Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Jackfish 2/3

LAST UPDATED: FEBRUARY 5, 2021

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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 SO_2, H_2S, TRS, O_3, NO_X, NO, NO_2, NH_3, CO, CO_2, $PM_{2.5}$, THC, NMHC, and CH_4. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. 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_2, H_2S, NO_X, NO, NO_2, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as $PM_{2.5}$. 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 $PM_{2.5}$, PM_{10}, 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. 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 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_2S), total reduced sulphur (TRS), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), total hydrocarbons (THC), methane (CH_4), non-methane hydrocarbons (NMHC), ammonia (NH_3), carbon monoxide (CO), and carbon dioxide (CO_2). Sites are categorized as industrial or community, based on the setting in which they are located.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_x$	O_3	$PM_{2.5}$	TRS	H_2S	THC	Methane / NMHC	CO	CO_2	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY	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	
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			
501	COMPLIANCE	LEISMER	X	X				X	X				
505	COMPLIANCE	SAWBONES BAY	X	X				X	X				
506	COMPLIANCE	JACKFISH 1	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	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Radiation	Precipitation	Leaf Wetness
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				
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				
501	COMPLIANCE	LEISMER	X	X		X	X				
505	COMPLIANCE	SAWBONES BAY	X	X		X	X				
506	COMPLIANCE	JACKFISH 1	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), and precipitation samples.

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	PM2.5 Mass, ECOC	PM_{10} Mass, Metals and Ions	PAH	PRECIP
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	
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	
30	COMPLIANCE	ELLS RIVER	X			X		

