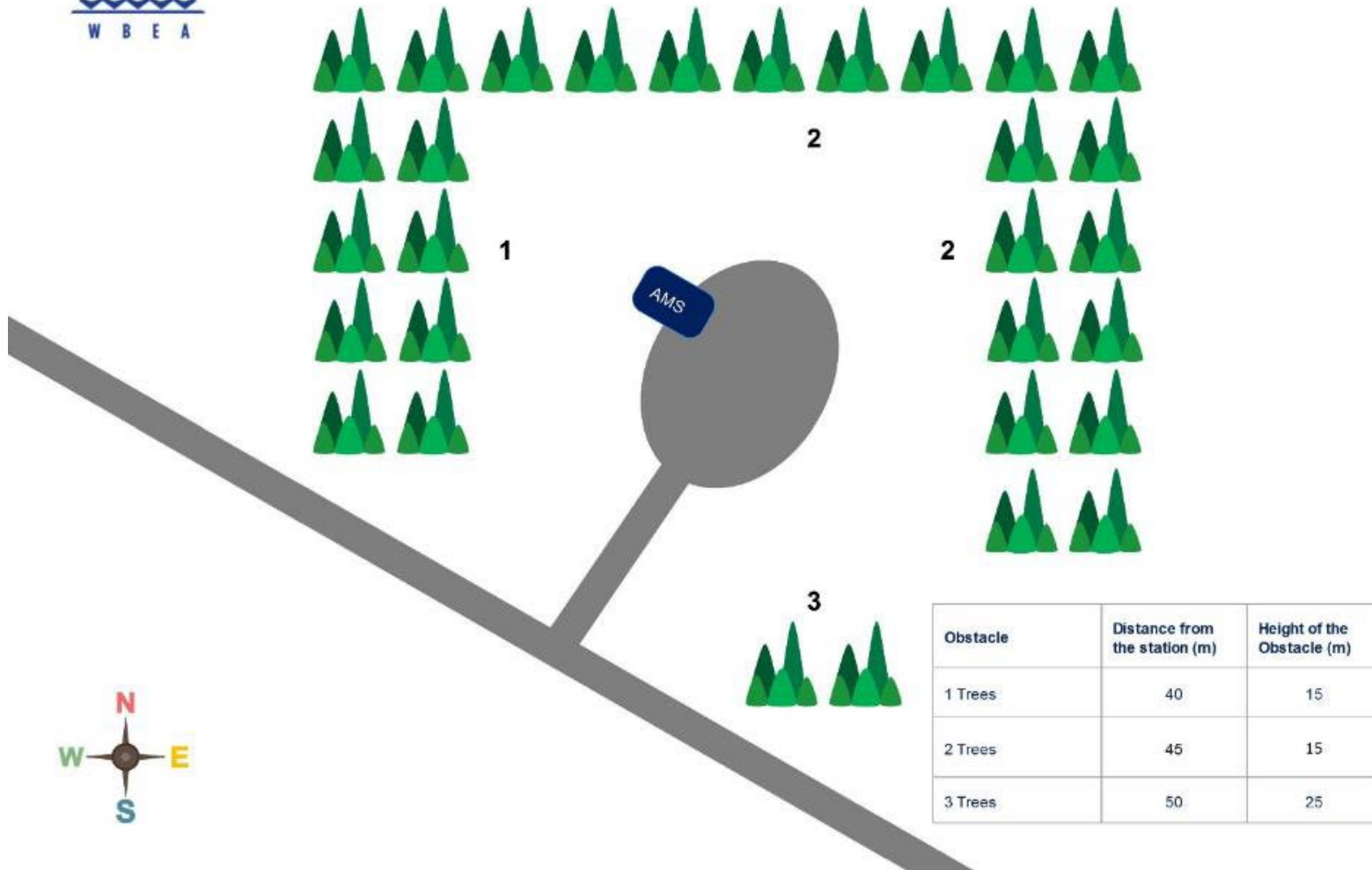
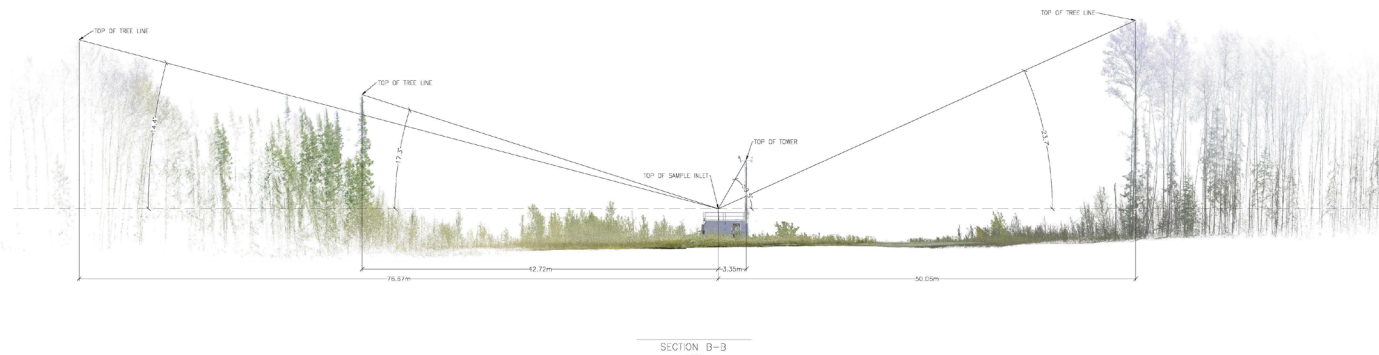
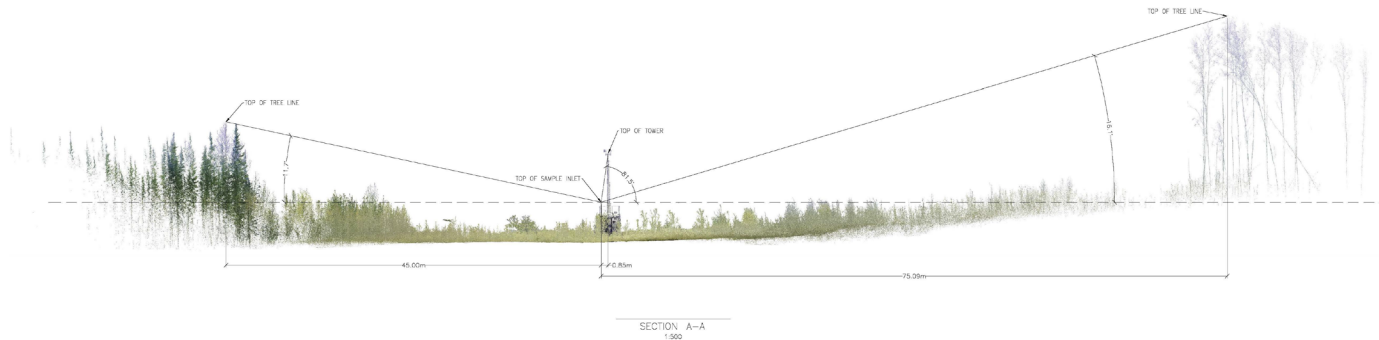