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

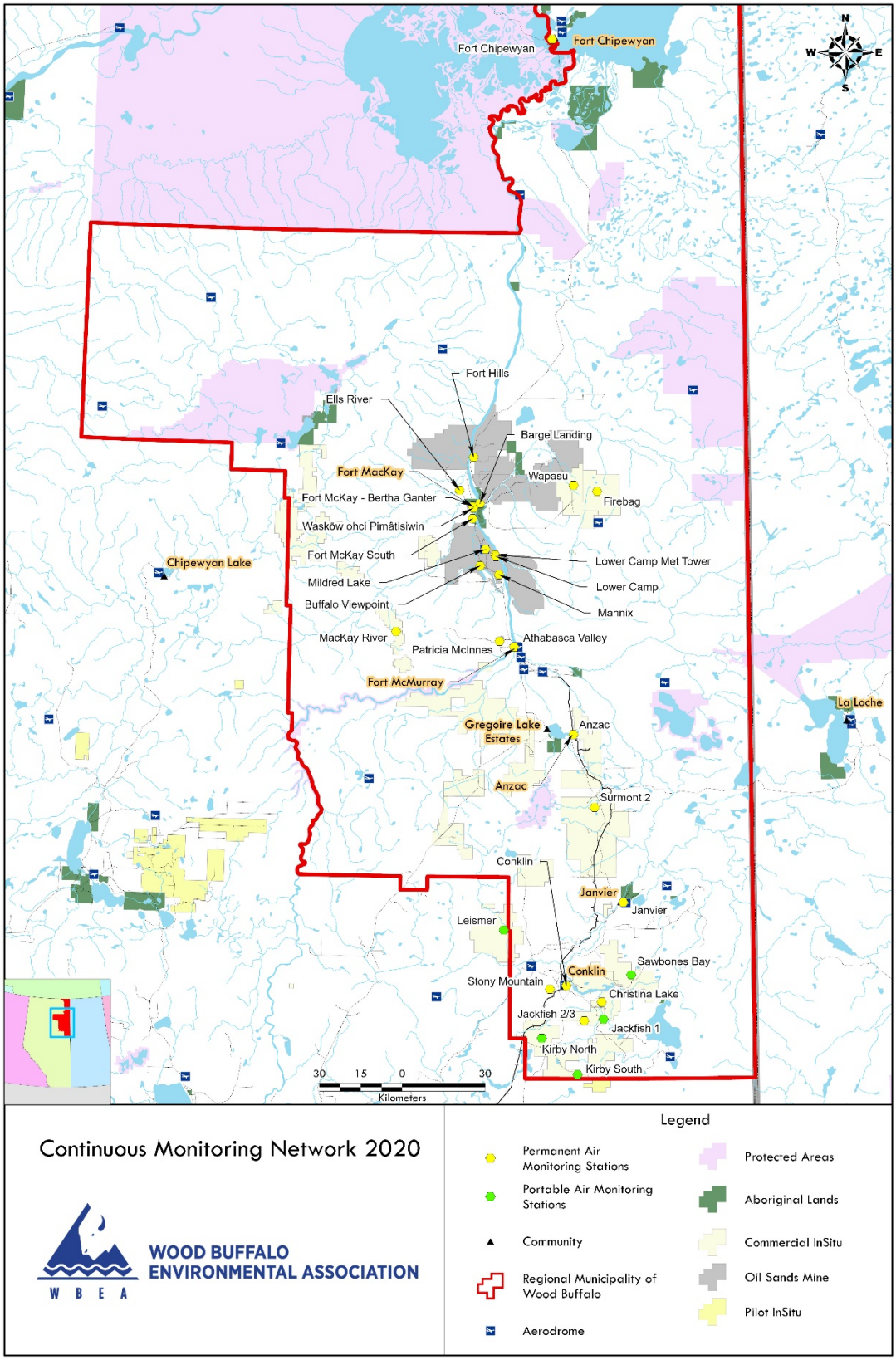


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 27
Station name	Jackfish
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
Latitude	55.518694
Longitude	-110.976000
UTM East	501515.38
UTM North	6152513.90
Nearest community	Conklin
Community population	185

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
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 (above sea level)	670m	
Angle of elevation to nearby buildings	Greatest angle	23 degrees
	Trees direction	South
Airflow restrictions	North	No
	East	No
	South	No
	West	No
Sample manifold	Type	All glass
	Inlet height above roof	1 meter

Meteorological Sensors	Type	Cup and vane
	Height above ground	10m
	Distance from station	7m

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

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Teledyne/API	T100	4007	Sep 15, 2018
Hydrogen Sulfide	WBEA	Teledyne/API	T101	621	Sep 15, 2018
Oxides of Nitrogen	WBEA	Teledyne/API	T200	4460	Sep 15, 2018
Temperature/RH	WBEA	Vaisala	HMP155	N2910512	Sep 15, 2018
Wind speed	WBEA	Met One	010C-1	X16480	Sep 15, 2018
Wind direction	WBEA	Met One	020C-1	X16496	Sep 15, 2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	12310
Zero air generator	Zero Air Generator	Teledyne/API	701	364
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	3253

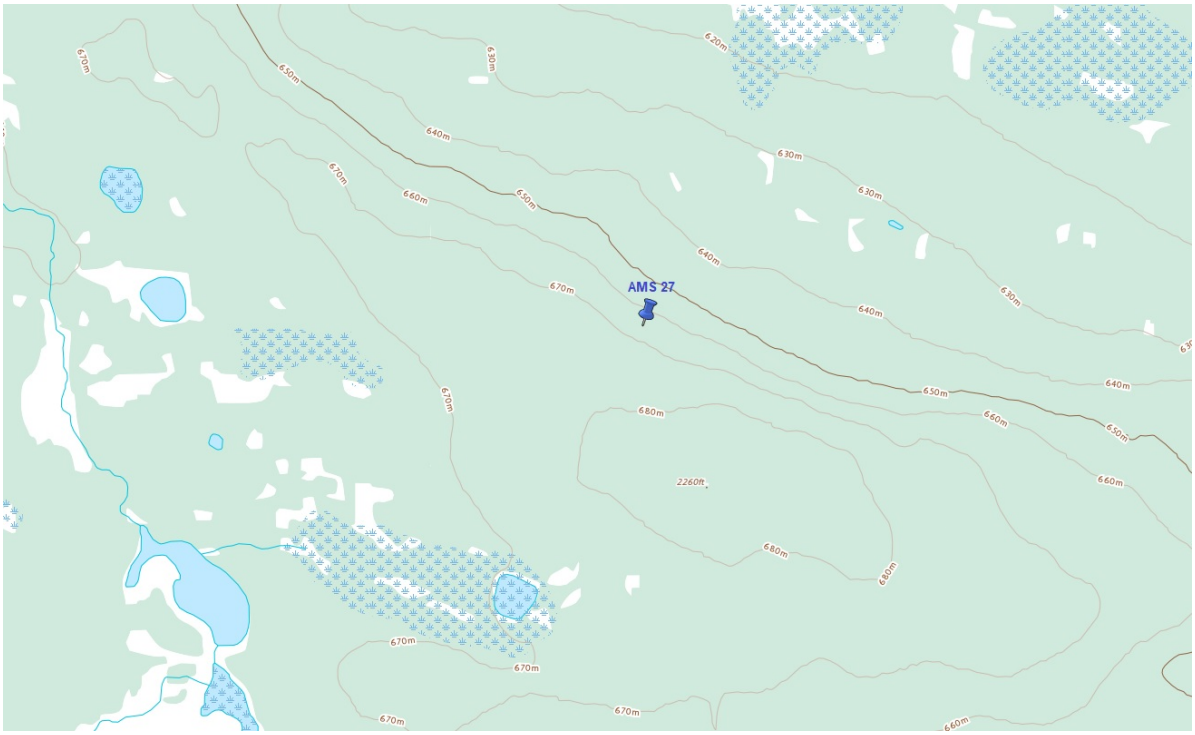
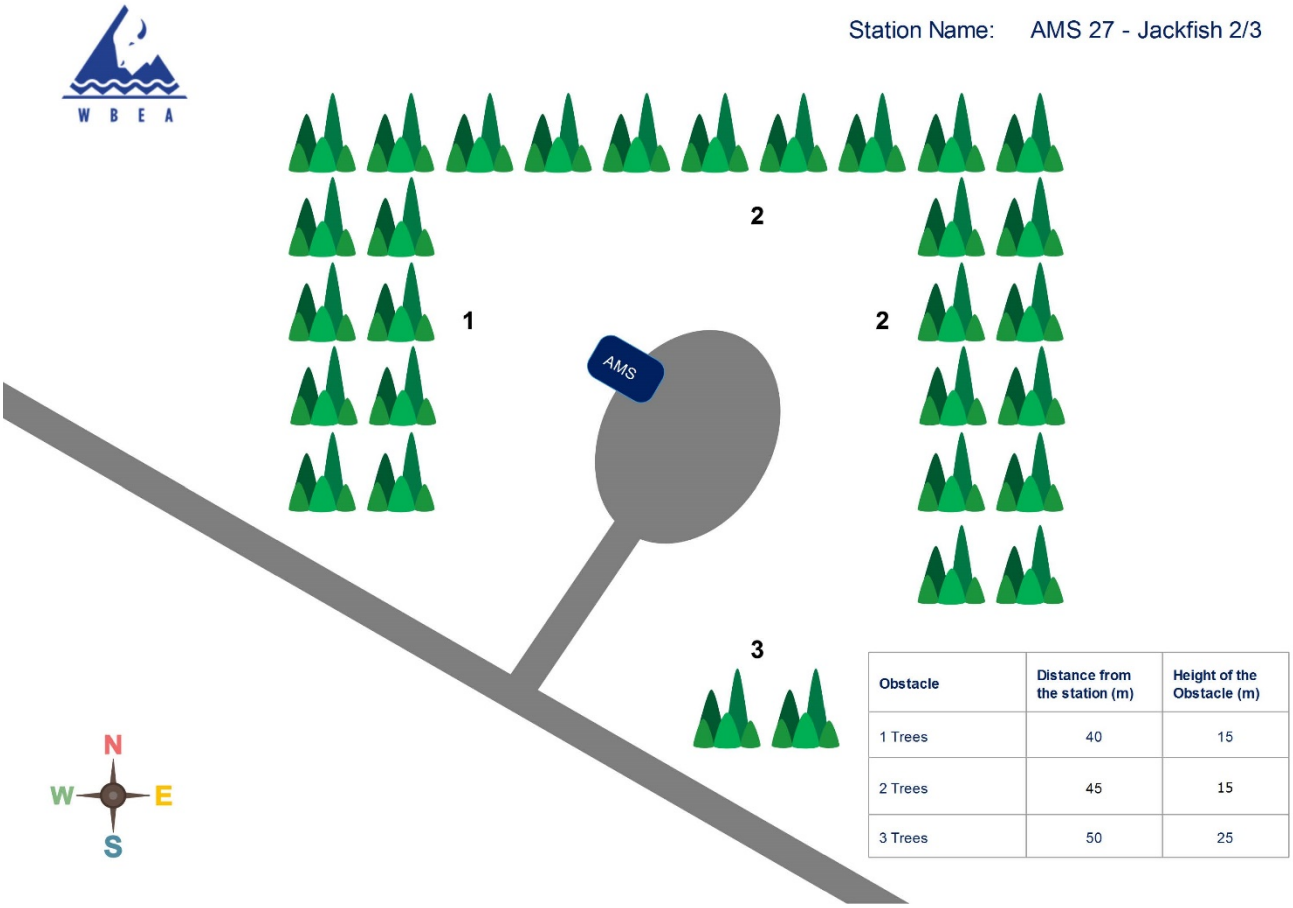