Figure 4.0 – Plan view sketch for AMS 27 – Jackfish 2/3



SECTION VIEW:



CLIENT:



NOTES:

1. ALL DIMENSIONS AND DISTANCES ARE IN MILLIMETERS UNLESS SHOWN OTHERWISE.
2. ALL ELEVATIONS ARE IN METERS AND REFERENCED TO CAN-MET BASE STATION.
3. PROJECT: WBEA AMS#27
4. DRAWING: SITE PLAN
5. ELEVATION: 365.70m
6. COORDINATE SYSTEM: UTM, ZONE 13, UTM, 11° WEST
7. HORIZONTAL REFERENCE DATUM: NAD83

THE INFORMATION CONTAINED ON THIS DRAWING AND ANY DOCUMENTATION PERTAINING TO THIS DRAWING IS CURRENT AS OF 31-SEP-2022. ANY FACILITIES, UNLESS OR ABOVE GROUND INSTALLED AFTER THE DATE MENTIONED MAY NOT HAVE BEEN CONSIDERED IN THE PREPARATION OF THIS DOCUMENT, OR ITS SUPPORT DOCUMENTS.

LEGEND:

SITE MAP:



REVISIONS

NO.	DESCRIPTION	DATE
0	PLAN ISSUED	3-Nov-22
1	ADDED GROUND ELEVATION AT AMS	4-Nov-22



DRAWING TITLE:

WBEA AMS#27  
AIR MONITORING STATION  
SITE PLAN

SCALE:

DRAWN BY	DATE	SUBMITTED BY	DATE	REV.
MD	NOV-2022	MD	NOV-2022	1

Figure 5.0 – Cross-Sectional Elevation Drawing of AMS 27

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



Wood Buffalo Environmental Association  
Wind Rose 2018 - 2022

Wind Speed (WS) - km/h  
Jackfish 2/3

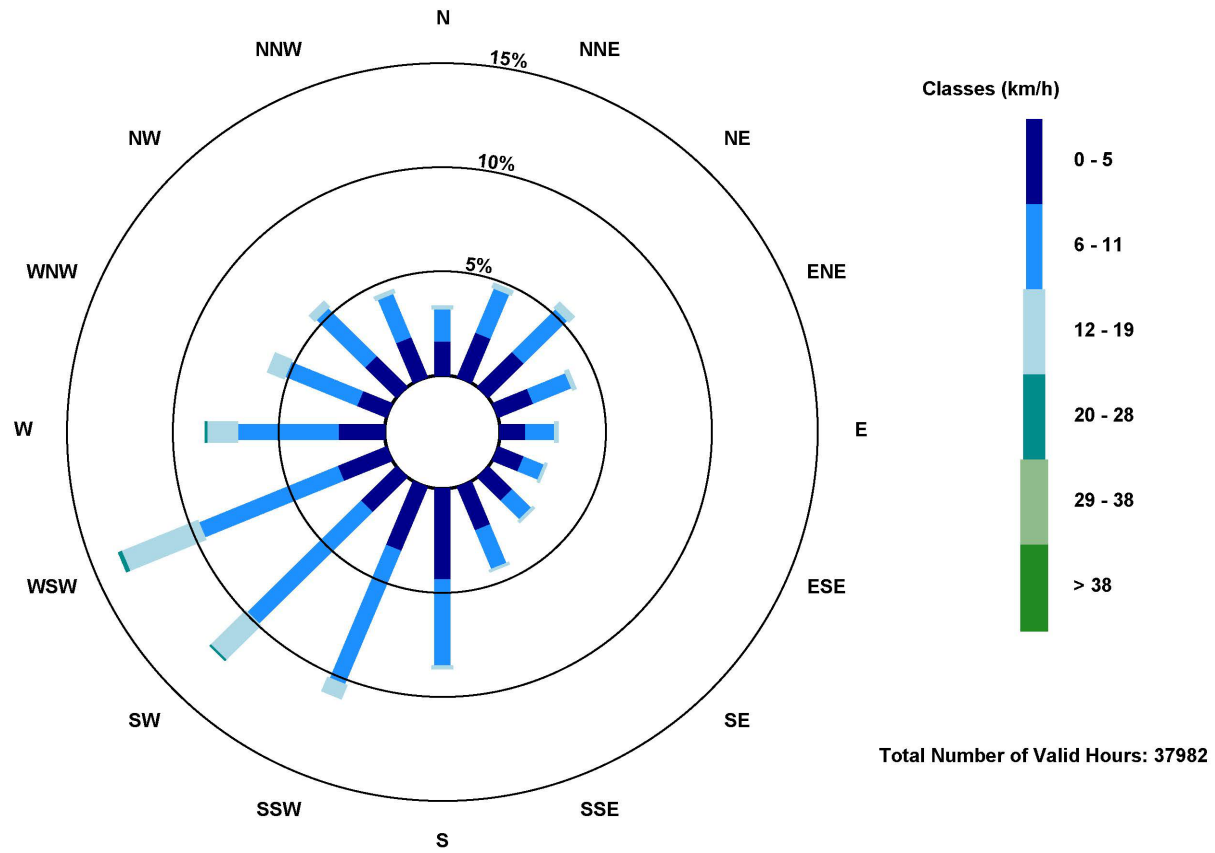


Figure 8.0 – Windrose