Figure 2.0 – Area Topographic map showing AMS 27



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Trees	40	15
2 Trees	45	15
3 Trees	50	25

Figure 3.0 – Plan view sketch for AMS 27 site

Figure 4.0 – Aerial photo showing AMS 27

Site photos

The following photos show the environment surrounding the monitoring station.

Figure 5.0 – Environ Looking North

Figure 5.1 – Environ Looking East

Figure 5.2 – Environ looking South

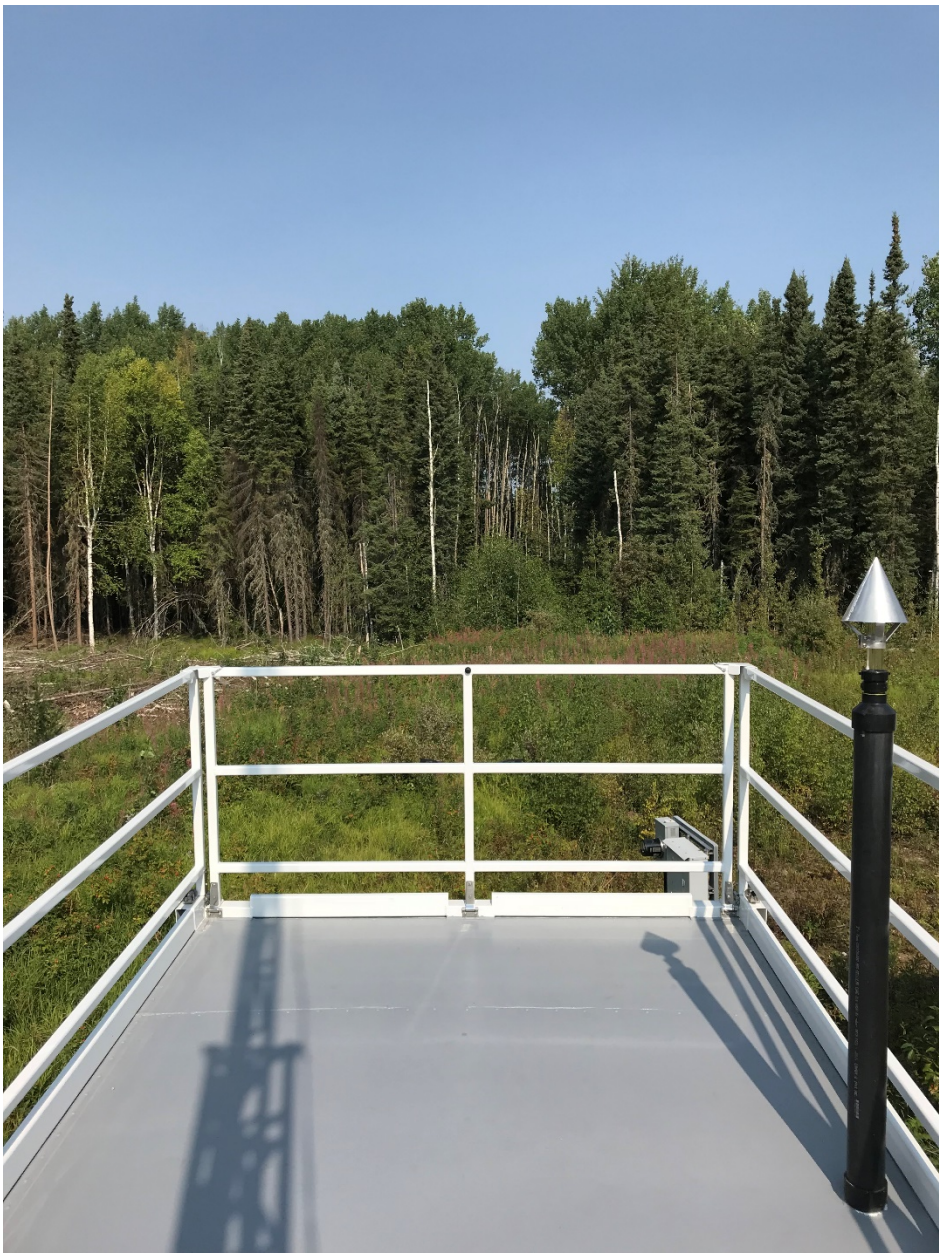


Figure 5.3 – Environ Looking West

Figure 5.4 – Meteorological Tower

Station Photos

The following photos show the monitoring station and instrumentation.

Figure 6.0 – Photo showing the inlet and sample manifold

Figure 6.1 – Curb shot of the monitoring station

Figure 6.2 –Photo of front and back of instrument rack

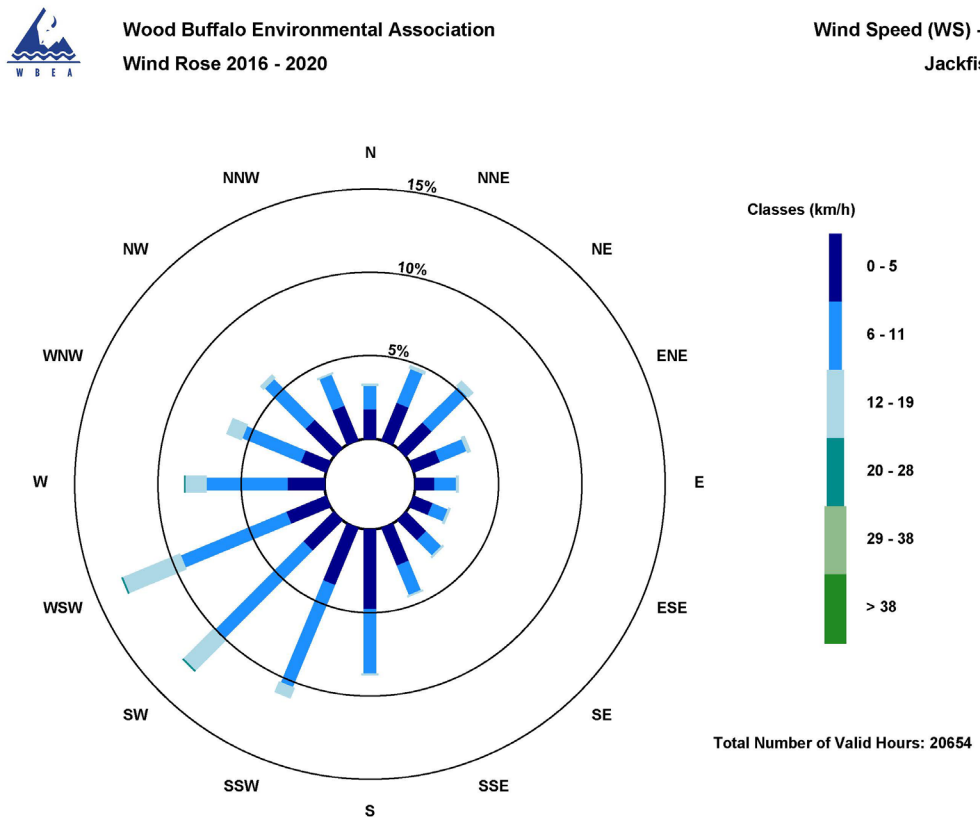


Figure 7.0 – Windrose (Five Year)